

Hydrology and Hydraulics

for

Building&Safety: jtyea

10/26/2022

Approval: Project Final Hydrology and Hydraulics

Permits: GRD21-0090

Dana Point Harbor

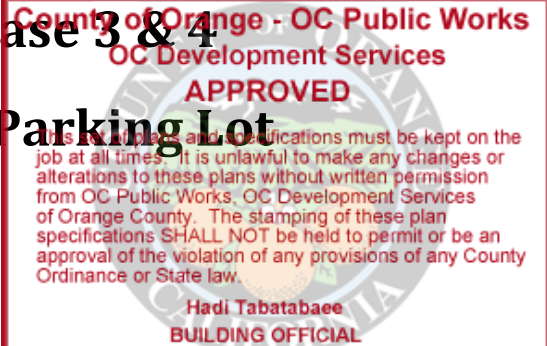
Commercial Core Area Phase 3 & 4

Bldgs 6 to 12 and Northern Parking Lot

GRD21-0090

Dana Point, California

September, 2022



This Hydrology Study has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

Jacob Vandervis, PE

Registered Civil Engineer No. C46301

Exp.: 12/31/22



Prepared for:

Prepared by:



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TAIT JOB # **ME0381C**

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SECTION 1 INTRODUCTION AND BACKGROUND

This Hydrology and Hydraulic Report (Report) serves as a basis of design for the proposed drainage system for the Dana Point Harbor (DPH) Commercial Core Area (CCA) Buildings 6 to 12 and the Northern Parking Lot in Dana Point (City), County of Orange (County), California. This study was prepared following the requirements set forth by the Orange County Hydrology Manual (OCHM), dated 1986, and its 1996 Addendum and the Orange County Local Drainage Manual (LDM), dated January 1996. Analysis of the existing drainage patterns and existing storm drainage capacity and overall site analysis can be found in the Master Plan of Drainage under Permit MB19-0039 and GRD19-0177, by TAIT & Associates, Inc. dated January 2020. Any plans and specification in this report are not for construction purposes. The contractor shall refer to final approved construction documents for plans and specifications.

DPH encompasses approximately 276.8 acres, owned by the County of Orange, and located in the southern portion of the City of Dana Point. This Report analyzed the Buildings 6 to 12 and the Northern Parking Lot Improvements which encompass an area of 12.33 acres which include proposed storm drain Line C1, C3, C4, D, E (See Section 6 for detailed description). Line C1, C3, and C4, convey runoff from the project improvements to an existing 60-inch Reinforced Concrete Pipe (RCP) Line C that is centrally located on the site and discharges to Outlet 3. Line D and Line E connect to two existing 15-inch RCP lines that discharge to the Harbor via Outlets 4 and 5 respectively.

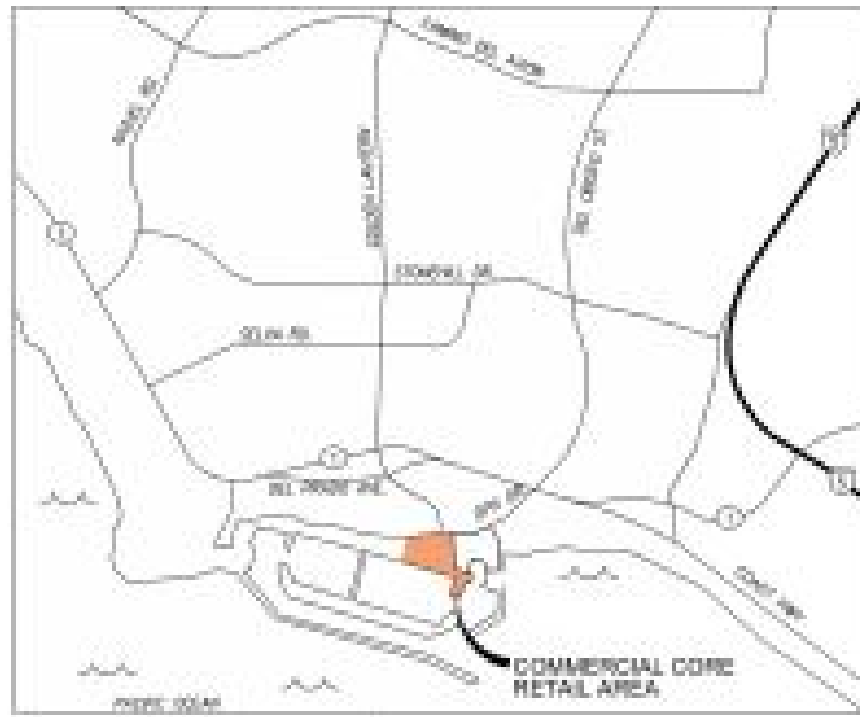
DPH is bordered by the Pacific Ocean to the south, Dana Point Headlands and Old Cove Marine Preserve to the west, Doheny State Beach to the east and a variety of commercial, hotel, residential and public park uses to the north. The Interstate-5 freeway is located approximately two miles to the east and provides regional access to the Harbor. The City lies in the southwest portion of Orange County, in the State of California and it is part of the larger Southern California Region. It was incorporated on January 1st, 1989 and comprises of approximately 6.5 square miles. See Figure 1 Vicinity Map for project location.

The Dana Point Harbor Revitalization Plan has been in process since the late 1990's. Currently, the Revitalization Plan includes improvements to the Harbor's boat slips, retail center, boater facilities and parking, and storm water quality treatment. DPH is owned by the County of Orange and it is currently under a 66-year operating and maintenance lease agreement with the DPH Partners, LLC. and DPH Partners Drystack, LLC. which includes Burnham Ward Properties, R.D. Olson Development and Bellwether Financial Group. Burnham Ward Properties will develop the Commercial Core Retail Area, R.D. Olson will develop the Hotel Area, and Bellwether Financial Group will develop the Marina portion and the Dry Stack Lease Area.

Buildings 6 to 12 and the Northern Parking Lot improvements are part of the CCA and are under Burnham Ward's Properties scope of work.

Figure 2 DPH Study Area provides an overview of DPH and the CCA. The proposed improvements will include the construction of 6 new waterfront buildings and the northern surface parking. Future improvements will include the reconstruction and remodeling of the buildings at Dana Wharf along with the site improvements.

Figure 1 – Vicinity Map (Not To Scale)



SECTION 2 PROJECT DESCRIPTION

This Hydraulic and Hydrology Analysis studies the proposed Buildings 6 to 12 and the Northern Parking Lot improvements of the Commercial Core Area (CCA) which is the fourth and sixth phase of construction development being completed by the DPH Partners, LLC, specifically by Burhan Ward as part of the DPH Revitalization Plan. For the DPH Revitalization Plan, the Environmental Impact Report (EIR) was approved in 2006, in November 18, 2014 the Coastal Development Plan was approved by the Coastal Commission and the City of Dana Point, in May 29, 2019 the Substantial Conformance to the 2014 CDP. The improvements for the CCA will be completed in separate phases as described in the CDP.

This phase of construction improvements include the construction of 6 new waterfront buildings designated as Buildings 6 to 12 and the northern surface parking lot. Buildings 6 to 9 are interconnected by a 2nd floor level deck, and Buildings 10 and 12 will include their own 2nd floor deck areas. Building 6 is called the Boathouse it will include a modern style food court area, Buildings 7, 8, 9, 10 and 12 will include restaurant and retail spaces, and Building 11 will be a surf museum. West of Building 12 there will be designated kayak and paddle boat rentals, south of building 11 is a proposed event lawn that will be used for live music and other events, south of buildings 6 to 9 there are several fire pits and seating areas for visitors, south of Building 6 will be a smaller event lawn area and north is the designated main valet and passenger drop off area. There is a proposed loading area on the east side of the valet parking lot per the Phase 2B – Parking Structure & Golden Lantern. North of Buildings 8 to 12 there is a proposed main access drive aisle that services the CCA from Casitas Place to Golden Lantern, north of this main drive aisle is the North Surface Parking Lot which includes general parking, designated future electrical vehicle stalls.

The Northern Surface Parking Lot stormwater runoff will sheet flow over the surface parking to catch basins and will be collected by storm drain Lines C1 and C3, and the main drive aisle runoff will be collected through gutters into catch basins that connect to storm drain Line C4, ultimately these storm drain Lines convey runoff to the existing 60-inch RCP storm drain Line C. The southwestern portion of the northern parking lot, Casitas Place and the western portion of the main access drive aisle stormwater runoff will be collected by Line E which runs southerly and receives water from Buildings 11 and 12 and discharges into the Harbor via the existing 15-inch RCP. Lastly the most eastern portions of the site, specifically the areas south of Building 6 and 7 will drain towards the south and be collected by storm drain Line D. Storm drain Line D also will convey all flows from Dana Wharf.

The overall site plan with phasing limits is included in Figure 2. Phasing Limits are in compliance with the Construction Phasing and Construction Management Parking Plan approved by the City of Dana Point in July, 2020.

Figure 2 – Commercial Core Overall Site Plan /Phasing Plan



SECTION 3 HYDROLOGY DESIGN AND CRITERIA

3.1 Hydrology Criteria

The existing and proposed condition hydrology calculations were prepared in conformance with the Orange County Hydrology Manual (OCHM), dated 1986 and its Addendum No. 1, dated 1996. The hydrology analysis and small area hydrograph were prepared using the Advanced Engineer Software (AES), a computer software approved by the Orange County Flood Control District that follows the hydrology methodology and criteria from the OCHM. For this analysis drainage area delineations were prepared following the proposed grading for each analysis, flow paths, areas, and elevation were determined, as well as hydrology characteristics such as soil group and land use. The rational method for the existing and proposed conditions for the 10-year, 25-year and 100-year storm were prepared. Per the OCHM, the Antecedent Moisture Content (AMC) is II for the 10-year and 25-year storm event, and III for the 100-year storm event. Sections 4 and 5 provide detailed descriptions for the Existing Condition and Proposed Condition Hydrology analyses.

The OCHM uses the rational method to calculate peak runoff discharge from a drainage area. It utilizes the equation $Q=CIA$, where Q is discharge, I is intensity, and A is area. The RATSCX module of AES was used to analyze and route runoff through each subarea using elevations, slopes, flow lengths, soil group, land use and area inputs. The rational method analysis was prepared using the high confidence rainfall values as determined by the OCHM. The AES results provide peak discharge and time of concentration. The area being analyzed includes elevation below mean sea level which result in negative numbers. Due to limitations of AES for modeling purposes all elevations were raise by 1,000 to input into the models. Time of concentration and peak flow rates for the 10- and 100-year storm events were obtained.

3.2 Soil Group and Land Use

The OCHM utilizes Hydrologic Soil Groups to develop the rational method calculations. Soils are classified as Hydrologic Soil Groups A, B, C and D. The on-site consists of group D and a small portion of group C. The DPH Commercial Core land use types consist mainly of commercial areas.

3.3 Regional Hydrology

The Dana Point Harbor lies within the bounds of the Dana Point Coastal Streams Watershed, which includes a number of coastal drains that discharge to the Pacific Ocean through DPH. Stormwater runoff from the site, sheet flows to different inlets that connect to underground storm drain lines that ultimately discharge to the Harbor through storm drain outlets located within the concrete stone revetment below the seawall.

The CCA includes the existing storm drain main Line C which is a 60-inch Reinforced Concrete Pipes (RCP) bisecting the CCA. Line C receives off-site runoffs from the City of Dana Point and discharge through Outlet 3 as described in the MPD. It receives stormwater runoff from a large off-site area consisting of residential and commercial developments within the City of Dana Point and north of Dana Point Harbor Drive. The MPD provides more detail for these off-site drainage areas. Stormwater runoff from the proposed project areas discharges directly to the Ocean via several maintained and engineered storm drain systems or as stormwater runoff that sheet flows directly into the Ocean over the seawall.

SECTION 4 PROPOSED CONDITION HYDROLOGY

The proposed condition hydrology analysis was prepared for Lateral Line C1, C3 , and C4 and for storm drain Lines D and E for the 10-year, 25-year, and 100-year storm events. Per the MPD, the area tributary to Outlet 3 is increasing and the area tributary to Outlet 1 is decreasing. This change results in adding approximately 5 acres of drainage to storm drain Line C that is accounted for in Lateral Line C2, which was approved as part of Phase 2B and included in the overall proposed model for Line C under this hydrology study. Appendix A provides the Proposed Condition Hydrology Map, and Appendix B includes the AES Rational Method Results for the 10-year, 25-year, and 100-year storm events.

5.1 Existing Condition Hydrology

The MPD analyzed the existing condition hydrology and drainage patterns for Outlets 1, 2, 3, 4 and 5. Outlet 1 is an existing 18-inch storm drain Line B located in the Dry Stack lease Area, Outlet 3 is the existing 60-inch storm drain Line C, Outlet 4 is the existing 15-inch storm drain Line D, and Outlet 5 is the existing storm drain Line E located in the CCA. See Appendix F Section 4 of the Master Drainage Plan has more information regarding the existing project drainage patterns.

5.2 Proposed Condition Hydrology

The proposed drainage for Buildings 6 to 12 and the northern surface parking lot is designed for the ultimate condition of construction which includes Buildings 6, 7, 8, 9, 10, 11 and 12 along with the associated site improvements, the boardwalk, and the parking lot. However, the improvements at Dana Wharf will not be constructed as part of this phase but the future drainage will be accounted for in storm drain Line D.

SECTION 5 HYDRAULIC DESIGN

5.1 Hydraulics Design Criteria

The project storm drain facilities include the on-site storm drain system, catch basin inlets, grated inlets to conform to the standards set forth in the Orange County Local Drainage Manual (LDM), dated 1996. The main line storm drain systems Lines C1, C3, C4, C4-1, D and E were designed using the Water Surface Pressure Gradient (WSPGW), a software developed by the Los Angeles Flood Control District and approved by the County of Orange was utilized to calculate the Hydraulic Grade Line (HGL) for the proposed storm drain lines. WSPG uses the Bernoulli equation to calculate the HGL for each storm drain line utilizing the flow and boundary condition. All other storm drains sizes were designed using computer estimated pipe size model function within AES. The catch basin inlets that will be utilized for flood control purposes were designed to fully capture the 25-year storm events following the recommendation of the LDM. See Reference Plans in Appendix D of this report for detailed information and the location of proposed drainage facilities.

5.2 Storm Drain Design

As described in the MPD, the existing storm drain Outlets 3, 4 and 5 were built under the seawall through the concrete stone revetment. Thus, the existing storm drain system is controlled downstream by the seawater elevation, which varies due to tidal influence. Seawater is expected to backflow into the storm drain system and is considered in the hydraulic calculations. The downstream surface water elevation is set to the Mean High Water (MHW) at 4.41-feet taken from the NOAA Tides/Water Levels for La Jolla Monitoring Station per the MPD.

Storm Drain Lines C1, C3, C4, D and E were designed using the flows obtained from the hydrology rational method analysis for the 10-year storm event. Lines C1, C3, C4, and C4-1 will ultimately discharge to Line C, Lines D and E connect to the existing 15-inch RCP lines. The HGL throughout the pipe is below the finished surface, and above the storm drain top throughout the entire system. This will cause the pipe to be under pressure in the higher storm events. Storm drain laterals that require sizes smaller than 15-inch are proposed as High Density Polyethylene Pipe (HDPE) with water tight joints will be provided for the groundwater condition. Lines C1, C3, C4, C4-1, D and E were sized using WSPG to keep the HGL at least 3-feet below the finished surface to prevent backflow to the proposed Modular Wetland System (see WQMP for Water Quality Design Futures Details). Results will be provided on Appendix C of this report with the next hydrology report submittal.

5.3 Catch Basin Design

The catch basin were designed using the AES HYDRAULIC ELEMENTS I module, approved by the County of Orange. The catch basin design calculations are provided on Appendix E of this report

and Appendix D include the locations of the catch basin structures. Majority of the site consists of Inlet Type I (Orange County Public Work (OCPW) Std. 1301) and grated inlets will be used within the landscape areas. Additionally, there is a proposed trench drain under the proposed timber wood boardwalk that will collect drainage south of the proposed buildings and some of the roof drainages from Buildings 6 to 12. All catch basins are designed to capture the ultimate condition 25-year storm event. All catch basins are located in a sump condition. Overflows for the 100-year storm will sheet flow over the seawall and into the harbor.

SECTION 6 DRAINAGE ANALYSIS RESULTS SUMMARY

This section summarizes the results for the hydrology and hydraulics analyses.

6.1 Hydrology Results

The Rational Method hydrology analysis was prepared for the 10-year, 25-year and 100-year storm events for the proposed conditions. The site has been designed with the connection to the existing Line C, which corresponds to Node 450 of the ultimate condition hydrology. The results summary for the Line C1, C3, C4, C4-1, D and E Rational Method hydrology analysis are provided in Table 1 below.

Table 1: Rational Method Results Summary

Line	Area (AC)	10-Year (CFS)	25-Year (CFS)	100-Year (CFS)
C1	1.1	3.61	4.30	5.52
C3	3.2	10.30	12.27	15.76
C4	1.4	4.26	5.08	6.52
C4-1	0.41	1.39	-	-
D	2.8	9.61	11.45	14.73
E	1.8	6.25	7.47	9.61

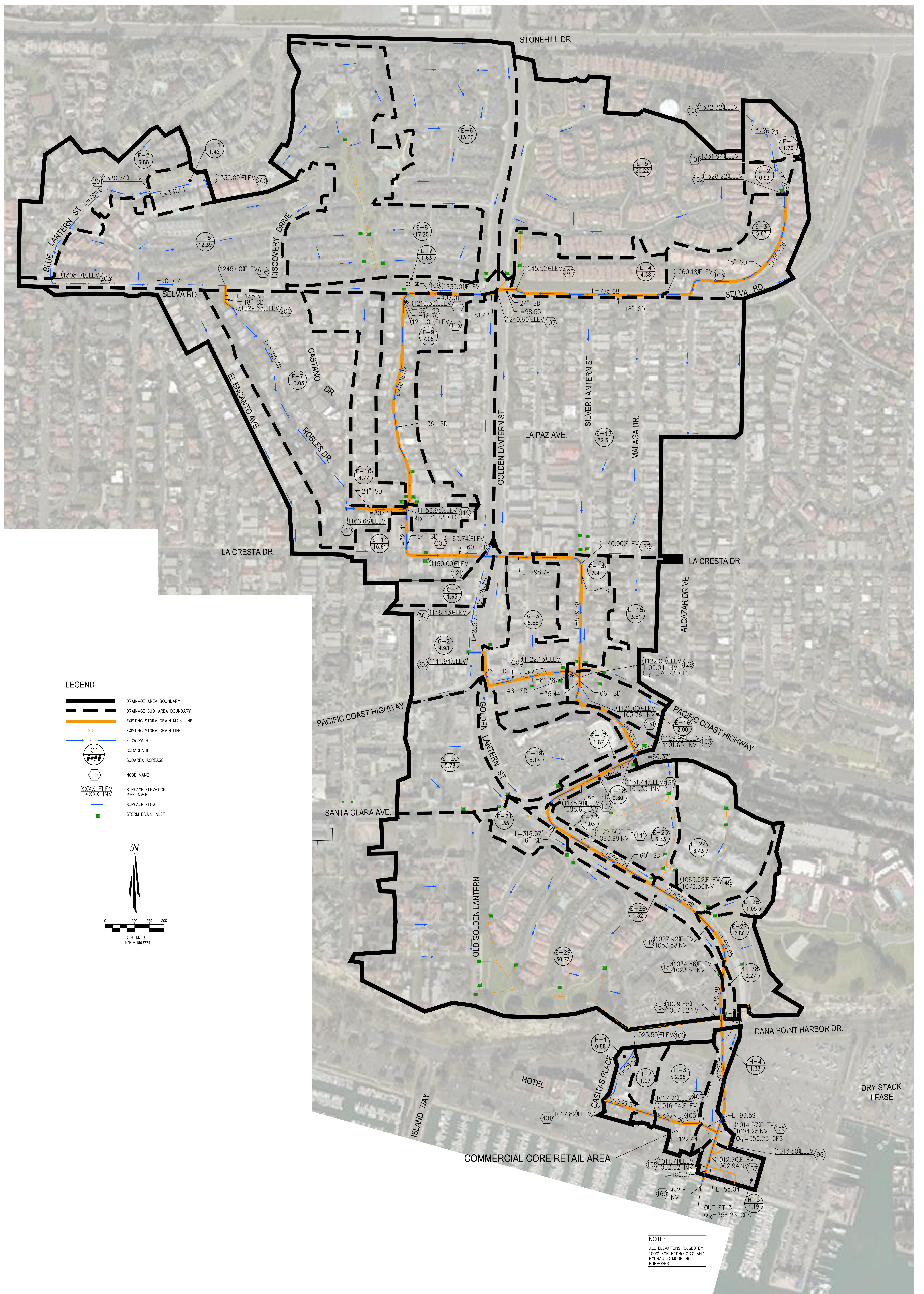
The results summary for the Outlet 3 Rational Method hydrology analysis are provided in Table 2 below. Peak discharge from the Ultimate Condition decreases in comparison to the calculations in the MPD designed. Further phases of construction will include ultimate proposed hydrology and hydraulics analysis tributary to Outlet 3 and to Outlets 4 and 5 as described in the MPD.

Table 2 –Rational Method Summary

Analysis	Area (AC)	Outlet 3		Outlet 4		Outlet 5	
		10-Year (CFS)	100-Year (CFS)	10-Year (CFS)	100-Year (CFS)	10-Year (CFS)	100-Year (CFS)
Existing Condition	252.7	356.50	575.64	TBD	TBD	TBD	TBD
Interim Condition	258.7	367.55	593.37	TBD	TBD	TBD	TBD
Ultimate Condition	259.8	366.07	598.96	9.61	14.3	6.25	9.61
MPD	259.4	374.28	602.02	TBD	TBD	TBD	TBD

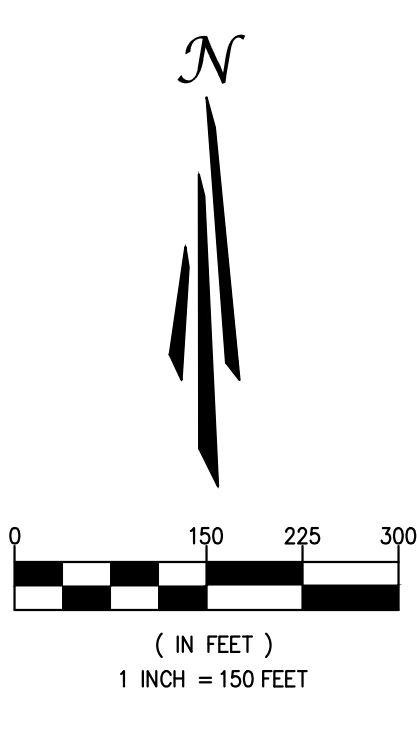
TECHNICAL APPENDIX

APPENDIX A – ULTIMATE CONDITION HYDROLOGY MAP



LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- EXISTING STORM DRAIN MAIN LINE
- EXISTING STORM DRAIN LINE
- FLOW PATH
- SUBAREA ID
- SUBAREA ACREAGE
- NODE NAME
- SURFACE ELEVATION
PIPE INVERT
- SURFACE FLOW
- STORM DRAIN INLET



NOTE:
ALL ELEVATIONS RAISED BY
1000' FOR HYDROLOGIC AND
HYDRAULIC MODELING
PURPOSES.

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 RECOMMENDED BY: DATE:

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 DANA POINT HARBOR PARTNERS, LLC

BELLWETHER FINANCIAL GROUP **R.D. OLSON DEVELOPMENT** **BWP BURNHAM I WARD PROPERTIES**

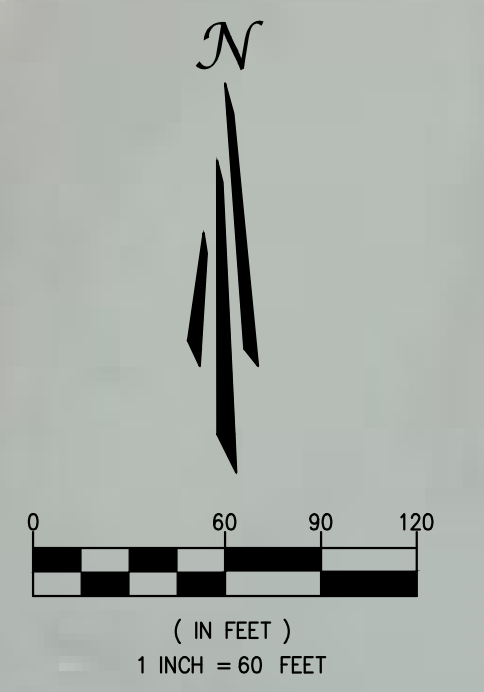
OUTLET 3 EXISTING CONDITION HYDROLOGY MAP
 (ON-SITE AND OFF-SITE AREAS)
 COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

LEGEND

- WATERSHED AREA BOUNDARY
- WATERSHED SUBAREA BOUNDARY
- EXISTING STORM DRAIN MAIN LINE
- EXISTING STORM DRAIN LINE
- FLOW LINE
- STORM DRAIN SURFACE STRUCTURE
- SURFACE ID
- SUBAREA ACREAGE
- NODE NAME
- XXXX ELEV
- XXXX INV

OUTLETS EXISTING CONDITIONS			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	20.1	48.46	76.15
2	1.7	4.75	7.93
3	252.75	356.73	575.46
4	3.4	9.05	13.84
5	1.55	4.36	7.61
6	0.44	1.6	2.44

- NOTE:
1. ALL ELEVATIONS HAVE BEEN RAISED BY 1000' FOR HYDROLOGIC MODELING PURPOSES.
 2. SEE SEPARATE HYDROLOGY MAP FOR ALL OFF-SITE AND ON-SITE AREAS TRIBUTARY TO OUTLET 3.
 3. ONLY ON-SITE AREA FOR OUTLET 3 IS SHOWN HEREON.



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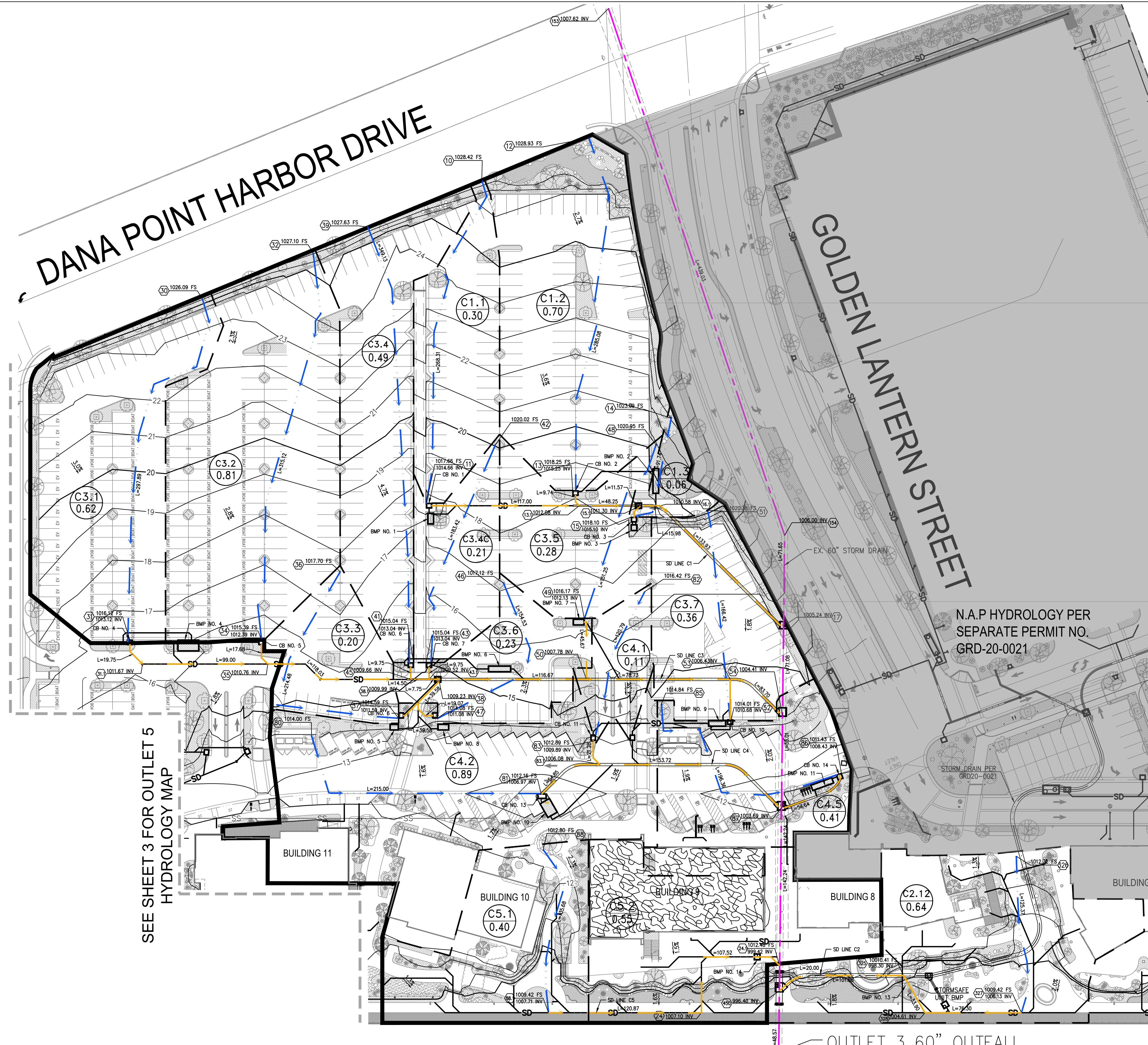
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ON-SITE EXISTING CONDITION HYDROLOGY MAP
 (OUTLETS 1, 2, 3, 4, & 5)

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

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- LEGEND**
- DRAINAGE AREA BOUNDARY
 - DRAINAGE SUB-AREA BOUNDARY
 - SUB-AREA FLOW PATH
 - STORM DRAIN FLOW PATH
 - EXISTING STORM DRAIN LINE
 - C1 SUBAREA ID
 - X SUBAREA ACREAGE
 - 1000.00 FS NODE ELEVATION

SEE SHEET 3 FOR OUTLET 5 HYDROLOGY MAP

SEE SHEET 2 FOR OUTLET 4 HYDROLOGY MAP

N.A.P HYDROLOGY PER SEPARATE PERMIT NO. GRD-20-0021

OUTLET 3 60" OUTFALL

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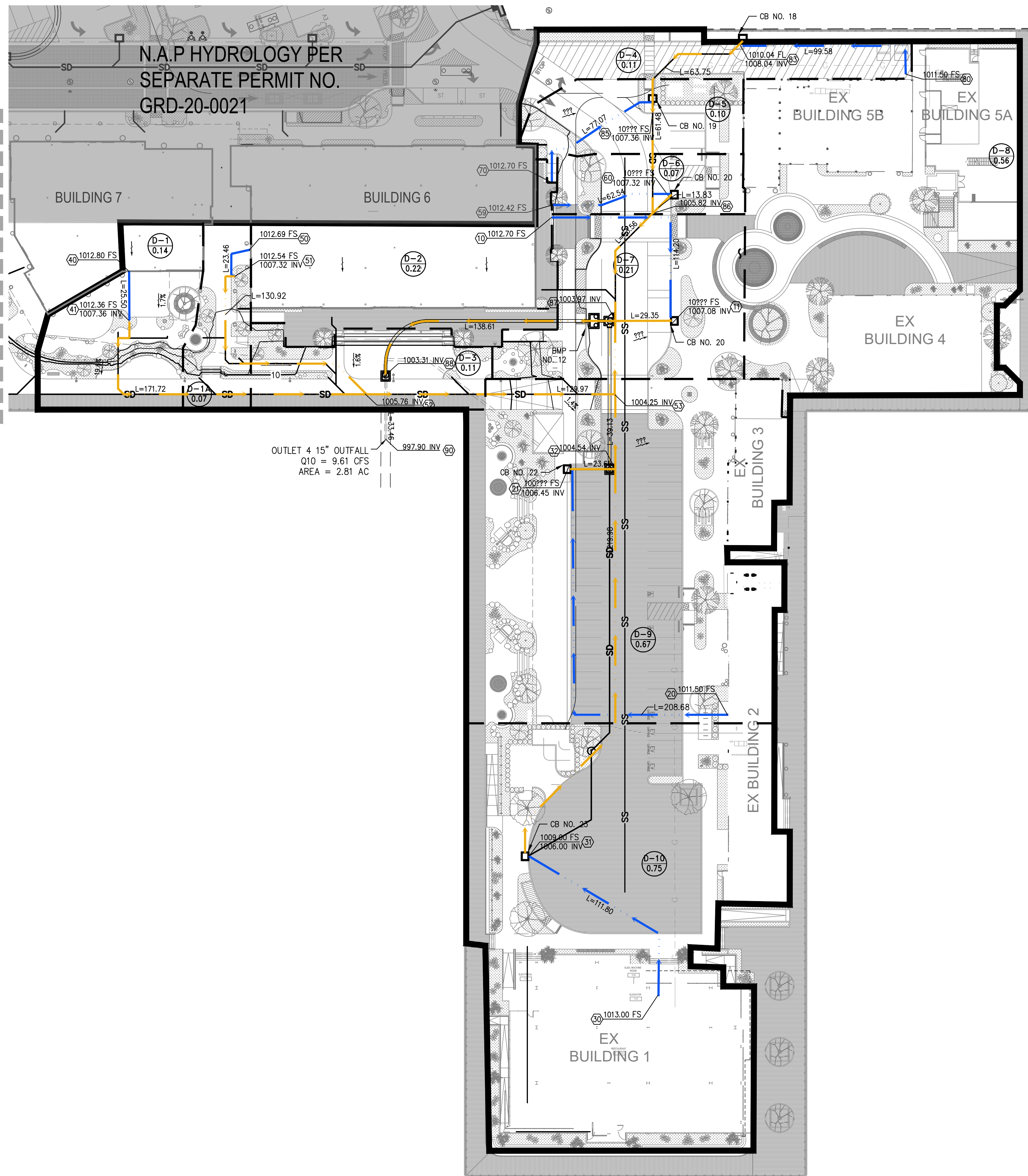
DANA POINT HARBOR COMMERCIAL CORE
PROPOSED CONDITION HYDROLOGY

OUTLET 3 ULTIMATE CONDITION

SHT 1 OF 3

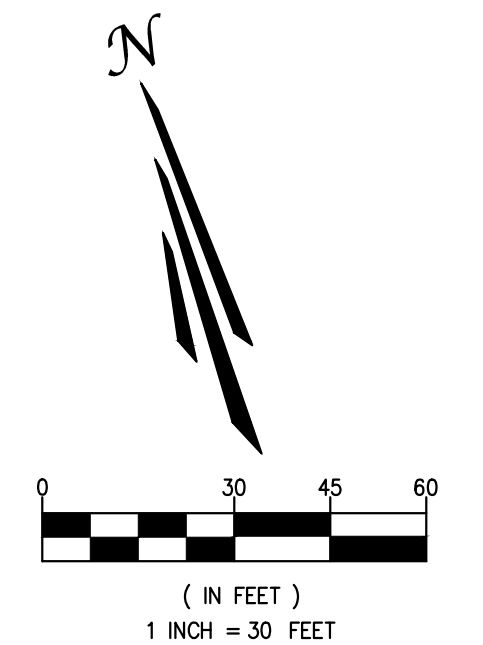
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SEE SHEET 1 FOR OUTLET 3
HYDROLOGY MAP



LEGEND

	DRAINAGE AREA BOUNDARY
	DRAINAGE SUB-AREA BOUNDARY
	SUB-AREA FLOW PATH
	STORM DRAIN FLOW PATH
	EXISTING STORM DRAIN LINE
	SUBAREA ID
	SUBAREA ACREAGE
	NODE ELEVATION



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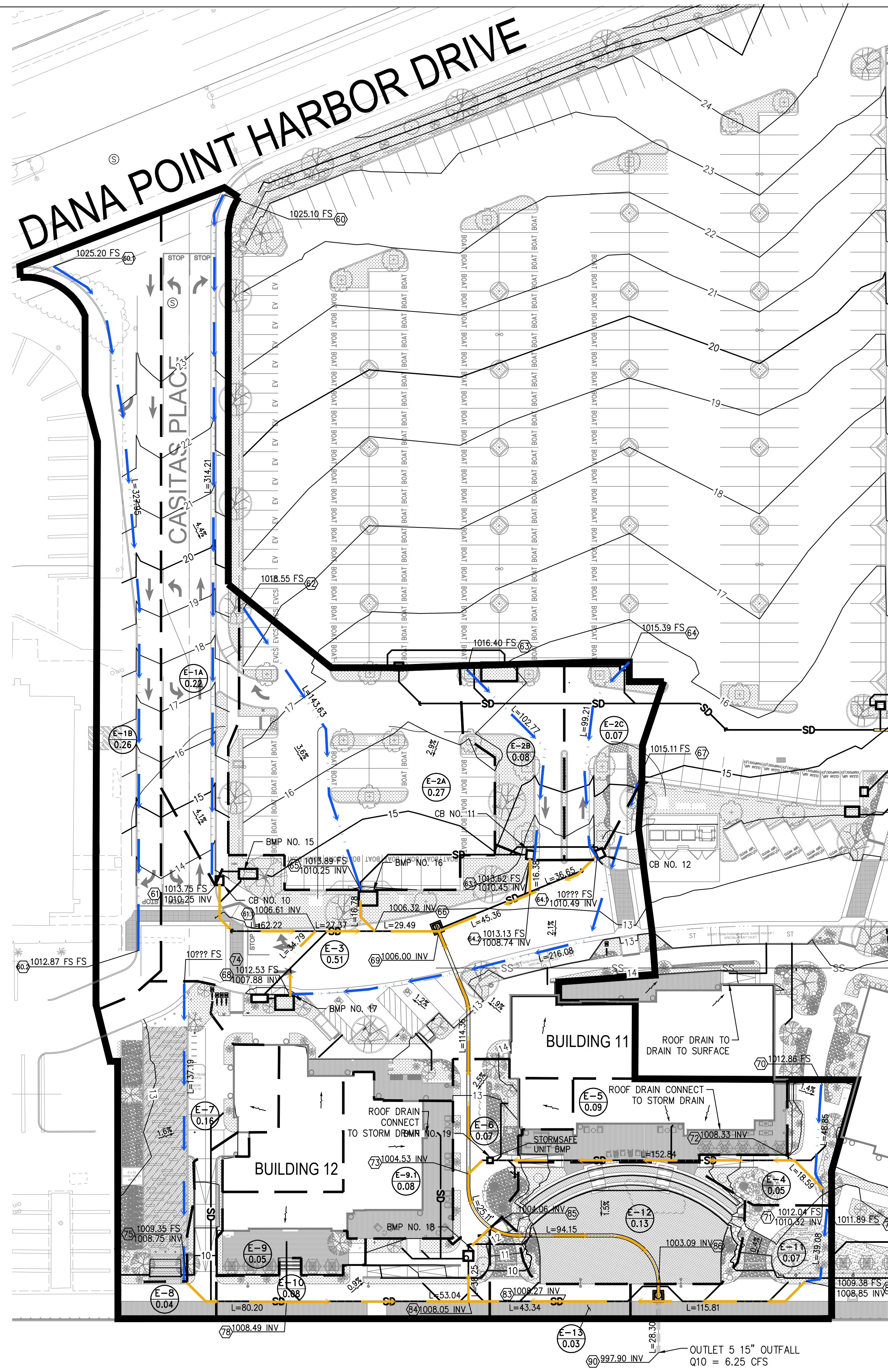
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DANA POINT HARBOR COMMERCIAL CORE
 PROPOSED CONDITION HYDROLOGY

OUTLET 4 ULTIMATE CONDITION

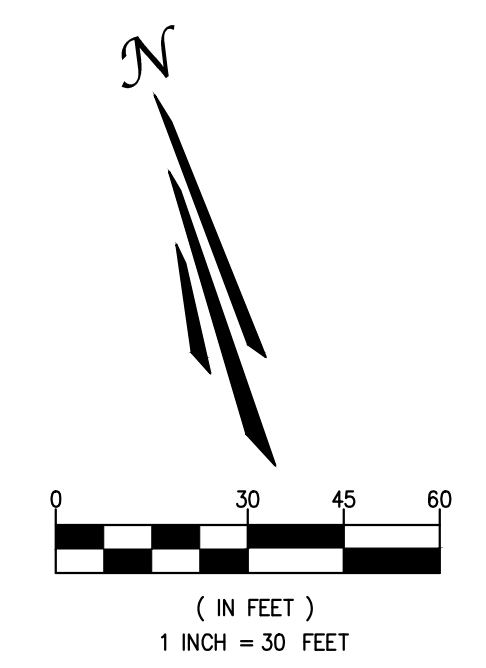
SHT 2 OF 3

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- LEGEND**
- DRAINAGE AREA BOUNDARY
 - DRAINAGE SUB-AREA BOUNDARY
 - SUB-AREA FLOW PATH
 - STORM DRAIN FLOW PATH
 - EXISTING STORM DRAIN LINE
 - C1
X SUBAREA ID
 - 1000.00 FS
1000.00 INV SUBAREA ACREAGE
 - 1000.00 FS
1000.00 INV NODE ELEVATION

SEE SHEET 1 FOR OUTLET 3 HYDROLOGY MAP



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DANA POINT HARBOR COMMERCIAL CORE
 PROPOSED CONDITION HYDROLOGY

OUTLET 5 ULTIMATE CONDITION

SHT 3 OF 3

APPENDIX B – ULTIMATE CONDITION HYDROLOGY RESULTS (AES)

LINE C1

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 10-YEAR STORM EVENT CD *

FILE NAME: C1P10R.DAT
TIME/DATE OF STUDY: 09:41 11/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 268.31
ELEVATION DATA: UPSTREAM(FEET) = 1028.42 DOWNSTREAM(FEET) = 1017.66

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.416
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.878
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.19	0.25	0.100	69	5.42
COMMERCIAL	D	0.11	0.20	0.100	75	5.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.04
TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 1.04

FLOW PROCESS FROM NODE 11.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1014.66 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 117.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.56
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.04
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 5.77
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.77
RAINFALL INTENSITY(INCH/HR) = 3.74
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.30
TOTAL STREAM AREA(ACRES) = 0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.04

FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 285.08
ELEVATION DATA: UPSTREAM(FEET) = 1028.93 DOWNSTREAM(FEET) = 1018.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.625
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.794
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.01	0.25	0.100	69	5.63
COMMERCIAL	D	0.69	0.20	0.100	75	5.63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.38
TOTAL AREA(ACRES) = 0.70 PEAK FLOW RATE(CFS) = 2.38

FLOW PROCESS FROM NODE 13.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1015.25 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 9.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.67
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.38
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 5.63
LONGEST FLOWPATH FROM NODE 12.00 TO NODE 13.10 = 294.82 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.63
RAINFALL INTENSITY(INCH/HR) = 3.79
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.70
TOTAL STREAM AREA(ACRES) = 0.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.38

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.04	5.77	3.741	0.23(0.02)	0.10	0.3	10.00
2	2.38	5.63	3.791	0.20(0.02)	0.10	0.7	12.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.41	5.63	3.791	0.21(0.02)	0.10	1.0	12.00
2	3.39	5.77	3.741	0.21(0.02)	0.10	1.0	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.41 Tc(MIN.) = 5.63
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.08 DOWNSTREAM(FEET) = 1011.30
FLOW LENGTH(FEET) = 48.25 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.62
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.41
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.76
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.76

RAINFALL INTENSITY(INCH/HR) = 3.75
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.99
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.41

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 91.74
 ELEVATION DATA: UPSTREAM(FEET) = 1021.71 DOWNSTREAM(FEET) = 1018.10

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.06	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.22
 TOTAL AREA(ACRES) = 0.06 PEAK FLOW RATE(CFS) = 0.22

FLOW PROCESS FROM NODE 15.00 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1015.10 DOWNSTREAM(FEET) = 1011.30
 FLOW LENGTH(FEET) = 11.57 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.61
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.22
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 14.00 TO NODE 15.10 = 103.31 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 4.05
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.06
 TOTAL STREAM AREA(ACRES) = 0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.22

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.41	5.76	3.745	0.21(0.02)	0.10	1.0	12.00
1	3.39	5.89	3.696	0.21(0.02)	0.10	1.0	10.00
2	0.22	5.02	4.050	0.20(0.02)	0.10	0.1	14.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.43	5.02	4.050	0.21(0.02)	0.10	0.9	14.00
2	3.61	5.76	3.745	0.21(0.02)	0.10	1.1	12.00
3	3.59	5.89	3.696	0.21(0.02)	0.10	1.1	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.61 Tc(MIN.) = 5.76
 EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.1
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 16.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1011.30 DOWNSTREAM(FEET) = 1010.58
 FLOW LENGTH(FEET) = 15.98 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.56
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.61
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.78
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.10 = 449.54 FEET.

FLOW PROCESS FROM NODE 16.10 TO NODE 17.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.68 DOWNSTREAM(FEET) = 1005.24

FLOW LENGTH(FEET) = 133.93 MANNING'S N = 0.012

DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.54

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.61

PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 6.02

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 583.47 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.1 TC(MIN.) = 6.02

EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 3.61

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.43	5.29	3.929	0.21(0.02)	0.10	0.9	14.00
2	3.61	6.02	3.651	0.21(0.02)	0.10	1.1	12.00
3	3.59	6.15	3.605	0.21(0.02)	0.10	1.1	10.00

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 25-YEAR STORM EVENT CD *

FILE NAME: C1P25R.DAT
TIME/DATE OF STUDY: 09:44 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 268.31
ELEVATION DATA: UPSTREAM(FEET) = 1028.42 DOWNSTREAM(FEET) = 1017.66

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.416
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.610
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.19	0.25	0.100	69	5.42
COMMERCIAL	D	0.11	0.20	0.100	75	5.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.24
TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 1.24

FLOW PROCESS FROM NODE 11.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1014.66 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 117.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.81
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.24
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 5.75
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.75
RAINFALL INTENSITY(INCH/HR) = 4.46
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.30
TOTAL STREAM AREA(ACRES) = 0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.24

FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 285.08
ELEVATION DATA: UPSTREAM(FEET) = 1028.93 DOWNSTREAM(FEET) = 1018.25

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.625
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.513
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.01	0.25	0.100	69	5.63
COMMERCIAL	D	0.69	0.20	0.100	75	5.63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.83
TOTAL AREA(ACRES) = 0.70 PEAK FLOW RATE(CFS) = 2.83

FLOW PROCESS FROM NODE 13.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1015.25 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 9.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.29
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.83
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 5.63
LONGEST FLOWPATH FROM NODE 12.00 TO NODE 13.10 = 294.82 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.63
RAINFALL INTENSITY(INCH/HR) = 4.51
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.70
TOTAL STREAM AREA(ACRES) = 0.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.83

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.24	5.75	4.456	0.23(0.02)	0.10	0.3	10.00
2	2.83	5.63	4.509	0.20(0.02)	0.10	0.7	12.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.06	5.63	4.509	0.21(0.02)	0.10	1.0	12.00
2	4.04	5.75	4.456	0.21(0.02)	0.10	1.0	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.06 Tc(MIN.) = 5.63
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.08 DOWNSTREAM(FEET) = 1011.30
FLOW LENGTH(FEET) = 48.25 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.84
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.06
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.75
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.75

RAINFALL INTENSITY(INCH/HR) = 4.46
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.99
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.06

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 91.74
 ELEVATION DATA: UPSTREAM(FEET) = 1021.71 DOWNSTREAM(FEET) = 1018.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.06	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.26
 TOTAL AREA(ACRES) = 0.06 PEAK FLOW RATE(CFS) = 0.26

FLOW PROCESS FROM NODE 15.00 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1015.10 DOWNSTREAM(FEET) = 1011.30
 FLOW LENGTH(FEET) = 11.57 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.25
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.26
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 14.00 TO NODE 15.10 = 103.31 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 4.81
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.06
 TOTAL STREAM AREA(ACRES) = 0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.26

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.06	5.75	4.456	0.21(0.02)	0.10	1.0	12.00
1	4.04	5.87	4.405	0.21(0.02)	0.10	1.0	10.00
2	0.26	5.02	4.813	0.20(0.02)	0.10	0.1	14.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.09	5.02	4.813	0.21(0.02)	0.10	0.9	14.00
2	4.30	5.75	4.456	0.21(0.02)	0.10	1.1	12.00
3	4.27	5.87	4.405	0.21(0.02)	0.10	1.1	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.30 Tc(MIN.) = 5.75
 EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.1
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 16.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.30 DOWNSTREAM(FEET) = 1010.58
 FLOW LENGTH(FEET) = 15.98 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.36
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.30
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.78
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.10 = 449.54 FEET.

FLOW PROCESS FROM NODE 16.10 TO NODE 17.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.68 DOWNSTREAM(FEET) = 1005.24
FLOW LENGTH(FEET) = 133.93 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.96
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.30
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 6.00
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 583.47 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.1 TC(MIN.) = 6.00
EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 4.30

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.09	5.27	4.681	0.21(0.02)	0.10	0.9	14.00
2	4.30	6.00	4.350	0.21(0.02)	0.10	1.1	12.00
3	4.27	6.12	4.302	0.21(0.02)	0.10	1.1	10.00

=====

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 100-YEAR STORM EVENT CD *

FILE NAME: C1P100R.DAT
TIME/DATE OF STUDY: 09:50 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 268.31
ELEVATION DATA: UPSTREAM(FEET) = 1028.42 DOWNSTREAM(FEET) = 1017.66

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.416
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.910
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.19	0.25	0.100	86	5.42
COMMERCIAL	D	0.11	0.20	0.100	91	5.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.59
TOTAL AREA(ACRES) = 0.30 PEAK FLOW RATE(CFS) = 1.59

FLOW PROCESS FROM NODE 11.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1014.66 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 117.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.17
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.59
PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 5.73
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.73
RAINFALL INTENSITY(INCH/HR) = 5.72
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.30
TOTAL STREAM AREA(ACRES) = 0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.59

FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 285.08
ELEVATION DATA: UPSTREAM(FEET) = 1028.93 DOWNSTREAM(FEET) = 1018.25

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.625
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.783
SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	C	0.01	0.25	0.100	86	5.63
COMMERCIAL	D	0.69	0.20	0.100	91	5.63

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 3.63
TOTAL AREA(ACRES) = 0.70 PEAK FLOW RATE(CFS) = 3.63

FLOW PROCESS FROM NODE 13.00 TO NODE 13.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1015.25 DOWNSTREAM(FEET) = 1012.08
FLOW LENGTH(FEET) = 9.74 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.78
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.63
PIPE TRAVEL TIME(MIN.) = 0.01 T_c (MIN.) = 5.63
LONGEST FLOWPATH FROM NODE 12.00 TO NODE 13.10 = 294.82 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 13.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.63
RAINFALL INTENSITY(INCH/HR) = 5.78
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20

AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.70
TOTAL STREAM AREA(ACRES) = 0.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.63

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.59	5.73	5.721	0.23(0.02)	0.10	0.3	10.00
2	3.63	5.63	5.779	0.20(0.02)	0.10	0.7	12.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	5.21	5.63	5.779	0.21(0.02)	0.10	1.0	12.00
2	5.18	5.73	5.721	0.21(0.02)	0.10	1.0	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.21 T_c (MIN.) = 5.63
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.21 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.10 = 385.31 FEET.

FLOW PROCESS FROM NODE 13.10 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.08 DOWNSTREAM(FEET) = 1011.30
FLOW LENGTH(FEET) = 48.25 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.39
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.21
PIPE TRAVEL TIME(MIN.) = 0.11 T_c (MIN.) = 5.74
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.74

RAINFALL INTENSITY(INCH/HR) = 5.72
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.99
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.21

FLOW PROCESS FROM NODE 14.00 TO NODE 15.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 91.74
 ELEVATION DATA: UPSTREAM(FEET) = 1021.71 DOWNSTREAM(FEET) = 1018.10

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC I II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.06	0.20	0.100	91	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.33
 TOTAL AREA(ACRES) = 0.06 PEAK FLOW RATE(CFS) = 0.33

FLOW PROCESS FROM NODE 15.00 TO NODE 15.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1015.10 DOWNSTREAM(FEET) = 1011.30
 FLOW LENGTH(FEET) = 11.57 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.01
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.33
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 14.00 TO NODE 15.10 = 103.31 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 15.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 6.17
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.06
 TOTAL STREAM AREA(ACRES) = 0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.33

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.21	5.74	5.716	0.21(0.02)	0.10	1.0	12.00
1	5.18	5.84	5.660	0.21(0.02)	0.10	1.0	10.00
2	0.33	5.02	6.175	0.20(0.02)	0.10	0.1	14.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.25	5.02	6.175	0.21(0.02)	0.10	0.9	14.00
2	5.52	5.74	5.716	0.21(0.02)	0.10	1.1	12.00
3	5.49	5.84	5.660	0.21(0.02)	0.10	1.1	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.52 Tc(MIN.) = 5.74
 EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.1
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 15.10 = 433.56 FEET.

FLOW PROCESS FROM NODE 15.10 TO NODE 16.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1011.30 DOWNSTREAM(FEET) = 1010.58
 FLOW LENGTH(FEET) = 15.98 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.97
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.52
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.77
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.10 = 449.54 FEET.

FLOW PROCESS FROM NODE 16.10 TO NODE 17.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.68 DOWNSTREAM(FEET) = 1005.24

FLOW LENGTH(FEET) = 133.93 MANNING'S N = 0.012

DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.53

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 5.52

PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 5.98

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 17.00 = 583.47 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.1 TC(MIN.) = 5.98

EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 5.52

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.25	5.26	6.013	0.21(0.02)	0.10	0.9	14.00
2	5.52	5.98	5.585	0.21(0.02)	0.10	1.1	12.00
3	5.49	6.08	5.532	0.21(0.02)	0.10	1.1	10.00

END OF RATIONAL METHOD ANALYSIS

▲

LINE C3

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 10-YEAR STORM EVENT CD *

FILE NAME: C3P10R.DAT
TIME/DATE OF STUDY: 10:40 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 297.89
ELEVATION DATA: UPSTREAM(FEET) = 1026.09 DOWNSTREAM(FEET) = 1016.12

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION CHANGE)]^{**0.20}$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.856
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.708

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	C	0.24	0.25	0.100	69	5.86
COMMERCIAL	D	0.38	0.20	0.100	75	5.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 2.06

TOTAL AREA(ACRES) = 0.62 PEAK FLOW RATE(CFS) = 2.06

FLOW PROCESS FROM NODE 31.00 TO NODE 31.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.12 DOWNSTREAM(FEET) = 1011.67
FLOW LENGTH(FEET) = 19.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.06
PIPE TRAVEL TIME(MIN.) = 0.03 T_c (MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 31.10 = 317.64 FEET.

FLOW PROCESS FROM NODE 31.10 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.67 DOWNSTREAM(FEET) = 1010.76
FLOW LENGTH(FEET) = 99.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.74
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.06
PIPE TRAVEL TIME(MIN.) = 0.35 T_c (MIN.) = 6.24
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.24
RAINFALL INTENSITY(INCH/HR) = 3.58
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.62
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.06

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 315.12
ELEVATION DATA: UPSTREAM(FEET) = 1027.10 DOWNSTREAM(FEET) = 1015.39

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.865

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705

SUBAREA Tc AND LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include COMMERCIAL C and D.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 2.69

TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 2.69

FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1012.39 DOWNSTREAM(FEET) = 1010.76

FLOW LENGTH(FEET) = 17.68 MANNING'S N = 0.012

DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 12.03

ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.69

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.89
 LONGEST FLOWPATH FROM NODE 32.00 TO NODE 35.00 = 332.80 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.89
 RAINFALL INTENSITY(INCH/HR) = 3.70
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.81
 TOTAL STREAM AREA(ACRES) = 0.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.69

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.06	6.24	3.577	0.22(0.02)	0.10	0.6	30.00
2	2.69	5.89	3.696	0.21(0.02)	0.10	0.8	32.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.69	5.89	3.696	0.22(0.02)	0.10	1.4	32.00
2	4.66	6.24	3.577	0.22(0.02)	0.10	1.4	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.69 Tc(MIN.) = 5.89
 EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.76 DOWNSTREAM(FEET) = 1009.66
 FLOW LENGTH(FEET) = 118.03 MANNING'S N = 0.012

DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.83
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.69
 PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 6.23
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

 FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.23
 RAINFALL INTENSITY(INCH/HR) = 3.58
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.40
 TOTAL STREAM AREA(ACRES) = 1.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.69

 FLOW PROCESS FROM NODE 39.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 349.13
 ELEVATION DATA: UPSTREAM(FEET) = 1027.64 DOWNSTREAM(FEET) = 1015.04

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.146
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.607
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.25	0.25	0.100	69	6.15
COMMERCIAL	D	0.24	0.20	0.100	75	6.15

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.58
 TOTAL AREA(ACRES) = 0.49 PEAK FLOW RATE(CFS) = 1.58

 FLOW PROCESS FROM NODE 41.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.04  DOWNSTREAM(FEET) = 1009.66
FLOW LENGTH(FEET) = 9.75  MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.34
ESTIMATED PIPE DIAMETER(INCH) = 6.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.58
PIPE TRAVEL TIME(MIN.) = 0.01  Tc(MIN.) = 6.16
LONGEST FLOWPATH FROM NODE 39.00 TO NODE 45.00 = 358.88 FEET.

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FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

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>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<

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=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.16
RAINFALL INTENSITY(INCH/HR) = 3.60
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.49
TOTAL STREAM AREA(ACRES) = 0.49
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.58

```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.69	6.23	3.580	0.22(0.02)	0.10	1.4	32.00
1	4.66	6.57	3.470	0.22(0.02)	0.10	1.4	30.00
2	1.58	6.16	3.604	0.23(0.02)	0.10	0.5	39.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.25	6.16	3.604	0.22(0.02)	0.10	1.9	39.00
2	6.26	6.23	3.580	0.22(0.02)	0.10	1.9	32.00
3	6.18	6.57	3.470	0.22(0.02)	0.10	1.9	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 6.26  Tc(MIN.) = 6.23
EFFECTIVE AREA(ACRES) = 1.89  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

```

FLOW PROCESS FROM NODE 45.00 TO NODE 43.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.66 DOWNSTREAM(FEET) = 1009.52
FLOW LENGTH(FEET) = 14.50 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.21
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.26
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 6.27
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 43.10 = 549.17 FEET.

FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.27
RAINFALL INTENSITY(INCH/HR) = 3.57
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.89
TOTAL STREAM AREA(ACRES) = 1.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.26

FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 183.42
ELEVATION DATA: UPSTREAM(FEET) = 1020.02 DOWNSTREAM(FEET) = 1015.04

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.029

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.046

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.20	0.20	0.100	75	5.03

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 0.72
 TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 0.72

FLOW PROCESS FROM NODE 43.00 TO NODE 43.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.04 DOWNSTREAM(FEET) = 1009.52
 FLOW LENGTH(FEET) = 9.75 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.24
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.72
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 5.04
 LONGEST FLOWPATH FROM NODE 42.00 TO NODE 43.10 = 193.17 FEET.

FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.04
 RAINFALL INTENSITY(INCH/HR) = 4.04
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.20
 TOTAL STREAM AREA(ACRES) = 0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.72

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.25	6.19	3.591	0.22(0.02)	0.10	1.9	39.00
1	6.26	6.27	3.567	0.22(0.02)	0.10	1.9	32.00
1	6.18	6.61	3.459	0.22(0.02)	0.10	1.9	30.00
2	0.72	5.04	4.041	0.20(0.02)	0.10	0.2	42.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.45	5.04	4.041	0.22(0.02)	0.10	1.7	42.00

2	6.89	6.19	3.591	0.22(0.02)	0.10	2.1	39.00
3	6.90	6.27	3.567	0.22(0.02)	0.10	2.1	32.00
4	6.80	6.61	3.459	0.22(0.02)	0.10	2.1	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.90 Tc(MIN.) = 6.27
 EFFECTIVE AREA(ACRES) = 2.09 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.1
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 43.10 = 549.17 FEET.

FLOW PROCESS FROM NODE 43.10 TO NODE 38.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.52 DOWNSTREAM(FEET) = 1009.23
 FLOW LENGTH(FEET) = 7.75 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.55
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.90
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 6.28
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 36.00 TO NODE 37.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 214.48
 ELEVATION DATA: UPSTREAM(FEET) = 1017.70 DOWNSTREAM(FEET) = 1014.59

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.070
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.633
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.20	0.20	0.100	75	6.07

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 0.65
TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 0.65

FLOW PROCESS FROM NODE 37.00 TO NODE 38.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.59 DOWNSTREAM(FEET) = 1009.99
FLOW LENGTH(FEET) = 39.58 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.18
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.65
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 6.18
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.10 = 254.06 FEET.

FLOW PROCESS FROM NODE 38.10 TO NODE 38.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.18
RAINFALL INTENSITY(INCH/HR) = 3.60
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.65

FLOW PROCESS FROM NODE 46.00 TO NODE 47.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 154.53
ELEVATION DATA: UPSTREAM(FEET) = 1017.12 DOWNSTREAM(FEET) = 1014.08

$$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$$

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.008

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.056

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.23	0.20	0.100	75	5.01

SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(\text{INCH/HR}) = 0.20$
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
 SUBAREA RUNOFF(CFS) = 0.84
 TOTAL AREA(ACRES) = 0.23 PEAK FLOW RATE(CFS) = 0.84

FLOW PROCESS FROM NODE 47.00 TO NODE 38.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1011.08 DOWNSTREAM(FEET) = 1009.99
 FLOW LENGTH(FEET) = 19.07 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.54
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.84
 PIPE TRAVEL TIME(MIN.) = 0.04 $T_c(\text{MIN.}) = 5.05$
 LONGEST FLOWPATH FROM NODE 46.00 TO NODE 38.10 = 173.60 FEET.

FLOW PROCESS FROM NODE 38.10 TO NODE 38.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 4.04
 AREA-AVERAGED $F_m(\text{INCH/HR}) = 0.02$
 AREA-AVERAGED $F_p(\text{INCH/HR}) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 0.23
 TOTAL STREAM AREA(ACRES) = 0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.84

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.65	6.18	3.597	0.20(0.02)	0.10	0.2	36.00
2	0.84	5.05	4.036	0.20(0.02)	0.10	0.2	46.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.43	5.05	4.036	0.20(0.02)	0.10	0.4	46.00

2 1.39 6.18 3.597 0.20(0.02) 0.10 0.4 36.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.43 Tc(MIN.) = 5.05
EFFECTIVE AREA(ACRES) = 0.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.4
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.10 = 254.06 FEET.

FLOW PROCESS FROM NODE 38.10 TO NODE 38.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.99 DOWNSTREAM(FEET) = 1009.23
FLOW LENGTH(FEET) = 39.58 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.72
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.43
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.17
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.43	5.17	3.984	0.20(0.02)	0.10	0.4	46.00
2	1.39	6.29	3.558	0.20(0.02)	0.10	0.4	36.00

LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.45	5.05	4.035	0.22(0.02)	0.10	1.7	42.00
2	6.89	6.21	3.587	0.22(0.02)	0.10	2.1	39.00
3	6.90	6.28	3.563	0.22(0.02)	0.10	2.1	32.00
4	6.80	6.62	3.455	0.22(0.02)	0.10	2.1	30.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.87	5.05	4.035	0.21(0.02)	0.10	2.1	42.00

2	7.93	5.17	3.984	0.21(0.02)	0.10	2.1	46.00
3	8.29	6.21	3.587	0.21(0.02)	0.10	2.5	39.00
4	8.30	6.28	3.563	0.21(0.02)	0.10	2.5	32.00
5	8.29	6.29	3.558	0.21(0.02)	0.10	2.5	36.00
6	8.15	6.62	3.455	0.21(0.02)	0.10	2.6	30.00
TOTAL AREA(ACRES) =			2.6				

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.30 Tc(MIN.) = 6.278
EFFECTIVE AREA(ACRES) = 2.52 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.6
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 38.00 TO NODE 50.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.23 DOWNSTREAM(FEET) = 1007.78
FLOW LENGTH(FEET) = 116.67 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.51
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.30
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 6.54
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 673.59 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.54
RAINFALL INTENSITY(INCH/HR) = 3.48
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.52
TOTAL STREAM AREA(ACRES) = 2.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.30

FLOW PROCESS FROM NODE 48.00 TO NODE 49.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 151.25
ELEVATION DATA: UPSTREAM(FEET) = 1028.84 DOWNSTREAM(FEET) = 1016.17

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.28	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 1.02

TOTAL AREA(ACRES) = 0.28 PEAK FLOW RATE(CFS) = 1.02

FLOW PROCESS FROM NODE 49.00 TO NODE 50.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.13 DOWNSTREAM(FEET) = 1007.78
FLOW LENGTH(FEET) = 45.67 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.57
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.02
PIPE TRAVEL TIME(MIN.) = 0.08 T_c (MIN.) = 5.08
LONGEST FLOWPATH FROM NODE 48.00 TO NODE 50.00 = 196.92 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.08
RAINFALL INTENSITY(INCH/HR) = 4.02
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10

EFFECTIVE STREAM AREA(ACRES) = 0.28
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.02

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.87	5.32	3.920	0.21(0.02)	0.10	2.1	42.00
1	7.93	5.43	3.873	0.21(0.02)	0.10	2.1	46.00
1	8.29	6.47	3.503	0.21(0.02)	0.10	2.5	39.00
1	8.30	6.54	3.482	0.21(0.02)	0.10	2.5	32.00
1	8.29	6.55	3.477	0.21(0.02)	0.10	2.5	36.00
1	8.15	6.88	3.380	0.21(0.02)	0.10	2.6	30.00
2	1.02	5.08	4.023	0.20(0.02)	0.10	0.3	48.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.74	5.08	4.023	0.21(0.02)	0.10	2.3	48.00
2	8.86	5.32	3.920	0.21(0.02)	0.10	2.4	42.00
3	8.91	5.43	3.873	0.21(0.02)	0.10	2.4	46.00
4	9.18	6.47	3.503	0.21(0.02)	0.10	2.8	39.00
5	9.18	6.54	3.482	0.21(0.02)	0.10	2.8	32.00
6	9.17	6.55	3.477	0.21(0.02)	0.10	2.8	36.00
7	9.00	6.88	3.380	0.21(0.02)	0.10	2.8	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.18 Tc(MIN.) = 6.54
 EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.8
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 673.59 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.78 DOWNSTREAM(FEET) = 1006.43
 FLOW LENGTH(FEET) = 78.73 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.70
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.18
 PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 6.69
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.69
RAINFALL INTENSITY(INCH/HR) = 3.44
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.80
TOTAL STREAM AREA(ACRES) = 2.83
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.18

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 166.42
ELEVATION DATA: UPSTREAM(FEET) = 1020.38 DOWNSTREAM(FEET) = 1014.22

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.36	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.31
TOTAL AREA(ACRES) = 0.36 PEAK FLOW RATE(CFS) = 1.31

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.39 DOWNSTREAM(FEET) = 1006.43
FLOW LENGTH(FEET) = 36.21 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.67
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.31

PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 5.06
 LONGEST FLOWPATH FROM NODE 51.00 TO NODE 53.00 = 202.63 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.06
 RAINFALL INTENSITY(INCH/HR) = 4.03
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.36
 TOTAL STREAM AREA(ACRES) = 0.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.31

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.74	5.24	3.953	0.21(0.02)	0.10	2.3	48.00
1	8.86	5.47	3.855	0.21(0.02)	0.10	2.4	42.00
1	8.91	5.59	3.810	0.21(0.02)	0.10	2.4	46.00
1	9.18	6.62	3.457	0.21(0.02)	0.10	2.8	39.00
1	9.18	6.69	3.436	0.21(0.02)	0.10	2.8	32.00
1	9.17	6.70	3.432	0.21(0.02)	0.10	2.8	36.00
1	9.00	7.04	3.338	0.21(0.02)	0.10	2.8	30.00
2	1.31	5.06	4.033	0.20(0.02)	0.10	0.4	51.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.92	5.06	4.033	0.21(0.02)	0.10	2.6	51.00
2	10.02	5.24	3.953	0.21(0.02)	0.10	2.7	48.00
3	10.11	5.47	3.855	0.21(0.02)	0.10	2.7	42.00
4	10.14	5.59	3.810	0.21(0.02)	0.10	2.8	46.00
5	10.30	6.62	3.457	0.21(0.02)	0.10	3.1	39.00
6	10.29	6.69	3.436	0.21(0.02)	0.10	3.2	32.00
7	10.28	6.70	3.432	0.21(0.02)	0.10	3.2	36.00
8	10.09	7.04	3.338	0.21(0.02)	0.10	3.2	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 10.30 Tc(MIN.) = 6.62
 EFFECTIVE AREA(ACRES) = 3.14 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.2
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.43 DOWNSTREAM(FEET) = 1004.41
 FLOW LENGTH(FEET) = 83.70 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.84
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.30
 PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 6.76
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 54.00 = 836.02 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 3.2 TC(MIN.) = 6.76
 EFFECTIVE AREA(ACRES) = 3.14 AREA-AVERAGED Fm(INCH/HR)= 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 10.30

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.92	5.20	3.970	0.21(0.02)	0.10	2.6	51.00
2	10.02	5.38	3.893	0.21(0.02)	0.10	2.7	48.00
3	10.11	5.61	3.798	0.21(0.02)	0.10	2.7	42.00
4	10.14	5.73	3.755	0.21(0.02)	0.10	2.8	46.00
5	10.30	6.76	3.416	0.21(0.02)	0.10	3.1	39.00
6	10.29	6.83	3.395	0.21(0.02)	0.10	3.2	32.00
7	10.28	6.84	3.391	0.21(0.02)	0.10	3.2	36.00
8	10.09	7.18	3.300	0.21(0.02)	0.10	3.2	30.00

=====

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 25-YEAR STORM EVENT CD *

FILE NAME: C3P25R.DAT
TIME/DATE OF STUDY: 10:42 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 297.89
ELEVATION DATA: UPSTREAM(FEET) = 1026.09 DOWNSTREAM(FEET) = 1016.12

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.856
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.411
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL C 0.24 0.25 0.100 69 5.86
COMMERCIAL D 0.38 0.20 0.100 75 5.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.45
TOTAL AREA(ACRES) = 0.62 PEAK FLOW RATE(CFS) = 2.45

FLOW PROCESS FROM NODE 31.00 TO NODE 31.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.12 DOWNSTREAM(FEET) = 1011.67
FLOW LENGTH(FEET) = 19.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.79
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.45
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 31.10 = 317.64 FEET.

FLOW PROCESS FROM NODE 31.10 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.67 DOWNSTREAM(FEET) = 1010.76
FLOW LENGTH(FEET) = 99.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.45
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 6.22
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.22
RAINFALL INTENSITY(INCH/HR) = 4.26
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.62
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.45

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 315.12
ELEVATION DATA: UPSTREAM(FEET) = 1027.10 DOWNSTREAM(FEET) = 1015.39

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.865
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.407
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.24	0.25	0.100	69	5.86
COMMERCIAL	D	0.57	0.20	0.100	75	5.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.20
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 3.20

FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.39 DOWNSTREAM(FEET) = 1010.76
FLOW LENGTH(FEET) = 17.68 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.58
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.20

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 32.00 TO NODE 35.00 = 332.80 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.89
RAINFALL INTENSITY(INCH/HR) = 4.40
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.81
TOTAL STREAM AREA(ACRES) = 0.81
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.20

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.45	6.22	4.263	0.22(0.02)	0.10	0.6	30.00
2	3.20	5.89	4.397	0.21(0.02)	0.10	0.8	32.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.59	5.89	4.397	0.22(0.02)	0.10	1.4	32.00
2	5.55	6.22	4.263	0.22(0.02)	0.10	1.4	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.59 Tc(MIN.) = 5.89
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.76 DOWNSTREAM(FEET) = 1009.66
FLOW LENGTH(FEET) = 118.03 MANNING'S N = 0.012

DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.02
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.59
 PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 6.21
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

 FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.21
 RAINFALL INTENSITY(INCH/HR) = 4.26
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.40
 TOTAL STREAM AREA(ACRES) = 1.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.59

 FLOW PROCESS FROM NODE 39.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 349.13
 ELEVATION DATA: UPSTREAM(FEET) = 1027.64 DOWNSTREAM(FEET) = 1015.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.146
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.292
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.25	0.25	0.100	69	6.15
COMMERCIAL	D	0.24	0.20	0.100	75	6.15

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.88
 TOTAL AREA(ACRES) = 0.49 PEAK FLOW RATE(CFS) = 1.88

 FLOW PROCESS FROM NODE 41.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.04 DOWNSTREAM(FEET) = 1009.66
 FLOW LENGTH(FEET) = 9.75 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.08
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.88
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 6.15
 LONGEST FLOWPATH FROM NODE 39.00 TO NODE 45.00 = 358.88 FEET.

 FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.15
 RAINFALL INTENSITY(INCH/HR) = 4.29
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.23
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.49
 TOTAL STREAM AREA(ACRES) = 0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.88

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.59	6.21	4.265	0.22(0.02)	0.10	1.4	32.00
1	5.55	6.55	4.141	0.22(0.02)	0.10	1.4	30.00
2	1.88	6.15	4.288	0.23(0.02)	0.10	0.5	39.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.45	6.15	4.288	0.22(0.02)	0.10	1.9	39.00
2	7.46	6.21	4.265	0.22(0.02)	0.10	1.9	32.00
3	7.37	6.55	4.141	0.22(0.02)	0.10	1.9	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.46 Tc(MIN.) = 6.21
 EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

```

*****
FLOW PROCESS FROM NODE 45.00 TO NODE 43.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.66 DOWNSTREAM(FEET) = 1009.52
FLOW LENGTH(FEET) = 14.50 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.65
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.46
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 6.25
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 43.10 = 549.17 FEET.
*****
FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.25
RAINFALL INTENSITY(INCH/HR) = 4.25
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.89
TOTAL STREAM AREA(ACRES) = 1.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.46
*****
FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 183.42
ELEVATION DATA: UPSTREAM(FEET) = 1020.02 DOWNSTREAM(FEET) = 1015.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.029
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.808
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.20 0.20 0.100 75 5.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

```

```

SUBAREA RUNOFF(CFS) = 0.86
TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 0.86

```

```

*****
FLOW PROCESS FROM NODE 43.00 TO NODE 43.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.04 DOWNSTREAM(FEET) = 1009.52
FLOW LENGTH(FEET) = 9.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.96
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.86
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 43.10 = 193.17 FEET.
*****
FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.80
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.86

```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.45	6.19	4.274	0.22(0.02)	0.10	1.9	39.00
1	7.46	6.25	4.251	0.22(0.02)	0.10	1.9	32.00
1	7.37	6.58	4.128	0.22(0.02)	0.10	1.9	30.00
2	0.86	5.04	4.802	0.20(0.02)	0.10	0.2	42.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.68	5.04	4.802	0.22(0.02)	0.10	1.7	42.00

```

2      8.22  6.19  4.274  0.22( 0.02)  0.10    2.1   39.00
3      8.22  6.25  4.251  0.22( 0.02)  0.10    2.1   32.00
4      8.11  6.58  4.128  0.22( 0.02)  0.10    2.1   30.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) =      8.22   Tc(MIN.) =      6.25
EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) =      2.1
LONGEST FLOWPATH FROM NODE      30.00 TO NODE      43.10 =      549.17 FEET.

```

```

FLOW PROCESS FROM NODE      43.10 TO NODE      38.00 IS CODE = 31

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.52 DOWNSTREAM(FEET) = 1009.23
FLOW LENGTH(FEET) =      7.75   MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.34
ESTIMATED PIPE DIAMETER(INCH) = 15.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) =      8.22
PIPE TRAVEL TIME(MIN.) = 0.01   Tc(MIN.) = 6.26
LONGEST FLOWPATH FROM NODE      30.00 TO NODE      38.00 =      556.92 FEET.

```

```

FLOW PROCESS FROM NODE      38.00 TO NODE      38.00 IS CODE = 10

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```

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

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```

FLOW PROCESS FROM NODE      36.00 TO NODE      37.00 IS CODE = 21

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

```

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 214.48
ELEVATION DATA: UPSTREAM(FEET) = 1017.70 DOWNSTREAM(FEET) = 1014.59

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.070
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.323
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.20   0.20   0.100  75   6.07
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

```

```

SUBAREA RUNOFF(CFS) =      0.77
TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.77

```

```

FLOW PROCESS FROM NODE      37.00 TO NODE      38.10 IS CODE = 31

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 1011.59 DOWNSTREAM(FEET) = 1009.99
FLOW LENGTH(FEET) =      39.58   MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.48
ESTIMATED PIPE DIAMETER(INCH) = 6.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) =      0.77
PIPE TRAVEL TIME(MIN.) = 0.10   Tc(MIN.) = 6.17
LONGEST FLOWPATH FROM NODE      36.00 TO NODE      38.10 =      254.06 FEET.

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FLOW PROCESS FROM NODE      38.10 TO NODE      38.10 IS CODE = 1

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.17
RAINFALL INTENSITY(INCH/HR) = 4.28
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) =      0.20
TOTAL STREAM AREA(ACRES) =      0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.77

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FLOW PROCESS FROM NODE      46.00 TO NODE      47.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 154.53
ELEVATION DATA: UPSTREAM(FEET) = 1017.12 DOWNSTREAM(FEET) = 1014.08

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.008
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.819
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.23   0.20   0.100  75   5.01

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.99
 TOTAL AREA(ACRES) = 0.23 PEAK FLOW RATE(CFS) = 0.99

 FLOW PROCESS FROM NODE 47.00 TO NODE 38.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.08 DOWNSTREAM(FEET) = 1009.99
 FLOW LENGTH(FEET) = 19.07 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.83
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.99
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.05
 LONGEST FLOWPATH FROM NODE 46.00 TO NODE 38.10 = 173.60 FEET.

 FLOW PROCESS FROM NODE 38.10 TO NODE 38.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 4.80
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.23
 TOTAL STREAM AREA(ACRES) = 0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.99

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.77	6.17	4.282	0.20(0.02)	0.10	0.2	36.00
2	0.99	5.05	4.797	0.20(0.02)	0.10	0.2	46.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.70	5.05	4.797	0.20(0.02)	0.10	0.4	46.00

2 1.66 6.17 4.282 0.20(0.02) 0.10 0.4 36.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 1.70 Tc(MIN.) = 5.05
 EFFECTIVE AREA(ACRES) = 0.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.4
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.10 = 254.06 FEET.

 FLOW PROCESS FROM NODE 38.10 TO NODE 38.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.99 DOWNSTREAM(FEET) = 1009.23
 FLOW LENGTH(FEET) = 39.58 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.94
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.70
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.16
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

 FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.70	5.16	4.738	0.20(0.02)	0.10	0.4	46.00
2	1.66	6.28	4.239	0.20(0.02)	0.10	0.4	36.00

LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.68	5.05	4.796	0.22(0.02)	0.10	1.7	42.00
2	8.22	6.20	4.270	0.22(0.02)	0.10	2.1	39.00
3	8.22	6.26	4.247	0.22(0.02)	0.10	2.1	32.00
4	8.11	6.60	4.124	0.22(0.02)	0.10	2.1	30.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.37	5.05	4.796	0.21(0.02)	0.10	2.1	42.00

```

2      9.43  5.16  4.738  0.21( 0.02) 0.10    2.2  46.00
3      9.88  6.20  4.270  0.21( 0.02) 0.10    2.5  39.00
4      9.89  6.26  4.247  0.21( 0.02) 0.10    2.5  32.00
5      9.88  6.28  4.239  0.21( 0.02) 0.10    2.5  36.00
6      9.72  6.60  4.124  0.21( 0.02) 0.10    2.6  30.00
TOTAL AREA(ACRES) =          2.6

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =          9.89  Tc(MIN.) =          6.263
EFFECTIVE AREA(ACRES) =          2.52  AREA-AVERAGED Fm(INCH/HR) =          0.02
AREA-AVERAGED Fp(INCH/HR) =          0.21  AREA-AVERAGED Ap =          0.10
TOTAL AREA(ACRES) =          2.6
LONGEST FLOWPATH FROM NODE          30.00 TO NODE          38.00 =          556.92 FEET.

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*****
FLOW PROCESS FROM NODE          38.00 TO NODE          38.00 IS CODE =          12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE          38.00 TO NODE          50.00 IS CODE =          31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) =          1009.23  DOWNSTREAM(FEET) =          1007.78
FLOW LENGTH(FEET) =          116.67  MANNING'S N =          0.012
DEPTH OF FLOW IN          18.0 INCH PIPE IS          12.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =          7.78
ESTIMATED PIPE DIAMETER(INCH) =          18.00  NUMBER OF PIPES =          1
PIPE-FLOW(CFS) =          9.89
PIPE TRAVEL TIME(MIN.) =          0.25  Tc(MIN.) =          6.51
LONGEST FLOWPATH FROM NODE          30.00 TO NODE          50.00 =          673.59 FEET.

```

```

*****
FLOW PROCESS FROM NODE          50.00 TO NODE          50.00 IS CODE =          1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS =          2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM          1 ARE:
TIME OF CONCENTRATION(MIN.) =          6.51
RAINFALL INTENSITY(INCH/HR) =          4.15
AREA-AVERAGED Fm(INCH/HR) =          0.02
AREA-AVERAGED Fp(INCH/HR) =          0.21
AREA-AVERAGED Ap =          0.10
EFFECTIVE STREAM AREA(ACRES) =          2.52
TOTAL STREAM AREA(ACRES) =          2.55
PEAK FLOW RATE(CFS) AT CONFLUENCE =          9.89

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*****
FLOW PROCESS FROM NODE          48.00 TO NODE          49.00 IS CODE =          21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) =          151.25
ELEVATION DATA: UPSTREAM(FEET) =          1028.84  DOWNSTREAM(FEET) =          1016.17

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =          5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =          4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/          SCS SOIL          AREA          Fp          Ap          SCS          Tc
LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D          0.28          0.20          0.100          75          5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =          0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =          0.100
SUBAREA RUNOFF(CFS) =          1.21
TOTAL AREA(ACRES) =          0.28  PEAK FLOW RATE(CFS) =          1.21

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```

*****
FLOW PROCESS FROM NODE          49.00 TO NODE          50.00 IS CODE =          31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----

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ELEVATION DATA: UPSTREAM(FEET) =          1012.13  DOWNSTREAM(FEET) =          1007.78
FLOW LENGTH(FEET) =          45.67  MANNING'S N =          0.012
DEPTH OF FLOW IN          6.0 INCH PIPE IS          3.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =          9.96
ESTIMATED PIPE DIAMETER(INCH) =          6.00  NUMBER OF PIPES =          1
PIPE-FLOW(CFS) =          1.21
PIPE TRAVEL TIME(MIN.) =          0.08  Tc(MIN.) =          5.08
LONGEST FLOWPATH FROM NODE          48.00 TO NODE          50.00 =          196.92 FEET.

```

```

*****
FLOW PROCESS FROM NODE          50.00 TO NODE          50.00 IS CODE =          1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
-----

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TOTAL NUMBER OF STREAMS =          2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM          2 ARE:
TIME OF CONCENTRATION(MIN.) =          5.08
RAINFALL INTENSITY(INCH/HR) =          4.78
AREA-AVERAGED Fm(INCH/HR) =          0.02
AREA-AVERAGED Fp(INCH/HR) =          0.20
AREA-AVERAGED Ap =          0.10

```

EFFECTIVE STREAM AREA(ACRES) = 0.28
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.21

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.37	5.30	4.665	0.21(0.02)	0.10	2.1	42.00
1	9.43	5.41	4.612	0.21(0.02)	0.10	2.2	46.00
1	9.88	6.45	4.175	0.21(0.02)	0.10	2.5	39.00
1	9.89	6.51	4.153	0.21(0.02)	0.10	2.5	32.00
1	9.88	6.53	4.146	0.21(0.02)	0.10	2.5	36.00
1	9.72	6.85	4.038	0.21(0.02)	0.10	2.6	30.00
2	1.21	5.08	4.782	0.20(0.02)	0.10	0.3	48.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.40	5.08	4.782	0.21(0.02)	0.10	2.3	48.00
2	10.55	5.30	4.665	0.21(0.02)	0.10	2.4	42.00
3	10.60	5.41	4.612	0.21(0.02)	0.10	2.4	46.00
4	10.94	6.45	4.175	0.21(0.02)	0.10	2.8	39.00
5	10.94	6.51	4.153	0.21(0.02)	0.10	2.8	32.00
6	10.93	6.53	4.146	0.21(0.02)	0.10	2.8	36.00
7	10.74	6.85	4.038	0.21(0.02)	0.10	2.8	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 10.94 Tc(MIN.) = 6.51
 EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.8
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 673.59 FEET.

 FLOW PROCESS FROM NODE 50.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.78 DOWNSTREAM(FEET) = 1006.43
 FLOW LENGTH(FEET) = 78.73 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.94
 PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 6.66
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.66
 RAINFALL INTENSITY(INCH/HR) = 4.10
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.80
 TOTAL STREAM AREA(ACRES) = 2.83
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.94

 FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 166.42
 ELEVATION DATA: UPSTREAM(FEET) = 1020.38 DOWNSTREAM(FEET) = 1014.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.36	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.56
 TOTAL AREA(ACRES) = 0.36 PEAK FLOW RATE(CFS) = 1.56

 FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.39 DOWNSTREAM(FEET) = 1006.43
 FLOW LENGTH(FEET) = 36.21 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.08
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.56

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.05
 LONGEST FLOWPATH FROM NODE 51.00 TO NODE 53.00 = 202.63 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 4.79
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.36
 TOTAL STREAM AREA(ACRES) = 0.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.56

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.40	5.22	4.706	0.21(0.02)	0.10	2.3	48.00
1	10.55	5.45	4.594	0.21(0.02)	0.10	2.4	42.00
1	10.60	5.56	4.543	0.21(0.02)	0.10	2.4	46.00
1	10.94	6.60	4.123	0.21(0.02)	0.10	2.8	39.00
1	10.94	6.66	4.102	0.21(0.02)	0.10	2.8	32.00
1	10.93	6.68	4.095	0.21(0.02)	0.10	2.8	36.00
1	10.74	6.99	3.990	0.21(0.02)	0.10	2.8	30.00
2	1.56	5.05	4.794	0.20(0.02)	0.10	0.4	51.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.81	5.05	4.794	0.21(0.02)	0.10	2.6	51.00
2	11.93	5.22	4.706	0.21(0.02)	0.10	2.7	48.00
3	12.04	5.45	4.594	0.21(0.02)	0.10	2.8	42.00
4	12.07	5.56	4.543	0.21(0.02)	0.10	2.8	46.00
5	12.27	6.60	4.123	0.21(0.02)	0.10	3.1	39.00
6	12.27	6.66	4.102	0.21(0.02)	0.10	3.2	32.00
7	12.26	6.68	4.095	0.21(0.02)	0.10	3.2	36.00
8	12.04	6.99	3.990	0.21(0.02)	0.10	3.2	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 12.27 Tc(MIN.) = 6.60
 EFFECTIVE AREA(ACRES) = 3.14 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.2
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.43 DOWNSTREAM(FEET) = 1004.41
 FLOW LENGTH(FEET) = 83.70 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.59
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 12.27
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.73
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 54.00 = 836.02 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 3.2 TC(MIN.) = 6.73
 EFFECTIVE AREA(ACRES) = 3.14 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 12.27

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.81	5.19	4.724	0.21(0.02)	0.10	2.6	51.00
2	11.93	5.36	4.640	0.21(0.02)	0.10	2.7	48.00
3	12.04	5.58	4.532	0.21(0.02)	0.10	2.8	42.00
4	12.07	5.69	4.483	0.21(0.02)	0.10	2.8	46.00
5	12.27	6.73	4.077	0.21(0.02)	0.10	3.1	39.00
6	12.27	6.79	4.057	0.21(0.02)	0.10	3.2	32.00
7	12.26	6.81	4.050	0.21(0.02)	0.10	3.2	36.00
8	12.04	7.12	3.948	0.21(0.02)	0.10	3.2	30.00

 END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 100-YEAR STORM EVENT CD *

FILE NAME: C3P100R.DAT
TIME/DATE OF STUDY: 10:45 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 297.89
ELEVATION DATA: UPSTREAM(FEET) = 1026.09 DOWNSTREAM(FEET) = 1016.12

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.856
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.652
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.24	0.25	0.100	86	5.86
COMMERCIAL	D	0.38	0.20	0.100	91	5.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.14
TOTAL AREA(ACRES) = 0.62 PEAK FLOW RATE(CFS) = 3.14

FLOW PROCESS FROM NODE 31.00 TO NODE 31.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.12 DOWNSTREAM(FEET) = 1011.67
FLOW LENGTH(FEET) = 19.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.46
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.14
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.88
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 31.10 = 317.64 FEET.

FLOW PROCESS FROM NODE 31.10 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.67 DOWNSTREAM(FEET) = 1010.76
FLOW LENGTH(FEET) = 99.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.18
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.14
PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 6.20
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.20
RAINFALL INTENSITY(INCH/HR) = 5.47
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.62
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.14

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 315.12
ELEVATION DATA: UPSTREAM(FEET) = 1027.10 DOWNSTREAM(FEET) = 1015.39

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.865
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.647
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.24	0.25	0.100	86	5.86
COMMERCIAL	D	0.57	0.20	0.100	91	5.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.10
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 4.10

FLOW PROCESS FROM NODE 34.00 TO NODE 35.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1012.39 DOWNSTREAM(FEET) = 1010.76
FLOW LENGTH(FEET) = 17.68 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.25
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.10

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 32.00 TO NODE 35.00 = 332.80 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.89
RAINFALL INTENSITY(INCH/HR) = 5.63
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.81
TOTAL STREAM AREA(ACRES) = 0.81
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.10

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.14	6.20	5.468	0.22(0.02)	0.10	0.6	30.00
2	4.10	5.89	5.635	0.21(0.02)	0.10	0.8	32.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.17	5.89	5.635	0.22(0.02)	0.10	1.4	32.00
2	7.12	6.20	5.468	0.22(0.02)	0.10	1.4	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.17 Tc(MIN.) = 5.89
EFFECTIVE AREA(ACRES) = 1.40 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 416.64 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.76 DOWNSTREAM(FEET) = 1009.66
FLOW LENGTH(FEET) = 118.03 MANNING'S N = 0.012

DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.50
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.17
 PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 6.19
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

 FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.19
 RAINFALL INTENSITY(INCH/HR) = 5.48
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.40
 TOTAL STREAM AREA(ACRES) = 1.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.17

 FLOW PROCESS FROM NODE 39.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 349.13
 ELEVATION DATA: UPSTREAM(FEET) = 1027.64 DOWNSTREAM(FEET) = 1015.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.146
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.497
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.25	0.25	0.100	86	6.15
COMMERCIAL	D	0.24	0.20	0.100	91	6.15

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.41
 TOTAL AREA(ACRES) = 0.49 PEAK FLOW RATE(CFS) = 2.41

 FLOW PROCESS FROM NODE 41.00 TO NODE 45.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.04 DOWNSTREAM(FEET) = 1009.66
 FLOW LENGTH(FEET) = 9.75 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.19
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.41
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 6.15
 LONGEST FLOWPATH FROM NODE 39.00 TO NODE 45.00 = 358.88 FEET.

 FLOW PROCESS FROM NODE 45.00 TO NODE 45.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.15
 RAINFALL INTENSITY(INCH/HR) = 5.49
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.23
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.49
 TOTAL STREAM AREA(ACRES) = 0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.41

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.17	6.19	5.475	0.22(0.02)	0.10	1.4	32.00
1	7.12	6.51	5.321	0.22(0.02)	0.10	1.4	30.00
2	2.41	6.15	5.493	0.23(0.02)	0.10	0.5	39.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.57	6.15	5.493	0.22(0.02)	0.10	1.9	39.00
2	9.58	6.19	5.475	0.22(0.02)	0.10	1.9	32.00
3	9.46	6.51	5.321	0.22(0.02)	0.10	1.9	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 9.58 Tc(MIN.) = 6.19
 EFFECTIVE AREA(ACRES) = 1.89 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 45.00 = 534.67 FEET.

```

*****
FLOW PROCESS FROM NODE 45.00 TO NODE 43.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.66 DOWNSTREAM(FEET) = 1009.52
FLOW LENGTH(FEET) = 14.50 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.96
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.58
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.22
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 43.10 = 549.17 FEET.
*****
FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.22
RAINFALL INTENSITY(INCH/HR) = 5.46
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.89
TOTAL STREAM AREA(ACRES) = 1.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.58
*****
FLOW PROCESS FROM NODE 42.00 TO NODE 43.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 183.42
ELEVATION DATA: UPSTREAM(FEET) = 1020.02 DOWNSTREAM(FEET) = 1015.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.029
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.167
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.20 0.20 0.100 91 5.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

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```

SUBAREA RUNOFF(CFS) = 1.11
TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 1.11

```

```

*****
FLOW PROCESS FROM NODE 43.00 TO NODE 43.10 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.04 DOWNSTREAM(FEET) = 1009.52
FLOW LENGTH(FEET) = 9.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.96
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.11
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 42.00 TO NODE 43.10 = 193.17 FEET.
*****
FLOW PROCESS FROM NODE 43.10 TO NODE 43.10 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 6.16
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.11

```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.57	6.19	5.475	0.22(0.02)	0.10	1.9	39.00
1	9.58	6.22	5.457	0.22(0.02)	0.10	1.9	32.00
1	9.46	6.54	5.304	0.22(0.02)	0.10	1.9	30.00
2	1.11	5.04	6.160	0.20(0.02)	0.10	0.2	42.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.88	5.04	6.160	0.22(0.02)	0.10	1.7	42.00

```

2      10.55  6.19  5.475  0.22( 0.02) 0.10    2.1    39.00
3      10.56  6.22  5.457  0.22( 0.02) 0.10    2.1    32.00
4      10.41  6.54  5.304  0.22( 0.02) 0.10    2.1    30.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 10.56 Tc(MIN.) = 6.22
EFFECTIVE AREA(ACRES) = 2.09 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 43.10 = 549.17 FEET.

```

```

*****
FLOW PROCESS FROM NODE 43.10 TO NODE 38.00 IS CODE = 31
-----

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----

```

```

ELEVATION DATA: UPSTREAM(FEET) = 1009.52 DOWNSTREAM(FEET) = 1009.23
FLOW LENGTH(FEET) = 7.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.95
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.56
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 6.24
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

```

```

*****
FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 10
-----

```

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
-----

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```

*****
FLOW PROCESS FROM NODE 36.00 TO NODE 37.00 IS CODE = 21
-----

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```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----

```

```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 214.48
ELEVATION DATA: UPSTREAM(FEET) = 1017.70 DOWNSTREAM(FEET) = 1014.59

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.070
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.537
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.20 0.20 0.100 91 6.07
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

```

```

SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 0.99

```

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*****
FLOW PROCESS FROM NODE 37.00 TO NODE 38.10 IS CODE = 31
-----

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1011.59 DOWNSTREAM(FEET) = 1009.99
FLOW LENGTH(FEET) = 39.58 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.77
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.99
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 6.17
LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.10 = 254.06 FEET.

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*****
FLOW PROCESS FROM NODE 38.10 TO NODE 38.10 IS CODE = 1
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```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.17
RAINFALL INTENSITY(INCH/HR) = 5.49
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.99

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*****
FLOW PROCESS FROM NODE 46.00 TO NODE 47.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) = 154.53
ELEVATION DATA: UPSTREAM(FEET) = 1017.12 DOWNSTREAM(FEET) = 1014.08

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.008
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.181
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.23 0.20 0.100 91 5.01

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.28
 TOTAL AREA(ACRES) = 0.23 PEAK FLOW RATE(CFS) = 1.28

 FLOW PROCESS FROM NODE 47.00 TO NODE 38.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.08 DOWNSTREAM(FEET) = 1009.99
 FLOW LENGTH(FEET) = 19.07 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.20
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.28
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.05
 LONGEST FLOWPATH FROM NODE 46.00 TO NODE 38.10 = 173.60 FEET.

 FLOW PROCESS FROM NODE 38.10 TO NODE 38.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 6.15
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.23
 TOTAL STREAM AREA(ACRES) = 0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.28

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.99	6.17	5.487	0.20(0.02)	0.10	0.2	36.00
2	1.28	5.05	6.154	0.20(0.02)	0.10	0.2	46.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.19	5.05	6.154	0.20(0.02)	0.10	0.4	46.00

2 2.13 6.17 5.487 0.20(0.02) 0.10 0.4 36.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 2.19 Tc(MIN.) = 5.05
 EFFECTIVE AREA(ACRES) = 0.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.4
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.10 = 254.06 FEET.

 FLOW PROCESS FROM NODE 38.10 TO NODE 38.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.99 DOWNSTREAM(FEET) = 1009.23
 FLOW LENGTH(FEET) = 39.58 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.21
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.19
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.15
 LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

 FLOW PROCESS FROM NODE 38.00 TO NODE 38.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.19	5.15	6.081	0.20(0.02)	0.10	0.4	46.00
2	2.13	6.27	5.433	0.20(0.02)	0.10	0.4	36.00

LONGEST FLOWPATH FROM NODE 36.00 TO NODE 38.00 = 293.64 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.88	5.05	6.152	0.22(0.02)	0.10	1.7	42.00
2	10.55	6.20	5.470	0.22(0.02)	0.10	2.1	39.00
3	10.56	6.24	5.452	0.22(0.02)	0.10	2.1	32.00
4	10.41	6.55	5.299	0.22(0.02)	0.10	2.1	30.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 38.00 = 556.92 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.05	5.05	6.152	0.21(0.02)	0.10	2.1	42.00

```

2      12.12  5.15  6.081  0.21( 0.02) 0.10    2.2   46.00
3      12.69  6.20  5.470  0.21( 0.02) 0.10    2.5   39.00
4      12.69  6.24  5.452  0.21( 0.02) 0.10    2.5   32.00
5      12.67  6.27  5.433  0.21( 0.02) 0.10    2.5   36.00
6      12.49  6.55  5.299  0.21( 0.02) 0.10    2.6   30.00
TOTAL AREA(ACRES) =          2.6

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

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PEAK FLOW RATE(CFS) =      12.69  Tc(MIN.) =      6.235
EFFECTIVE AREA(ACRES) =      2.52  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      2.6
LONGEST FLOWPATH FROM NODE      30.00 TO NODE      38.00 =      556.92 FEET.

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*****
FLOW PROCESS FROM NODE      38.00 TO NODE      38.00 IS CODE = 12

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>>>>CLEAR MEMORY BANK # 1 <<<<

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*****
FLOW PROCESS FROM NODE      38.00 TO NODE      50.00 IS CODE = 31

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

```

ELEVATION DATA: UPSTREAM(FEET) = 1009.23  DOWNSTREAM(FEET) = 1007.78
FLOW LENGTH(FEET) = 116.67  MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.34
ESTIMATED PIPE DIAMETER(INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.69
PIPE TRAVEL TIME(MIN.) = 0.23  Tc(MIN.) = 6.47
LONGEST FLOWPATH FROM NODE      30.00 TO NODE      50.00 =      673.59 FEET.

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```

*****
FLOW PROCESS FROM NODE      50.00 TO NODE      50.00 IS CODE = 1

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```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.47
RAINFALL INTENSITY(INCH/HR) = 5.34
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.52
TOTAL STREAM AREA(ACRES) = 2.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.69

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FLOW PROCESS FROM NODE      48.00 TO NODE      49.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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*****
INITIAL SUBAREA FLOW-LENGTH(FEET) = 151.25
ELEVATION DATA: UPSTREAM(FEET) = 1028.84  DOWNSTREAM(FEET) = 1016.17

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA  Fp      Ap      SCS  Tc
LAND USE      GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL      D      0.28      0.20      0.100      91      5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.55
TOTAL AREA(ACRES) = 0.28  PEAK FLOW RATE(CFS) = 1.55

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*****
FLOW PROCESS FROM NODE      49.00 TO NODE      50.00 IS CODE = 31

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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```

ELEVATION DATA: UPSTREAM(FEET) = 1012.13  DOWNSTREAM(FEET) = 1007.78
FLOW LENGTH(FEET) = 45.67  MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.46
ESTIMATED PIPE DIAMETER(INCH) = 6.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.55
PIPE TRAVEL TIME(MIN.) = 0.07  Tc(MIN.) = 5.07
LONGEST FLOWPATH FROM NODE      48.00 TO NODE      50.00 =      196.92 FEET.

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```

*****
FLOW PROCESS FROM NODE      50.00 TO NODE      50.00 IS CODE = 1

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```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

```

```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.07
RAINFALL INTENSITY(INCH/HR) = 6.14
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10

```

EFFECTIVE STREAM AREA(ACRES) = 0.28
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.55

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.05	5.29	5.988	0.21(0.02)	0.10	2.1	42.00
1	12.12	5.40	5.922	0.21(0.02)	0.10	2.2	46.00
1	12.69	6.43	5.355	0.21(0.02)	0.10	2.5	39.00
1	12.69	6.47	5.339	0.21(0.02)	0.10	2.5	32.00
1	12.67	6.51	5.320	0.21(0.02)	0.10	2.5	36.00
1	12.49	6.79	5.194	0.21(0.02)	0.10	2.6	30.00
2	1.55	5.07	6.136	0.20(0.02)	0.10	0.3	48.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.38	5.07	6.136	0.21(0.02)	0.10	2.3	48.00
2	13.56	5.29	5.988	0.21(0.02)	0.10	2.4	42.00
3	13.62	5.40	5.922	0.21(0.02)	0.10	2.4	46.00
4	14.04	6.43	5.355	0.21(0.02)	0.10	2.8	39.00
5	14.04	6.47	5.339	0.21(0.02)	0.10	2.8	32.00
6	14.02	6.51	5.320	0.21(0.02)	0.10	2.8	36.00
7	13.80	6.79	5.194	0.21(0.02)	0.10	2.8	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 14.04 Tc(MIN.) = 6.47
 EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.8
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 673.59 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.78 DOWNSTREAM(FEET) = 1006.43
 FLOW LENGTH(FEET) = 78.73 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.37
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.04
 PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 6.61
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.61
 RAINFALL INTENSITY(INCH/HR) = 5.27
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.80
 TOTAL STREAM AREA(ACRES) = 2.83
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.04

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 166.42
 ELEVATION DATA: UPSTREAM(FEET) = 1020.38 DOWNSTREAM(FEET) = 1014.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC I II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.36	0.20	0.100	91	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.00
 TOTAL AREA(ACRES) = 0.36 PEAK FLOW RATE(CFS) = 2.00

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.39 DOWNSTREAM(FEET) = 1006.43
 FLOW LENGTH(FEET) = 36.21 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.91
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.00

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.05
 LONGEST FLOWPATH FROM NODE 51.00 TO NODE 53.00 = 202.63 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 6.15
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.36
 TOTAL STREAM AREA(ACRES) = 0.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.00

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.38	5.21	6.041	0.21(0.02)	0.10	2.3	48.00
1	13.56	5.43	5.899	0.21(0.02)	0.10	2.4	42.00
1	13.62	5.54	5.836	0.21(0.02)	0.10	2.4	46.00
1	14.04	6.57	5.290	0.21(0.02)	0.10	2.8	39.00
1	14.04	6.61	5.274	0.21(0.02)	0.10	2.8	32.00
1	14.02	6.65	5.256	0.21(0.02)	0.10	2.8	36.00
1	13.80	6.93	5.133	0.21(0.02)	0.10	2.8	30.00
2	2.00	5.05	6.152	0.20(0.02)	0.10	0.4	51.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.20	5.05	6.152	0.21(0.02)	0.10	2.6	51.00
2	15.34	5.21	6.041	0.21(0.02)	0.10	2.7	48.00
3	15.48	5.43	5.899	0.21(0.02)	0.10	2.8	42.00
4	15.52	5.54	5.836	0.21(0.02)	0.10	2.8	46.00
5	15.76	6.57	5.290	0.21(0.02)	0.10	3.1	39.00
6	15.75	6.61	5.274	0.21(0.02)	0.10	3.2	32.00
7	15.72	6.65	5.256	0.21(0.02)	0.10	3.2	36.00
8	15.47	6.93	5.133	0.21(0.02)	0.10	3.2	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 15.76 Tc(MIN.) = 6.57
 EFFECTIVE AREA(ACRES) = 3.15 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.2
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 752.32 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.43 DOWNSTREAM(FEET) = 1004.41
 FLOW LENGTH(FEET) = 83.70 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.06
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 15.76
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.70
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 54.00 = 836.02 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 3.2 TC(MIN.) = 6.70
 EFFECTIVE AREA(ACRES) = 3.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 15.76

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.20	5.18	6.065	0.21(0.02)	0.10	2.6	51.00
2	15.34	5.34	5.958	0.21(0.02)	0.10	2.7	48.00
3	15.48	5.56	5.822	0.21(0.02)	0.10	2.8	42.00
4	15.52	5.66	5.761	0.21(0.02)	0.10	2.8	46.00
5	15.76	6.70	5.232	0.21(0.02)	0.10	3.1	39.00
6	15.75	6.73	5.217	0.21(0.02)	0.10	3.2	32.00
7	15.72	6.77	5.200	0.21(0.02)	0.10	3.2	36.00
8	15.47	7.05	5.081	0.21(0.02)	0.10	3.2	30.00

END OF RATIONAL METHOD ANALYSIS

↑

LINE C4

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 10-YEAR STORM EVENT CD *

FILE NAME: C4P10R.DAT
TIME/DATE OF STUDY: 13:11 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 215.00
ELEVATION DATA: UPSTREAM(FEET) = 1014.00 DOWNSTREAM(FEET) = 1012.16

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.751
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.418
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.89	0.20	0.100	75	6.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.72
TOTAL AREA(ACRES) = 0.89 PEAK FLOW RATE(CFS) = 2.72

FLOW PROCESS FROM NODE 81.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.97 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 54.85 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.30
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.72
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 6.90
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.90
RAINFALL INTENSITY(INCH/HR) = 3.38
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.89
TOTAL STREAM AREA(ACRES) = 0.89
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.72

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.79
ELEVATION DATA: UPSTREAM(FEET) = 1016.42 DOWNSTREAM(FEET) = 1012.89

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.11 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.40

FLOW PROCESS FROM NODE 83.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.89 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 21.28 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.36
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.40
PIPE TRAVEL TIME(MIN.) = 0.04 T_c (MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 82.00 TO NODE 83.10 = 142.07 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.04
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.11

TOTAL STREAM AREA(ACRES) = 0.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.40

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.72	6.90	3.376	0.20(0.02)	0.10	0.9	80.00
2	0.40	5.04	4.042	0.20(0.02)	0.10	0.1	82.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.78	6.90	4.042	0.20(0.02)	0.10	0.8	82.00
2	3.06	6.90	3.376	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.06 T_c (MIN.) = 6.90
EFFECTIVE AREA(ACRES) = 1.00 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.08 DOWNSTREAM(FEET) = 1003.69
FLOW LENGTH(FEET) = 153.72 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.37
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.06
PIPE TRAVEL TIME(MIN.) = 0.40 T_c (MIN.) = 7.30
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.30
RAINFALL INTENSITY(INCH/HR) = 3.27
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.00
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.06

 FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 196.36
 ELEVATION DATA: UPSTREAM(FEET) = 1014.84 DOWNSTREAM(FEET) = 1011.43

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.651
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.784

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.41	0.20	0.100	75	5.65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 1.39

TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.39

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.43 DOWNSTREAM(FEET) = 1003.69
 FLOW LENGTH(FEET) = 49.99 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.21
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.39
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.73
 LONGEST FLOWPATH FROM NODE 85.00 TO NODE 87.00 = 246.35 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.73
 RAINFALL INTENSITY(INCH/HR) = 3.75
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.41
 TOTAL STREAM AREA(ACRES) = 0.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.78	5.45	3.864	0.20(0.02)	0.10	0.8	82.00
1	3.06	7.30	3.269	0.20(0.02)	0.10	1.0	80.00
2	1.39	5.73	3.753	0.20(0.02)	0.10	0.4	85.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.14	5.45	3.864	0.20(0.02)	0.10	1.1	82.00
2	4.21	5.73	3.753	0.20(0.02)	0.10	1.2	85.00
3	4.26	7.30	3.269	0.20(0.02)	0.10	1.4	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.26 Tc(MIN.) = 7.30
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.4 TC(MIN.) = 7.30
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 PEAK FLOW RATE(CFS) = 4.26

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.14	5.45	3.864	0.20(0.02)	0.10	1.1	82.00
2	4.21	5.73	3.753	0.20(0.02)	0.10	1.2	85.00
3	4.26	7.30	3.269	0.20(0.02)	0.10	1.4	80.00

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 25-YEAR STORM EVENT CD *

FILE NAME: C4P25R.DAT
TIME/DATE OF STUDY: 13:13 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167 0.0150	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 215.00
ELEVATION DATA: UPSTREAM(FEET) = 1014.00 DOWNSTREAM(FEET) = 1012.16

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.751
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.070
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.89	0.20	0.100	75	6.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.24
TOTAL AREA(ACRES) = 0.89 PEAK FLOW RATE(CFS) = 3.24

FLOW PROCESS FROM NODE 81.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.97 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 54.85 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.56
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.24
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 6.89
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.89
RAINFALL INTENSITY(INCH/HR) = 4.02
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.89
TOTAL STREAM AREA(ACRES) = 0.89
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.24

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.79
ELEVATION DATA: UPSTREAM(FEET) = 1016.42 DOWNSTREAM(FEET) = 1012.89

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.11 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.48
TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.48

FLOW PROCESS FROM NODE 83.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.89 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 21.28 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.79
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.48
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 82.00 TO NODE 83.10 = 142.07 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.80
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.11

TOTAL STREAM AREA(ACRES) = 0.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.48

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.24	6.89	4.023	0.20(0.02)	0.10	0.9	80.00
2	0.48	5.04	4.804	0.20(0.02)	0.10	0.1	82.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.31	6.89	4.804	0.20(0.02)	0.10	0.8	82.00
2	3.64	6.89	4.023	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.64 Tc(MIN.) = 6.89
EFFECTIVE AREA(ACRES) = 1.00 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.08 DOWNSTREAM(FEET) = 1003.69
FLOW LENGTH(FEET) = 153.72 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.59
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.64
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 7.28
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.28
RAINFALL INTENSITY(INCH/HR) = 3.90
AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.00
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.64

 FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 196.36
 ELEVATION DATA: UPSTREAM(FEET) = 1014.84 DOWNSTREAM(FEET) = 1011.43

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.651
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.501
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.41 0.20 0.100 75 5.65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.65
 TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.65

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.43 DOWNSTREAM(FEET) = 1003.69
 FLOW LENGTH(FEET) = 49.99 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.51
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.65
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.73
 LONGEST FLOWPATH FROM NODE 85.00 TO NODE 87.00 = 246.35 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.73
 RAINFALL INTENSITY(INCH/HR) = 4.47
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.41
 TOTAL STREAM AREA(ACRES) = 0.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.65

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.31	5.43	4.603	0.20(0.02)	0.10	0.8	82.00
1	3.64	7.28	3.900	0.20(0.02)	0.10	1.0	80.00
2	1.65	5.73	4.465	0.20(0.02)	0.10	0.4	85.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.92	5.43	4.603	0.20(0.02)	0.10	1.1	82.00
2	5.02	5.73	4.465	0.20(0.02)	0.10	1.2	85.00
3	5.08	7.28	3.900	0.20(0.02)	0.10	1.4	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.08 Tc(MIN.) = 7.28
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.4 TC(MIN.) = 7.28
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 PEAK FLOW RATE(CFS) = 5.08

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.92	5.43	4.603	0.20(0.02)	0.10	1.1	82.00
2	5.02	5.73	4.465	0.20(0.02)	0.10	1.2	85.00
3	5.08	7.28	3.900	0.20(0.02)	0.10	1.4	80.00

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END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 3 *
* 100-YEAR STORM EVENT CD *

FILE NAME: C4P100R.DAT
TIME/DATE OF STUDY: 13:19 11/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 215.00
ELEVATION DATA: UPSTREAM(FEET) = 1014.00 DOWNSTREAM(FEET) = 1012.16

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.751
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.209
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.89 0.20 0.100 91 6.75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.16
TOTAL AREA(ACRES) = 0.89 PEAK FLOW RATE(CFS) = 4.16

FLOW PROCESS FROM NODE 81.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.97 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 54.85 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.87
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.16
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.88
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.88
RAINFALL INTENSITY(INCH/HR) = 5.15
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.89
TOTAL STREAM AREA(ACRES) = 0.89
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.16

FLOW PROCESS FROM NODE 82.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.79
ELEVATION DATA: UPSTREAM(FEET) = 1016.42 DOWNSTREAM(FEET) = 1012.89

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)]^{*0.20}$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA T_c AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.11 0.20 0.100 91 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.61
TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.61

FLOW PROCESS FROM NODE 83.00 TO NODE 83.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.89 DOWNSTREAM(FEET) = 1006.08
FLOW LENGTH(FEET) = 21.28 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.51
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.61
PIPE TRAVEL TIME(MIN.) = 0.03 T_c (MIN.) = 5.03
LONGEST FLOWPATH FROM NODE 82.00 TO NODE 83.10 = 142.07 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 83.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.03
RAINFALL INTENSITY(INCH/HR) = 6.16
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.11

TOTAL STREAM AREA(ACRES) = 0.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.61

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.16	6.88	5.151	0.20(0.02)	0.10	0.9	80.00
2	0.61	5.03	6.163	0.20(0.02)	0.10	0.1	82.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.25	5.03	6.163	0.20(0.02)	0.10	0.8	82.00
2	4.67	6.88	5.151	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.67 T_c (MIN.) = 6.88
EFFECTIVE AREA(ACRES) = 1.00 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 83.10 = 269.85 FEET.

FLOW PROCESS FROM NODE 83.10 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.08 DOWNSTREAM(FEET) = 1003.69
FLOW LENGTH(FEET) = 153.72 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.81
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.67
PIPE TRAVEL TIME(MIN.) = 0.38 T_c (MIN.) = 7.26
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.26
RAINFALL INTENSITY(INCH/HR) = 5.00
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.00
 TOTAL STREAM AREA(ACRES) = 1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.67

 FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 196.36
 ELEVATION DATA: UPSTREAM(FEET) = 1014.84 DOWNSTREAM(FEET) = 1011.43

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.651
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.768
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.41 0.20 0.100 91 5.65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.12
 TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 2.12

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.43 DOWNSTREAM(FEET) = 1003.69
 FLOW LENGTH(FEET) = 49.99 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.48
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.12
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 5.72
 LONGEST FLOWPATH FROM NODE 85.00 TO NODE 87.00 = 246.35 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.72
 RAINFALL INTENSITY(INCH/HR) = 5.73
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.41
 TOTAL STREAM AREA(ACRES) = 0.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.12

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.25	5.41	5.913	0.20(0.02)	0.10	0.8	82.00
1	4.67	7.26	4.997	0.20(0.02)	0.10	1.0	80.00
2	2.12	5.72	5.726	0.20(0.02)	0.10	0.4	85.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.32	5.41	5.913	0.20(0.02)	0.10	1.1	82.00
2	6.44	5.72	5.726	0.20(0.02)	0.10	1.2	85.00
3	6.52	7.26	4.997	0.20(0.02)	0.10	1.4	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.52 Tc(MIN.) = 7.26
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 423.57 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.4 TC(MIN.) = 7.26
 EFFECTIVE AREA(ACRES) = 1.41 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 PEAK FLOW RATE(CFS) = 6.52

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.32	5.41	5.913	0.20(0.02)	0.10	1.1	82.00
2	6.44	5.72	5.726	0.20(0.02)	0.10	1.2	85.00
3	6.52	7.26	4.997	0.20(0.02)	0.10	1.4	80.00

END OF RATIONAL METHOD ANALYSIS

▲

**OUTLET 4 /
LINE D**

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
 * RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 4 & LINE D *
 * 10-YEAR STORM EVENT CD *

FILE NAME: O4P10R.DAT
 TIME/DATE OF STUDY: 16:11 11/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
 1. Relative Flow-Depth = 0.00 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.58
 ELEVATION DATA: UPSTREAM(FEET) = 1011.50 DOWNSTREAM(FEET) = 1010.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.11	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.40
 TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.40

 FLOW PROCESS FROM NODE 83.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1008.04 DOWNSTREAM(FEET) = 1007.36
 FLOW LENGTH(FEET) = 63.75 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.32
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.40
 PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 5.32
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
 =====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.32
 RAINFALL INTENSITY(INCH/HR) = 3.92
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.11
 TOTAL STREAM AREA(ACRES) = 0.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.40

 FLOW PROCESS FROM NODE 70.00 TO NODE 85.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.07
 ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.36

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA T_c AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.10 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 0.36
 TOTAL AREA(ACRES) = 0.10 PEAK FLOW RATE(CFS) = 0.36

 FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.00
 RAINFALL INTENSITY(INCH/HR) = 4.06
 AREA-AVERAGED F_m (INCH/HR) = 0.02
 AREA-AVERAGED F_p (INCH/HR) = 0.20
 AREA-AVERAGED A_p = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.10
 TOTAL STREAM AREA(ACRES) = 0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.36

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.40	5.32	3.918	0.20(0.02)	0.10	0.1	80.00
2	0.36	5.00	4.060	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.40	5.32	3.918	0.20(0.02)	0.10	0.1	80.00
2	0.36	5.00	4.060	0.20(0.02)	0.10	0.1	70.00

1	0.75	5.00	4.060	0.20(0.02)	0.10	0.2	70.00
2	0.75	5.32	3.918	0.20(0.02)	0.10	0.2	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 0.75 T_c (MIN.) = 5.00
 EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED F_m (INCH/HR) = 0.02
 AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
 TOTAL AREA(ACRES) = 0.2
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

 FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.82
 FLOW LENGTH(FEET) = 61.48 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.30
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.75
 PIPE TRAVEL TIME(MIN.) = 0.19 T_c (MIN.) = 5.19
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.19
 RAINFALL INTENSITY(INCH/HR) = 3.97
 AREA-AVERAGED F_m (INCH/HR) = 0.02
 AREA-AVERAGED F_p (INCH/HR) = 0.20
 AREA-AVERAGED A_p = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.20
 TOTAL STREAM AREA(ACRES) = 0.21
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.75

 FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 62.54
 ELEVATION DATA: UPSTREAM(FEET) = 1012.42 DOWNSTREAM(FEET) = 1010.32

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.07 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.25
 TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.25

 FLOW PROCESS FROM NODE 60.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.82
 FLOW LENGTH(FEET) = 13.83 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.83
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.25
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.03
 LONGEST FLOWPATH FROM NODE 59.00 TO NODE 86.00 = 76.37 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.03
 RAINFALL INTENSITY(INCH/HR) = 4.04
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.07
 TOTAL STREAM AREA(ACRES) = 0.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.25

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.75	5.19	3.972	0.20(0.02)	0.10	0.2	70.00
1	0.75	5.51	3.839	0.20(0.02)	0.10	0.2	80.00

2	0.25	5.03	4.044	0.20(0.02)	0.10	0.1	59.00
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.00	5.03	4.044	0.20(0.02)	0.10	0.3	59.00
2	1.00	5.19	3.972	0.20(0.02)	0.10	0.3	70.00
3	0.99	5.51	3.839	0.20(0.02)	0.10	0.3	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.00 Tc(MIN.) = 5.19
 EFFECTIVE AREA(ACRES) = 0.27 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.3
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.82 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 63.56 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.87
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.00
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 5.37
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.37
 RAINFALL INTENSITY(INCH/HR) = 3.90
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.00

 FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 114.20
 ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.08

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
 SUBAREA ANALYSIS USED MINIMUM $T_c(MIN.) = 5.000$
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA T_c AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.21 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(INCH/HR) = 0.20$
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
 SUBAREA RUNOFF(CFS) = 0.76
 TOTAL AREA(ACRES) = 0.21 PEAK FLOW RATE(CFS) = 0.76

 FLOW PROCESS FROM NODE 11.00 TO NODE 11.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE $T_c(MIN.) = 5.00$
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL D 0.56 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(INCH/HR) = 0.20$
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
 SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 2.04
 EFFECTIVE AREA(ACRES) = 0.77 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$ AREA-AVERAGED $A_p = 0.10$
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.80

 FLOW PROCESS FROM NODE 11.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.08 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 29.35 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.83
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.80
 PIPE TRAVEL TIME(MIN.) = 0.04 $T_c(MIN.) = 5.04$
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 87.00 = 143.55 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.04
 RAINFALL INTENSITY(INCH/HR) = 4.04
 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 0.77
 TOTAL STREAM AREA(ACRES) = 0.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.80

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.00	5.21	3.963	0.20(0.02)	0.10	0.3	59.00
1	1.00	5.37	3.895	0.20(0.02)	0.10	0.3	70.00
1	0.99	5.69	3.768	0.20(0.02)	0.10	0.3	80.00
2	2.80	5.04	4.042	0.20(0.02)	0.10	0.8	10.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	3.78	5.04	4.042	0.20(0.02)	0.10	1.0	10.00
2	3.74	5.21	3.963	0.20(0.02)	0.10	1.0	59.00
3	3.70	5.37	3.895	0.20(0.02)	0.10	1.0	70.00
4	3.60	5.69	3.768	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.78 $T_c(MIN.) = 5.04$
 EFFECTIVE AREA(ACRES) = 1.03 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$ AREA-AVERAGED $A_p = 0.10$
 TOTAL AREA(ACRES) = 1.0
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 10

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE      30.00 TO NODE      31.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  111.80
ELEVATION DATA: UPSTREAM(FEET) =  1013.00  DOWNSTREAM(FEET) =  1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            D      0.75    0.20    0.100  75   5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  2.73
TOTAL AREA(ACRES) =  0.75  PEAK FLOW RATE(CFS) =  2.73

*****
FLOW PROCESS FROM NODE      31.00 TO NODE      32.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1006.00  DOWNSTREAM(FEET) =  1004.54
FLOW LENGTH(FEET) =  219.98  MANNING'S N =  0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS  8.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  4.42
ESTIMATED PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  2.73
PIPE TRAVEL TIME(MIN.) =  0.83  Tc(MIN.) =  5.83
LONGEST FLOWPATH FROM NODE  30.00 TO NODE  32.00 =  331.78 FEET.

*****
FLOW PROCESS FROM NODE      32.00 TO NODE      32.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  5.83
RAINFALL INTENSITY(INCH/HR) =  3.72
AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20

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AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.75
TOTAL STREAM AREA(ACRES) =  0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE =  2.73

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  208.68
ELEVATION DATA: UPSTREAM(FEET) =  1011.50  DOWNSTREAM(FEET) =  1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.490
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.496
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            D      0.67    0.20    0.100  75   6.49
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  2.10
TOTAL AREA(ACRES) =  0.67  PEAK FLOW RATE(CFS) =  2.10

*****
FLOW PROCESS FROM NODE      21.00 TO NODE      32.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1006.45  DOWNSTREAM(FEET) =  1004.54
FLOW LENGTH(FEET) =  23.65  MANNING'S N =  0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS  4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.77
ESTIMATED PIPE DIAMETER(INCH) =  9.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  2.10
PIPE TRAVEL TIME(MIN.) =  0.04  Tc(MIN.) =  6.53
LONGEST FLOWPATH FROM NODE  20.00 TO NODE  32.00 =  232.33 FEET.

*****
FLOW PROCESS FROM NODE      32.00 TO NODE      32.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  6.53

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RAINFALL INTENSITY(INCH/HR) = 3.48
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.10

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.73	5.83	3.718	0.20(0.02)	0.10	0.8	30.00
2	2.10	6.53	3.485	0.20(0.02)	0.10	0.7	20.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.72	5.83	3.718	0.20(0.02)	0.10	1.3	30.00
2	4.65	6.53	3.485	0.20(0.02)	0.10	1.4	20.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.72 Tc(MIN.) = 5.83
EFFECTIVE AREA(ACRES) = 1.35 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 331.78 FEET.

FLOW PROCESS FROM NODE 32.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.54 DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 39.13 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.33
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.72
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.95
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 25.50
ELEVATION DATA: UPSTREAM(FEET) = 1012.80 DOWNSTREAM(FEET) = 1012.36

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SC5 SOIL AREA Fp Ap SC5 Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.14 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.51
TOTAL AREA(ACRES) = 0.14 PEAK FLOW RATE(CFS) = 0.51

FLOW PROCESS FROM NODE 41.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.76
FLOW LENGTH(FEET) = 171.72 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.31
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.51
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 5.87
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.87
RAINFALL INTENSITY(INCH/HR) = 3.70
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.14

TOTAL STREAM AREA(ACRES) = 0.14
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.51

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 23.46
ELEVATION DATA: UPSTREAM(FEET) = 1012.69 DOWNSTREAM(FEET) = 1012.54

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.07	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.25
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.25

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.76
FLOW LENGTH(FEET) = 130.92 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.06
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.25
PIPE TRAVEL TIME(MIN.) = 0.71 T_c (MIN.) = 5.71
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 154.38 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.71
RAINFALL INTENSITY(INCH/HR) = 3.76
AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.07
TOTAL STREAM AREA(ACRES) = 0.07
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.25

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.51	5.87	3.705	0.20(0.02)	0.10	0.1	40.00
2	0.25	5.71	3.761	0.20(0.02)	0.10	0.1	50.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.76	5.71	3.761	0.20(0.02)	0.10	0.2	50.00
2	0.76	5.87	3.705	0.20(0.02)	0.10	0.2	40.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 0.76 T_c (MIN.) = 5.87
EFFECTIVE AREA(ACRES) = 0.21 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 5.87
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.22	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.22 SUBAREA RUNOFF(CFS) = 0.73
EFFECTIVE AREA(ACRES) = 0.43 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 1.43

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1005.76 DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 129.97 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.69
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.43
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 6.33
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

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*****
FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 11
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>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<
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** MAIN STREAM CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       1.44  6.18  3.597  0.20( 0.02) 0.10  0.4   50.00
2       1.43  6.33  3.547  0.20( 0.02) 0.10  0.4   40.00
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

```

```

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       4.72  5.95  3.673  0.20( 0.02) 0.10  1.3   30.00
2       4.65  6.65  3.448  0.20( 0.02) 0.10  1.4   20.00
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

```

```

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       6.14  5.95  3.673  0.20( 0.02) 0.10  1.8   30.00
2       6.14  6.18  3.597  0.20( 0.02) 0.10  1.8   50.00
3       6.11  6.33  3.547  0.20( 0.02) 0.10  1.8   40.00
4       6.04  6.65  3.448  0.20( 0.02) 0.10  1.9   20.00
TOTAL AREA(ACRES) = 1.9

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```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 6.14 Tc(MIN.) = 5.953
EFFECTIVE AREA(ACRES) = 1.76 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.9
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

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*****
FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 2 <<<<
=====
*****
FLOW PROCESS FROM NODE 53.00 TO NODE 87.00 IS CODE = 31
-----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1004.25 DOWNSTREAM(FEET) = 1003.97
FLOW LENGTH(FEET) = 39.17 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.66
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.14
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 6.07
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

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*****
FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 11
-----

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>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
-----

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** MAIN STREAM CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       6.14  6.07  3.633  0.20( 0.02) 0.10  1.8   30.00
2       6.14  6.29  3.559  0.20( 0.02) 0.10  1.8   50.00
3       6.11  6.44  3.511  0.20( 0.02) 0.10  1.8   40.00
4       6.04  6.76  3.414  0.20( 0.02) 0.10  1.9   20.00
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

```

```

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       3.78  5.04  4.042  0.20( 0.02) 0.10  1.0   10.00
2       3.74  5.21  3.963  0.20( 0.02) 0.10  1.0   59.00
3       3.70  5.37  3.895  0.20( 0.02) 0.10  1.0   70.00
4       3.60  5.69  3.768  0.20( 0.02) 0.10  1.0   80.00
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

```

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** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       9.46  5.04  4.042  0.20( 0.02) 0.10  2.5   10.00
2       9.50  5.21  3.963  0.20( 0.02) 0.10  2.5   59.00
3       9.53  5.37  3.895  0.20( 0.02) 0.10  2.6   70.00
4       9.58  5.69  3.768  0.20( 0.02) 0.10  2.7   80.00
5       9.61  6.07  3.633  0.20( 0.02) 0.10  2.8   30.00

```

6 9.54 6.29 3.559 0.20(0.02) 0.10 2.8 50.00
 7 9.46 6.44 3.511 0.20(0.02) 0.10 2.9 40.00
 8 9.30 6.76 3.414 0.20(0.02) 0.10 2.9 20.00
 TOTAL AREA(ACRES) = 2.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.61 Tc(MIN.) = 6.068
 EFFECTIVE AREA(ACRES) = 2.81 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

 FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.00 DOWNSTREAM(FEET) = 1003.31
 FLOW LENGTH(FEET) = 142.61 MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.41
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.61
 PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 6.51
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 88.00 = 552.69 FEET.

 FLOW PROCESS FROM NODE 88.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.31 DOWNSTREAM(FEET) = 997.90
 FLOW LENGTH(FEET) = 33.46 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.38
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.61
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.53
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 90.00 = 586.15 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 2.9 TC(MIN.) = 6.53

EFFECTIVE AREA(ACRES) = 2.81 AREA-AVERAGED Fm(INCH/HR)= 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 9.61

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.46	5.51	3.841	0.20(0.02)	0.10	2.5	10.00
2	9.50	5.68	3.773	0.20(0.02)	0.10	2.5	59.00
3	9.53	5.84	3.713	0.20(0.02)	0.10	2.6	70.00
4	9.58	6.16	3.602	0.20(0.02)	0.10	2.7	80.00
5	9.61	6.53	3.482	0.20(0.02)	0.10	2.8	30.00
6	9.54	6.76	3.416	0.20(0.02)	0.10	2.8	50.00
7	9.46	6.91	3.372	0.20(0.02)	0.10	2.9	40.00
8	9.30	7.23	3.285	0.20(0.02)	0.10	2.9	20.00

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 4 & LINE D *
* 25-YEAR STORM EVENT CD *

FILE NAME: O4P25R.DAT
TIME/DATE OF STUDY: 16:26 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
- (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.58
ELEVATION DATA: UPSTREAM(FEET) = 1011.50 DOWNSTREAM(FEET) = 1010.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.11	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.48
TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.48

FLOW PROCESS FROM NODE 83.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.04 DOWNSTREAM(FEET) = 1007.36
FLOW LENGTH(FEET) = 63.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.42
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.48
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 5.31
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.31
RAINFALL INTENSITY(INCH/HR) = 4.66
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.11
TOTAL STREAM AREA(ACRES) = 0.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.48

FLOW PROCESS FROM NODE 70.00 TO NODE 85.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.07
ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.36

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.10 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.43
TOTAL AREA(ACRES) = 0.10 PEAK FLOW RATE(CFS) = 0.43

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.00
RAINFALL INTENSITY(INCH/HR) = 4.82
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.10
TOTAL STREAM AREA(ACRES) = 0.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.43

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.48	5.31	4.662	0.20(0.02)	0.10	0.1	80.00
2	0.43	5.00	4.824	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.48	5.31	4.662	0.20(0.02)	0.10	0.1	80.00
2	0.43	5.00	4.824	0.20(0.02)	0.10	0.1	70.00

1	0.90	5.00	4.824	0.20(0.02)	0.10	0.2	70.00
2	0.89	5.31	4.662	0.20(0.02)	0.10	0.2	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 0.90 T_c (MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.82
FLOW LENGTH(FEET) = 61.48 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.42
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.90
PIPE TRAVEL TIME(MIN.) = 0.19 T_c (MIN.) = 5.19
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.19
RAINFALL INTENSITY(INCH/HR) = 4.72
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.21
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.90

FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 62.54
ELEVATION DATA: UPSTREAM(FEET) = 1012.42 DOWNSTREAM(FEET) = 1010.32

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.07 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.30
 TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.30

 FLOW PROCESS FROM NODE 60.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.82
 FLOW LENGTH(FEET) = 13.83 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.30
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.03
 LONGEST FLOWPATH FROM NODE 59.00 TO NODE 86.00 = 76.37 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.03
 RAINFALL INTENSITY(INCH/HR) = 4.81
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.07
 TOTAL STREAM AREA(ACRES) = 0.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.30

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.90	5.19	4.723	0.20(0.02)	0.10	0.2	70.00
1	0.89	5.50	4.571	0.20(0.02)	0.10	0.2	80.00

2	0.30	5.03	4.807	0.20(0.02)	0.10	0.1	59.00
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.19	5.03	4.807	0.20(0.02)	0.10	0.3	59.00
2	1.19	5.19	4.723	0.20(0.02)	0.10	0.3	70.00
3	1.18	5.50	4.571	0.20(0.02)	0.10	0.3	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.19 Tc(MIN.) = 5.19
 EFFECTIVE AREA(ACRES) = 0.27 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.3
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.82 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 63.56 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.37
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.19
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 5.36
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.36
 RAINFALL INTENSITY(INCH/HR) = 4.64
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.19

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 114.20
ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.08

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.21 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.91
TOTAL AREA(ACRES) = 0.21 PEAK FLOW RATE(CFS) = 0.91

FLOW PROCESS FROM NODE 11.00 TO NODE 11.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 5.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.56 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 0.77 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 3.33

FLOW PROCESS FROM NODE 11.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.08 DOWNSTREAM(FEET) = 1003.97
FLOW LENGTH(FEET) = 29.35 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.39
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.33
PIPE TRAVEL TIME(MIN.) = 0.04 T_c (MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 87.00 = 143.55 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.80
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.77
TOTAL STREAM AREA(ACRES) = 0.77
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.33

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.19	5.20	4.719	0.20(0.02)	0.10	0.3	59.00
1	1.19	5.36	4.640	0.20(0.02)	0.10	0.3	70.00
1	1.18	5.67	4.494	0.20(0.02)	0.10	0.3	80.00
2	3.33	5.04	4.804	0.20(0.02)	0.10	0.8	10.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.50	5.04	4.804	0.20(0.02)	0.10	1.0	10.00
2	4.46	5.20	4.719	0.20(0.02)	0.10	1.0	59.00
3	4.41	5.36	4.640	0.20(0.02)	0.10	1.0	70.00
4	4.29	5.67	4.494	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.50 T_c (MIN.) = 5.04
EFFECTIVE AREA(ACRES) = 1.03 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 10

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE    30.00 TO NODE    31.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  111.80
ELEVATION DATA: UPSTREAM(FEET) =  1013.00  DOWNSTREAM(FEET) =  1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.75    0.20    0.100  75   5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  3.24
TOTAL AREA(ACRES) =  0.75  PEAK FLOW RATE(CFS) =  3.24

*****
FLOW PROCESS FROM NODE    31.00 TO NODE    32.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1006.00  DOWNSTREAM(FEET) =  1004.54
FLOW LENGTH(FEET) =  219.98  MANNING'S N =  0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS  8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  4.71
ESTIMATED PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  3.24
PIPE TRAVEL TIME(MIN.) =  0.78  Tc(MIN.) =  5.78
LONGEST FLOWPATH FROM NODE  30.00 TO NODE  32.00 =  331.78 FEET.

*****
FLOW PROCESS FROM NODE    32.00 TO NODE    32.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  5.78
RAINFALL INTENSITY(INCH/HR) =  4.44
AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20

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AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.75
TOTAL STREAM AREA(ACRES) =  0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE =  3.24

*****
FLOW PROCESS FROM NODE    20.00 TO NODE    21.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  208.68
ELEVATION DATA: UPSTREAM(FEET) =  1011.50  DOWNSTREAM(FEET) =  1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.490
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.162
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.67    0.20    0.100  75   6.49
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  2.50
TOTAL AREA(ACRES) =  0.67  PEAK FLOW RATE(CFS) =  2.50

*****
FLOW PROCESS FROM NODE    21.00 TO NODE    32.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1006.45  DOWNSTREAM(FEET) =  1004.54
FLOW LENGTH(FEET) =  23.65  MANNING'S N =  0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS  4.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.25
ESTIMATED PIPE DIAMETER(INCH) =  9.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  2.50
PIPE TRAVEL TIME(MIN.) =  0.04  Tc(MIN.) =  6.52
LONGEST FLOWPATH FROM NODE  20.00 TO NODE  32.00 =  232.33 FEET.

*****
FLOW PROCESS FROM NODE    32.00 TO NODE    32.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  6.52

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RAINFALL INTENSITY(INCH/HR) = 4.15
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.50

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.24	5.78	4.444	0.20(0.02)	0.10	0.8	30.00
2	2.50	6.52	4.149	0.20(0.02)	0.10	0.7	20.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.61	5.78	4.444	0.20(0.02)	0.10	1.3	30.00
2	5.52	6.52	4.149	0.20(0.02)	0.10	1.4	20.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.61 Tc(MIN.) = 5.78
EFFECTIVE AREA(ACRES) = 1.34 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 331.78 FEET.

FLOW PROCESS FROM NODE 32.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.54 DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 39.13 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.45
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.61
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.90
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 25.50
ELEVATION DATA: UPSTREAM(FEET) = 1012.80 DOWNSTREAM(FEET) = 1012.36

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.14 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.61
TOTAL AREA(ACRES) = 0.14 PEAK FLOW RATE(CFS) = 0.61

FLOW PROCESS FROM NODE 41.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.76
FLOW LENGTH(FEET) = 171.72 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.51
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.61
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 5.82
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.82
RAINFALL INTENSITY(INCH/HR) = 4.43
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.14

TOTAL STREAM AREA(ACRES) = 0.14
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.61

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 23.46
ELEVATION DATA: UPSTREAM(FEET) = 1012.69 DOWNSTREAM(FEET) = 1012.54

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.07	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.30
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.30

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.76
FLOW LENGTH(FEET) = 130.92 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.21
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.30
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 5.68
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 154.38 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.68
RAINFALL INTENSITY(INCH/HR) = 4.49
AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.07
TOTAL STREAM AREA(ACRES) = 0.07
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.30

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.61	5.82	4.428	0.20(0.02)	0.10	0.1	40.00
2	0.30	5.68	4.488	0.20(0.02)	0.10	0.1	50.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.90	5.68	4.488	0.20(0.02)	0.10	0.2	50.00
2	0.90	5.82	4.428	0.20(0.02)	0.10	0.2	40.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 0.90 Tc(MIN.) = 5.82
EFFECTIVE AREA(ACRES) = 0.21 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 5.82
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.428
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.22	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.22 SUBAREA RUNOFF(CFS) = 0.87
EFFECTIVE AREA(ACRES) = 0.43 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 1.71

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.72	5.68	4.488	0.20(0.02)	0.10	0.4	50.00

2 1.71 5.82 4.428 0.20(0.02) 0.10 0.4 40.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) = 1.72 Tc(MIN.) = 5.68
 AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 0.43

 FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.76 DOWNSTREAM(FEET) = 1004.25
 FLOW LENGTH(FEET) = 129.97 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.82
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.72
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 6.13
 LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.72	6.13	4.299	0.20(0.02)	0.10	0.4	50.00
2	1.71	6.27	4.245	0.20(0.02)	0.10	0.4	40.00

LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.61	5.90	4.393	0.20(0.02)	0.10	1.3	30.00
2	5.52	6.64	4.107	0.20(0.02)	0.10	1.4	20.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.30	5.90	4.393	0.20(0.02)	0.10	1.8	30.00
2	7.30	6.13	4.299	0.20(0.02)	0.10	1.8	50.00
3	7.27	6.27	4.245	0.20(0.02)	0.10	1.8	40.00
4	7.17	6.64	4.107	0.20(0.02)	0.10	1.9	20.00

TOTAL AREA(ACRES) = 1.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7.30 Tc(MIN.) = 6.128
 EFFECTIVE AREA(ACRES) = 1.79 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

 FLOW PROCESS FROM NODE 53.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1004.25 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 39.17 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.87
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.30
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 6.24
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.30	6.01	4.347	0.20(0.02)	0.10	1.8	30.00
2	7.30	6.24	4.255	0.20(0.02)	0.10	1.8	50.00
3	7.27	6.38	4.203	0.20(0.02)	0.10	1.8	40.00
4	7.17	6.76	4.068	0.20(0.02)	0.10	1.9	20.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.50	5.04	4.804	0.20(0.02)	0.10	1.0	10.00
2	4.46	5.20	4.719	0.20(0.02)	0.10	1.0	59.00
3	4.41	5.36	4.640	0.20(0.02)	0.10	1.0	70.00
4	4.29	5.67	4.494	0.20(0.02)	0.10	1.0	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.26	5.04	4.804	0.20(0.02)	0.10	2.5	10.00
2	11.31	5.20	4.719	0.20(0.02)	0.10	2.6	59.00
3	11.35	5.36	4.640	0.20(0.02)	0.10	2.6	70.00
4	11.41	5.67	4.494	0.20(0.02)	0.10	2.7	80.00
5	11.45	6.01	4.347	0.20(0.02)	0.10	2.8	30.00
6	11.37	6.24	4.255	0.20(0.02)	0.10	2.8	50.00
7	11.29	6.38	4.203	0.20(0.02)	0.10	2.9	40.00
8	11.06	6.76	4.068	0.20(0.02)	0.10	2.9	20.00
TOTAL AREA(ACRES) =		2.9					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 11.45 Tc(MIN.) = 6.010
EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.9
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.00 DOWNSTREAM(FEET) = 1003.31
FLOW LENGTH(FEET) = 142.61 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.52
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.45
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 6.44
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 88.00 = 552.69 FEET.

FLOW PROCESS FROM NODE 88.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.31 DOWNSTREAM(FEET) = 997.90

FLOW LENGTH(FEET) = 33.46 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.35
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.45
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.47
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 90.00 = 586.15 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.9 TC(MIN.) = 6.47
EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
PEAK FLOW RATE(CFS) = 11.45

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.26	5.49	4.573	0.20(0.02)	0.10	2.5	10.00
2	11.31	5.65	4.499	0.20(0.02)	0.10	2.6	59.00
3	11.35	5.81	4.430	0.20(0.02)	0.10	2.6	70.00
4	11.41	6.12	4.301	0.20(0.02)	0.10	2.7	80.00
5	11.45	6.47	4.170	0.20(0.02)	0.10	2.8	30.00
6	11.37	6.70	4.089	0.20(0.02)	0.10	2.8	50.00
7	11.29	6.83	4.042	0.20(0.02)	0.10	2.9	40.00
8	11.06	7.21	3.920	0.20(0.02)	0.10	2.9	20.00

END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 4 & LINE D *
* 100-YEAR STORM EVENT CD *

FILE NAME: O4P100R.DAT
TIME/DATE OF STUDY: 16:29 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	MANNING LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.58
ELEVATION DATA: UPSTREAM(FEET) = 1011.50 DOWNSTREAM(FEET) = 1010.04

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.11	0.20	0.100	91	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.61
TOTAL AREA(ACRES) = 0.11 PEAK FLOW RATE(CFS) = 0.61

FLOW PROCESS FROM NODE 83.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.04 DOWNSTREAM(FEET) = 1007.36
FLOW LENGTH(FEET) = 63.75 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.57
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.61
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 5.30
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.30
RAINFALL INTENSITY(INCH/HR) = 5.99
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.11
TOTAL STREAM AREA(ACRES) = 0.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.61

FLOW PROCESS FROM NODE 70.00 TO NODE 85.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.07
ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.36

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA T_c AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.10 0.20 0.100 91 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 0.56
TOTAL AREA(ACRES) = 0.10 PEAK FLOW RATE(CFS) = 0.56

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.00
RAINFALL INTENSITY(INCH/HR) = 6.19
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.10
TOTAL STREAM AREA(ACRES) = 0.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.56

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.61	5.30	5.986	0.20(0.02)	0.10	0.1	80.00
2	0.56	5.00	6.187	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.61	5.30	5.986	0.20(0.02)	0.10	0.1	80.00
2	0.56	5.00	6.187	0.20(0.02)	0.10	0.1	70.00

1	1.15	5.00	6.187	0.20(0.02)	0.10	0.2	70.00
2	1.15	5.30	5.986	0.20(0.02)	0.10	0.2	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.15 T_c (MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 85.00 = 163.33 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.82
FLOW LENGTH(FEET) = 61.48 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.99
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.15
PIPE TRAVEL TIME(MIN.) = 0.17 T_c (MIN.) = 5.17
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.17
RAINFALL INTENSITY(INCH/HR) = 6.07
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.20
TOTAL STREAM AREA(ACRES) = 0.21
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.15

FLOW PROCESS FROM NODE 59.00 TO NODE 60.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 62.54
ELEVATION DATA: UPSTREAM(FEET) = 1012.42 DOWNSTREAM(FEET) = 1010.32

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.07 0.20 0.100 91 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.39
 TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.39

 FLOW PROCESS FROM NODE 60.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.82
 FLOW LENGTH(FEET) = 13.83 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.39
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.03
 LONGEST FLOWPATH FROM NODE 59.00 TO NODE 86.00 = 76.37 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 86.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.03
 RAINFALL INTENSITY(INCH/HR) = 6.17
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.07
 TOTAL STREAM AREA(ACRES) = 0.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.15	5.17	6.069	0.20(0.02)	0.10	0.2	70.00
1	1.15	5.47	5.877	0.20(0.02)	0.10	0.2	80.00
2	0.39	5.03	6.166	0.20(0.02)	0.10	0.1	59.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.53	5.03	6.166	0.20(0.02)	0.10	0.3	59.00
2	1.53	5.17	6.069	0.20(0.02)	0.10	0.3	70.00
3	1.52	5.47	5.877	0.20(0.02)	0.10	0.3	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.53 Tc(MIN.) = 5.17
 EFFECTIVE AREA(ACRES) = 0.27 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.3
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 86.00 = 224.81 FEET.

 FLOW PROCESS FROM NODE 86.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.82 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 63.56 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.79
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.53
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 5.33
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.33
 RAINFALL INTENSITY(INCH/HR) = 5.97
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.53

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 114.20
 ELEVATION DATA: UPSTREAM(FEET) = 1012.70 DOWNSTREAM(FEET) = 1010.08

 $T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA T_c AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS T_c
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.21 0.20 0.100 91 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.17
 TOTAL AREA(ACRES) = 0.21 PEAK FLOW RATE(CFS) = 1.17

 FLOW PROCESS FROM NODE 11.00 TO NODE 11.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE T_c (MIN.) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL D 0.56 0.20 0.100 91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 3.11
 EFFECTIVE AREA(ACRES) = 0.77 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 4.27

 FLOW PROCESS FROM NODE 11.00 TO NODE 87.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1007.08 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 29.35 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.14
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.27

PIPE TRAVEL TIME(MIN.) = 0.03 T_c (MIN.) = 5.03
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 87.00 = 143.55 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.03
 RAINFALL INTENSITY(INCH/HR) = 6.16
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.77
 TOTAL STREAM AREA(ACRES) = 0.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.53	5.19	6.059	0.20(0.02)	0.10	0.3	59.00
1	1.53	5.33	5.967	0.20(0.02)	0.10	0.3	70.00
1	1.52	5.63	5.783	0.20(0.02)	0.10	0.3	80.00
2	4.27	5.03	6.163	0.20(0.02)	0.10	0.8	10.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.78	5.03	6.163	0.20(0.02)	0.10	1.0	10.00
2	5.73	5.19	6.059	0.20(0.02)	0.10	1.0	59.00
3	5.67	5.33	5.967	0.20(0.02)	0.10	1.0	70.00
4	5.53	5.63	5.783	0.20(0.02)	0.10	1.0	80.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 5.78 T_c (MIN.) = 5.03
 EFFECTIVE AREA(ACRES) = 1.03 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.0
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 10

 >>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

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*****
FLOW PROCESS FROM NODE    30.00 TO NODE    31.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 111.80
ELEVATION DATA: UPSTREAM(FEET) = 1013.00 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp        Ap    SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.75    0.20    0.100  91   5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.16
TOTAL AREA(ACRES) = 0.75 PEAK FLOW RATE(CFS) = 4.16

*****
FLOW PROCESS FROM NODE    31.00 TO NODE    32.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.54
FLOW LENGTH(FEET) = 219.98 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.97
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.16
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 5.74
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 331.78 FEET.

*****
FLOW PROCESS FROM NODE    32.00 TO NODE    32.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.74
RAINFALL INTENSITY(INCH/HR) = 5.72
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10

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EFFECTIVE STREAM AREA(ACRES) = 0.75
TOTAL STREAM AREA(ACRES) = 0.75
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.16

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*****
FLOW PROCESS FROM NODE    20.00 TO NODE    21.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 208.68
ELEVATION DATA: UPSTREAM(FEET) = 1011.50 DOWNSTREAM(FEET) = 1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.490
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.329
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp        Ap    SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.67    0.20    0.100  91   6.49
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.20
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 3.20

*****
FLOW PROCESS FROM NODE    21.00 TO NODE    32.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1006.45 DOWNSTREAM(FEET) = 1004.54
FLOW LENGTH(FEET) = 23.65 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.94
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.20
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.52
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 32.00 = 232.33 FEET.

*****
FLOW PROCESS FROM NODE    32.00 TO NODE    32.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.52
RAINFALL INTENSITY(INCH/HR) = 5.31

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AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.67
 TOTAL STREAM AREA(ACRES) = 0.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.20

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.16	5.74	5.718	0.20(0.02)	0.10	0.8	30.00
2	3.20	6.52	5.313	0.20(0.02)	0.10	0.7	20.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.19	5.74	5.718	0.20(0.02)	0.10	1.3	30.00
2	7.07	6.52	5.313	0.20(0.02)	0.10	1.4	20.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.19 Tc(MIN.) = 5.74
 EFFECTIVE AREA(ACRES) = 1.34 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 331.78 FEET.

 FLOW PROCESS FROM NODE 32.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1004.54 DOWNSTREAM(FEET) = 1004.25
 FLOW LENGTH(FEET) = 39.13 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.94
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.19
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.85
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

 FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
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 FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 25.50
 ELEVATION DATA: UPSTREAM(FEET) = 1012.80 DOWNSTREAM(FEET) = 1012.36

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.14 0.20 0.100 91 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.78
 TOTAL AREA(ACRES) = 0.14 PEAK FLOW RATE(CFS) = 0.78

 FLOW PROCESS FROM NODE 41.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1007.36 DOWNSTREAM(FEET) = 1005.76
 FLOW LENGTH(FEET) = 171.72 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.75
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.78
 PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 5.76
 LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

 FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 =====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.76
 RAINFALL INTENSITY(INCH/HR) = 5.70
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.14
 TOTAL STREAM AREA(ACRES) = 0.14

PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.78

FLOW PROCESS FROM NODE 50.00 TO NODE 51.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 23.46
ELEVATION DATA: UPSTREAM(FEET) = 1012.69 DOWNSTREAM(FEET) = 1012.54

Tc = K*((LENGTH** 3.00)/(ELEVATION CHANGE))*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.07 0.20 0.100 91 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.39
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.39

FLOW PROCESS FROM NODE 51.00 TO NODE 52.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.32 DOWNSTREAM(FEET) = 1005.76
FLOW LENGTH(FEET) = 130.92 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.47
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.39
PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 5.63
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 52.00 = 154.38 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.63
RAINFALL INTENSITY(INCH/HR) = 5.78
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.07
TOTAL STREAM AREA(ACRES) = 0.07
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.78	5.76	5.704	0.20(0.02)	0.10	0.1	40.00
2	0.39	5.63	5.782	0.20(0.02)	0.10	0.1	50.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.16	5.63	5.782	0.20(0.02)	0.10	0.2	50.00
2	1.16	5.76	5.704	0.20(0.02)	0.10	0.2	40.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1.16 Tc(MIN.) = 5.76
EFFECTIVE AREA(ACRES) = 0.21 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 52.00 = 197.22 FEET.

FLOW PROCESS FROM NODE 52.00 TO NODE 52.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 5.76
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.704
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.22 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.22 SUBAREA RUNOFF(CFS) = 1.13
EFFECTIVE AREA(ACRES) = 0.43 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 2.20

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.21	5.63	5.782	0.20(0.02)	0.10	0.4	50.00
2	2.20	5.76	5.704	0.20(0.02)	0.10	0.4	40.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 2.21 Tc(MIN.) = 5.63
 AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 0.43

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.76 DOWNSTREAM(FEET) = 1004.25
 FLOW LENGTH(FEET) = 129.97 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.28
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.21
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 6.04
 LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.21	6.04	5.553	0.20(0.02)	0.10	0.4	50.00
2	2.20	6.17	5.483	0.20(0.02)	0.10	0.4	40.00

LONGEST FLOWPATH FROM NODE 40.00 TO NODE 53.00 = 327.19 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.19	5.85	5.656	0.20(0.02)	0.10	1.3	30.00
2	7.07	6.63	5.262	0.20(0.02)	0.10	1.4	20.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.38	5.85	5.656	0.20(0.02)	0.10	1.8	30.00
2	9.38	6.04	5.553	0.20(0.02)	0.10	1.8	50.00
3	9.34	6.17	5.483	0.20(0.02)	0.10	1.8	40.00
4	9.18	6.63	5.262	0.20(0.02)	0.10	1.9	20.00

TOTAL AREA(ACRES) = 1.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.38 Tc(MIN.) = 5.848
 EFFECTIVE AREA(ACRES) = 1.75 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 53.00 = 370.91 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 53.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<<<

FLOW PROCESS FROM NODE 53.00 TO NODE 87.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.25 DOWNSTREAM(FEET) = 1003.97
 FLOW LENGTH(FEET) = 39.17 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.05
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.38
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.96
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.38	5.96	5.597	0.20(0.02)	0.10	1.8	30.00
2	9.38	6.15	5.497	0.20(0.02)	0.10	1.8	50.00
3	9.34	6.28	5.429	0.20(0.02)	0.10	1.8	40.00
4	9.18	6.74	5.214	0.20(0.02)	0.10	1.9	20.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.78	5.03	6.163	0.20(0.02)	0.10	1.0	10.00
2	5.73	5.19	6.059	0.20(0.02)	0.10	1.0	59.00
3	5.67	5.33	5.967	0.20(0.02)	0.10	1.0	70.00
4	5.53	5.63	5.783	0.20(0.02)	0.10	1.0	80.00

LONGEST FLOWPATH FROM NODE 80.00 TO NODE 87.00 = 288.37 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.51	5.03	6.163	0.20(0.02)	0.10	2.5	10.00
2	14.57	5.19	6.059	0.20(0.02)	0.10	2.6	59.00
3	14.61	5.33	5.967	0.20(0.02)	0.10	2.6	70.00
4	14.68	5.63	5.783	0.20(0.02)	0.10	2.7	80.00
5	14.73	5.96	5.597	0.20(0.02)	0.10	2.8	30.00
6	14.63	6.15	5.497	0.20(0.02)	0.10	2.8	50.00
7	14.53	6.28	5.429	0.20(0.02)	0.10	2.9	40.00
8	14.16	6.74	5.214	0.20(0.02)	0.10	2.9	20.00
TOTAL AREA(ACRES) =							2.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 14.73 Tc(MIN.) = 5.956
 EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.9
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 87.00 = 410.08 FEET.

 FLOW PROCESS FROM NODE 87.00 TO NODE 87.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<<

 FLOW PROCESS FROM NODE 87.00 TO NODE 88.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.00 DOWNSTREAM(FEET) = 1003.31
 FLOW LENGTH(FEET) = 142.61 MANNING'S N = 0.012
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.98
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.73
 PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 6.35
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 88.00 = 552.69 FEET.

 FLOW PROCESS FROM NODE 88.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.31 DOWNSTREAM(FEET) = 997.90
 FLOW LENGTH(FEET) = 33.46 MANNING'S N = 0.012

DEPTH OF FLOW IN 15.0 INCH PIPE IS 7.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.76
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.73
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.38
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 90.00 = 586.15 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.9 TC(MIN.) = 6.38
 EFFECTIVE AREA(ACRES) = 2.80 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 14.73

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.51	5.46	5.884	0.20(0.02)	0.10	2.5	10.00
2	14.57	5.61	5.793	0.20(0.02)	0.10	2.6	59.00
3	14.61	5.75	5.711	0.20(0.02)	0.10	2.6	70.00
4	14.68	6.05	5.548	0.20(0.02)	0.10	2.7	80.00
5	14.73	6.38	5.382	0.20(0.02)	0.10	2.8	30.00
6	14.63	6.57	5.292	0.20(0.02)	0.10	2.8	50.00
7	14.53	6.70	5.230	0.20(0.02)	0.10	2.9	40.00
8	14.16	7.17	5.035	0.20(0.02)	0.10	2.9	20.00

END OF RATIONAL METHOD ANALYSIS



**OUTLET 5 /
LINE E**

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 5 *
* 10-YEAR STORM EVENT CD *

FILE NAME: O5P10R.DAT
TIME/DATE OF STUDY: 17:03 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.21
ELEVATION DATA: UPSTREAM(FEET) = 1025.10 DOWNSTREAM(FEET) = 1013.75

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.891
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.695
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.22 0.20 0.100 75 5.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.73
TOTAL AREA(ACRES) = 0.22 PEAK FLOW RATE(CFS) = 0.73

FLOW PROCESS FROM NODE 61.00 TO NODE 61.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 62.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.73
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 6.03
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.03
RAINFALL INTENSITY(INCH/HR) = 3.65
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.22
TOTAL STREAM AREA(ACRES) = 0.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.73

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 216.08
ELEVATION DATA: UPSTREAM(FEET) = 1014.87 DOWNSTREAM(FEET) = 1012.43

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.400
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.524
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.51 0.20 0.100 75 6.40
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 1.61
TOTAL AREA(ACRES) = 0.51 PEAK FLOW RATE(CFS) = 1.61

FLOW PROCESS FROM NODE 68.00 TO NODE 61.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.88 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 34.79 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.50
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.61
PIPE TRAVEL TIME(MIN.) = 0.08 T_c (MIN.) = 6.48
LONGEST FLOWPATH FROM NODE 67.00 TO NODE 61.10 = 250.87 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.48
RAINFALL INTENSITY(INCH/HR) = 3.50
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.51

TOTAL STREAM AREA(ACRES) = 0.51
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.73	6.03	3.645	0.20(0.02)	0.10	0.2	60.00
2	1.61	6.48	3.500	0.20(0.02)	0.10	0.5	67.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.29	6.03	3.645	0.20(0.02)	0.10	0.7	60.00
2	2.31	6.48	3.500	0.20(0.02)	0.10	0.7	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.31 T_c (MIN.) = 6.48
EFFECTIVE AREA(ACRES) = 0.73 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.7
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.61 DOWNSTREAM(FEET) = 1006.32
FLOW LENGTH(FEET) = 27.37 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.31
PIPE TRAVEL TIME(MIN.) = 0.09 T_c (MIN.) = 6.57
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.57
RAINFALL INTENSITY(INCH/HR) = 3.47
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.73
 TOTAL STREAM AREA(ACRES) = 0.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.31

 FLOW PROCESS FROM NODE 62.00 TO NODE 65.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 143.63
 ELEVATION DATA: UPSTREAM(FEET) = 1018.55 DOWNSTREAM(FEET) = 1013.89

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.27	0.20	0.100	75	5.00

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.98
 TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 0.98

 FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.32
 FLOW LENGTH(FEET) = 17.81 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.97
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.98
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 62.00 TO NODE 66.00 = 161.44 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 4.05
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.98

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.29	6.12	3.615	0.20(0.02)	0.10	0.7	60.00
1	2.31	6.57	3.473	0.20(0.02)	0.10	0.7	67.00
2	0.98	5.02	4.049	0.20(0.02)	0.10	0.3	62.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.09	5.02	4.049	0.20(0.02)	0.10	0.8	62.00
2	3.16	6.12	3.615	0.20(0.02)	0.10	1.0	60.00
3	3.15	6.57	3.473	0.20(0.02)	0.10	1.0	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.16 Tc(MIN.) = 6.12
 EFFECTIVE AREA(ACRES) = 0.97 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.0
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.32 DOWNSTREAM(FEET) = 1006.00
 FLOW LENGTH(FEET) = 25.35 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.90
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.16
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 6.19
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

 FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 10

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE      63.00 TO NODE      63.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 102.77
ELEVATION DATA: UPSTREAM(FEET) = 1016.40 DOWNSTREAM(FEET) = 1013.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            D      0.08      0.20    0.100  75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.29
TOTAL AREA(ACRES) = 0.08 PEAK FLOW RATE(CFS) = 0.29

*****
FLOW PROCESS FROM NODE      63.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.45 DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 16.38 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.02
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.29
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 63.00 TO NODE 64.20 = 119.15 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.04

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AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.08
TOTAL STREAM AREA(ACRES) = 0.08
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.29

*****
FLOW PROCESS FROM NODE      64.00 TO NODE      64.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.21
ELEVATION DATA: UPSTREAM(FEET) = 1015.39 DOWNSTREAM(FEET) = 1013.54

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE              GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            D      0.07      0.20    0.100  75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.25
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.25

*****
FLOW PROCESS FROM NODE      64.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.49 DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 36.65 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.25
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.12
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2

```

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.12
RAINFALL INTENSITY(INCH/HR) = 4.01
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.07
TOTAL STREAM AREA(ACRES) = 0.07
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.25

** CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows for streams 1 and 2.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows for streams 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 0.54 Tc(MIN.) = 5.04
EFFECTIVE AREA(ACRES) = 0.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

FLOW PROCESS FROM NODE 64.20 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.74 DOWNSTREAM(FEET) = 1006.00
FLOW LENGTH(FEET) = 45.36 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.89
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.54
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.15
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 69.00 = 181.22 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows for streams 1 and 2.

** MEMORY BANK # 1 CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows for streams 1, 2, and 3.

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows for streams 1 through 5.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.66 Tc(MIN.) = 6.194
EFFECTIVE AREA(ACRES) = 1.12 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.1
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 69.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.53
FLOW LENGTH(FEET) = 114.36 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.11
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.66
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 6.51
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.51
RAINFALL INTENSITY(INCH/HR) = 3.49
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.12
TOTAL STREAM AREA(ACRES) = 1.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.66

FLOW PROCESS FROM NODE 70.00 TO NODE 71.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 48.85
ELEVATION DATA: UPSTREAM(FEET) = 1012.86 DOWNSTREAM(FEET) = 1012.04

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.05 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.18
TOTAL AREA(ACRES) = 0.05 PEAK FLOW RATE(CFS) = 0.18

FLOW PROCESS FROM NODE 71.00 TO NODE 72.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.32 DOWNSTREAM(FEET) = 1008.33

FLOW LENGTH(FEET) = 18.59 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.31
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.18
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.05
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 72.00 = 67.44 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 72.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 5.05
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.037
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.09 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.09 SUBAREA RUNOFF(CFS) = 0.33
EFFECTIVE AREA(ACRES) = 0.14 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.1 PEAK FLOW RATE(CFS) = 0.51

FLOW PROCESS FROM NODE 72.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.33 DOWNSTREAM(FEET) = 1004.53
FLOW LENGTH(FEET) = 152.62 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.86
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.51
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 5.57
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 73.00 = 220.06 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.57
 RAINFALL INTENSITY(INCH/HR) = 3.82
 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.14
 TOTAL STREAM AREA(ACRES) = 0.14
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.51

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.63	5.41	3.881	0.20(0.02)	0.10	1.0	62.00
1	3.63	5.46	3.859	0.20(0.02)	0.10	1.0	63.00
1	3.64	5.54	3.827	0.20(0.02)	0.10	1.0	64.00
1	3.66	6.51	3.491	0.20(0.02)	0.10	1.1	60.00
1	3.62	6.95	3.361	0.20(0.02)	0.10	1.1	67.00
2	0.51	5.57	3.815	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.13	5.41	3.881	0.20(0.02)	0.10	1.1	62.00
2	4.14	5.46	3.859	0.20(0.02)	0.10	1.1	63.00
3	4.14	5.54	3.827	0.20(0.02)	0.10	1.1	64.00
4	4.14	5.57	3.815	0.20(0.02)	0.10	1.1	70.00
5	4.12	6.51	3.491	0.20(0.02)	0.10	1.3	60.00
6	4.07	6.95	3.361	0.20(0.02)	0.10	1.3	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.14 Tc(MIN.) = 5.57
 EFFECTIVE AREA(ACRES) = 1.15 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.3
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.57

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.815

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.07	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.07 SUBAREA RUNOFF(CFS) = 0.24
 EFFECTIVE AREA(ACRES) = 1.22 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 4.16

FLOW PROCESS FROM NODE 73.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.53 DOWNSTREAM(FEET) = 1004.06

FLOW LENGTH(FEET) = 25.11 MANNING'S N = 0.012

DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.16

PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 5.63

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 74.00 TO NODE 75.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 137.19

ELEVATION DATA: UPSTREAM(FEET) = 1012.59 DOWNSTREAM(FEET) = 1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.16	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 0.58

TOTAL AREA(ACRES) = 0.16 PEAK FLOW RATE(CFS) = 0.58

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FLOW PROCESS FROM NODE 75.00 TO NODE 75.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 5.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap    SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.04    0.20   0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.04  SUBAREA RUNOFF(CFS) = 0.15
EFFECTIVE AREA(ACRES) = 0.20  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2  PEAK FLOW RATE(CFS) = 0.73

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*****
FLOW PROCESS FROM NODE 75.00 TO NODE 78.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.75  DOWNSTREAM(FEET) = 1008.49
FLOW LENGTH(FEET) = 80.20  MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.47
ESTIMATED PIPE DIAMETER(INCH) = 9.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.73
PIPE TRAVEL TIME(MIN.) = 0.54  Tc(MIN.) = 5.54
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 78.00 = 217.39 FEET.

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*****
FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 5.54
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.827
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap    SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.05    0.20   0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.05  SUBAREA RUNOFF(CFS) = 0.17
EFFECTIVE AREA(ACRES) = 0.25  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2  PEAK FLOW RATE(CFS) = 0.86

```

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*****
FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 5.54
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.827
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap    SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.08    0.20   0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.08  SUBAREA RUNOFF(CFS) = 0.27
EFFECTIVE AREA(ACRES) = 0.33  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.3  PEAK FLOW RATE(CFS) = 1.13

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*****
FLOW PROCESS FROM NODE 78.00 TO NODE 84.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.33  DOWNSTREAM(FEET) = 1008.05
FLOW LENGTH(FEET) = 53.04  MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.25
ESTIMATED PIPE DIAMETER(INCH) = 9.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.13
PIPE TRAVEL TIME(MIN.) = 0.27  Tc(MIN.) = 5.81
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

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*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.81
RAINFALL INTENSITY(INCH/HR) = 3.72
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.33
TOTAL STREAM AREA(ACRES) = 0.33
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.13

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FLOW PROCESS FROM NODE 79.00 TO NODE 80.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 39.08
ELEVATION DATA: UPSTREAM(FEET) = 1011.89 DOWNSTREAM(FEET) = 1009.46

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.07 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.25
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.25

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*****
FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.85 DOWNSTREAM(FEET) = 1008.27
FLOW LENGTH(FEET) = 115.81 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.23
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.25
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 5.86
LONGEST FLOWPATH FROM NODE 79.00 TO NODE 83.00 = 154.89 FEET.

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*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 5.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.13 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.13 SUBAREA RUNOFF(CFS) = 0.43
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR) = 0.02

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AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 0.66

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*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 5.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.03 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.03 SUBAREA RUNOFF(CFS) = 0.10
EFFECTIVE AREA(ACRES) = 0.23 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 0.76

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*****
FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.27 DOWNSTREAM(FEET) = 1008.05
FLOW LENGTH(FEET) = 43.34 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.97
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.76
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 6.11
LONGEST FLOWPATH FROM NODE 79.00 TO NODE 84.00 = 198.23 FEET.

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*****
FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.11
RAINFALL INTENSITY(INCH/HR) = 3.62
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.23

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TOTAL STREAM AREA(ACRES) = 0.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.76

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.13	5.81	3.723	0.20(0.02)	0.10	0.3	74.00
2	0.76	6.11	3.620	0.20(0.02)	0.10	0.2	79.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.88	5.81	3.723	0.20(0.02)	0.10	0.5	74.00
2	1.86	6.11	3.620	0.20(0.02)	0.10	0.6	79.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.88 Tc(MIN.) = 5.81
 EFFECTIVE AREA(ACRES) = 0.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.6
 LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.81
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.723

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.08	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.27
 EFFECTIVE AREA(ACRES) = 0.63 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.10

FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.05 DOWNSTREAM(FEET) = 1004.06

FLOW LENGTH(FEET) = 38.25 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.81
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.10
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.87
 LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.10	5.87	3.704	0.20(0.02)	0.10	0.6	74.00
2	2.07	6.16	3.601	0.20(0.02)	0.10	0.6	79.00

LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.15	5.46	3.858	0.20(0.02)	0.10	1.2	62.00
2	4.16	5.52	3.836	0.20(0.02)	0.10	1.2	63.00
3	4.16	5.60	3.805	0.20(0.02)	0.10	1.2	64.00
4	4.16	5.63	3.793	0.20(0.02)	0.10	1.2	70.00
5	4.14	6.56	3.474	0.20(0.02)	0.10	1.3	60.00
6	4.09	7.01	3.346	0.20(0.02)	0.10	1.4	67.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.18	5.46	3.858	0.20(0.02)	0.10	1.8	62.00
2	6.20	5.52	3.836	0.20(0.02)	0.10	1.8	63.00
3	6.22	5.60	3.805	0.20(0.02)	0.10	1.8	64.00
4	6.22	5.63	3.793	0.20(0.02)	0.10	1.8	70.00
5	6.25	5.87	3.704	0.20(0.02)	0.10	1.9	74.00
6	6.22	6.16	3.601	0.20(0.02)	0.10	1.9	79.00
7	6.14	6.56	3.474	0.20(0.02)	0.10	2.0	60.00
8	6.02	7.01	3.346	0.20(0.02)	0.10	2.0	67.00

TOTAL AREA(ACRES) = 2.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.25 Tc(MIN.) = 5.868
 EFFECTIVE AREA(ACRES) = 1.88 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.0

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.06 DOWNSTREAM(FEET) = 1003.09
FLOW LENGTH(FEET) = 94.15 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.39
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.25
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 6.11
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 86.00 = 662.77 FEET.

FLOW PROCESS FROM NODE 86.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.09 DOWNSTREAM(FEET) = 997.90
FLOW LENGTH(FEET) = 28.30 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 4.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.96
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.25
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.14
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 691.07 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.0 TC(MIN.) = 6.14
EFFECTIVE AREA(ACRES) = 1.88 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 6.25

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.18	5.74	3.753	0.20(0.02)	0.10	1.8	62.00
2	6.20	5.79	3.732	0.20(0.02)	0.10	1.8	63.00
3	6.22	5.87	3.703	0.20(0.02)	0.10	1.8	64.00
4	6.22	5.90	3.692	0.20(0.02)	0.10	1.8	70.00
5	6.25	6.14	3.609	0.20(0.02)	0.10	1.9	74.00
6	6.22	6.43	3.514	0.20(0.02)	0.10	1.9	79.00
7	6.14	6.83	3.394	0.20(0.02)	0.10	2.0	60.00
8	6.02	7.28	3.273	0.20(0.02)	0.10	2.0	67.00

=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 5
* 25-YEAR STORM EVENT CD
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FILE NAME: O5P25R.DAT
TIME/DATE OF STUDY: 17:04 11/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
*DATA BANK RAINFALL USED*
*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
  HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
  WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
  1  30.0  20.0  0.018/0.018/0.020  0.67  2.00  0.0313  0.167  0.0150
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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.21
ELEVATION DATA: UPSTREAM(FEET) = 1025.10 DOWNSTREAM(FEET) = 1013.75

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.891
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.396
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.22 0.20 0.100 75 5.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.87
TOTAL AREA(ACRES) = 0.22 PEAK FLOW RATE(CFS) = 0.87

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*****
FLOW PROCESS FROM NODE 61.00 TO NODE 61.10 IS CODE = 31

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 62.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.67
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.87
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 6.03
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

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*****
FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.03
RAINFALL INTENSITY(INCH/HR) = 4.34
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.22
TOTAL STREAM AREA(ACRES) = 0.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.87

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FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 216.08
ELEVATION DATA: UPSTREAM(FEET) = 1014.87 DOWNSTREAM(FEET) = 1012.43

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.400
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.195
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.51 0.20 0.100 75 6.40
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 1.92
TOTAL AREA(ACRES) = 0.51 PEAK FLOW RATE(CFS) = 1.92

FLOW PROCESS FROM NODE 68.00 TO NODE 61.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.88 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 34.79 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.81
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.92
PIPE TRAVEL TIME(MIN.) = 0.07 T_c (MIN.) = 6.47
LONGEST FLOWPATH FROM NODE 67.00 TO NODE 61.10 = 250.87 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.47
RAINFALL INTENSITY(INCH/HR) = 4.17
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.51

TOTAL STREAM AREA(ACRES) = 0.51
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.92

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	0.87	6.03	4.340	0.20(0.02)	0.10	0.2	60.00
2	1.92	6.47	4.167	0.20(0.02)	0.10	0.5	67.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.72	6.03	4.340	0.20(0.02)	0.10	0.7	60.00
2	2.75	6.47	4.167	0.20(0.02)	0.10	0.7	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.75 T_c (MIN.) = 6.47
EFFECTIVE AREA(ACRES) = 0.73 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.7
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.61 DOWNSTREAM(FEET) = 1006.32
FLOW LENGTH(FEET) = 27.37 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.35
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.75
PIPE TRAVEL TIME(MIN.) = 0.09 T_c (MIN.) = 6.56
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.56
RAINFALL INTENSITY(INCH/HR) = 4.14
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.73
 TOTAL STREAM AREA(ACRES) = 0.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.75

 FLOW PROCESS FROM NODE 62.00 TO NODE 65.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 143.63
 ELEVATION DATA: UPSTREAM(FEET) = 1018.55 DOWNSTREAM(FEET) = 1013.89

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.27 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.17
 TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 1.17

 FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.32
 FLOW LENGTH(FEET) = 17.81 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.58
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.17
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 62.00 TO NODE 66.00 = 161.44 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

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TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 4.81
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.17

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.72	6.11	4.306	0.20(0.02)	0.10	0.7	60.00
1	2.75	6.56	4.137	0.20(0.02)	0.10	0.7	67.00
2	1.17	5.02	4.812	0.20(0.02)	0.10	0.3	62.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.67	5.02	4.812	0.20(0.02)	0.10	0.8	62.00
2	3.77	6.11	4.306	0.20(0.02)	0.10	1.0	60.00
3	3.75	6.56	4.137	0.20(0.02)	0.10	1.0	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.77 Tc(MIN.) = 6.11
 EFFECTIVE AREA(ACRES) = 0.96 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.0
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.32 DOWNSTREAM(FEET) = 1006.00
 FLOW LENGTH(FEET) = 25.35 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.09
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.77
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 6.18
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

 FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 10

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>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
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*****
FLOW PROCESS FROM NODE      63.00 TO NODE      63.10 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 102.77
ELEVATION DATA: UPSTREAM(FEET) = 1016.40 DOWNSTREAM(FEET) = 1013.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE                GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              D      0.08      0.20      0.100    75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.35
TOTAL AREA(ACRES) = 0.08 PEAK FLOW RATE(CFS) = 0.35

*****
FLOW PROCESS FROM NODE      63.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.45 DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 16.38 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.40
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.35
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 63.00 TO NODE 64.20 = 119.15 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.04
RAINFALL INTENSITY(INCH/HR) = 4.80
AREA-AVERAGED Fm(INCH/HR) = 0.02

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AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.08
TOTAL STREAM AREA(ACRES) = 0.08
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.35

*****
FLOW PROCESS FROM NODE      64.00 TO NODE      64.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.21
ELEVATION DATA: UPSTREAM(FEET) = 1015.39 DOWNSTREAM(FEET) = 1013.54

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE                GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              D      0.07      0.20      0.100    75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.30
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.30

*****
FLOW PROCESS FROM NODE      64.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.49 DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 36.65 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.39
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.30
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.11
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

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TIME OF CONCENTRATION(MIN.) = 5.11
 RAINFALL INTENSITY(INCH/HR) = 4.76
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.07
 TOTAL STREAM AREA(ACRES) = 0.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.30

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.35	5.04	4.804	0.20(0.02)	0.10	0.1	63.00
2	0.30	5.11	4.763	0.20(0.02)	0.10	0.1	64.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.65	5.04	4.804	0.20(0.02)	0.10	0.1	63.00
2	0.65	5.11	4.763	0.20(0.02)	0.10	0.2	64.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 0.65 Tc(MIN.) = 5.04
 EFFECTIVE AREA(ACRES) = 0.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.2
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

FLOW PROCESS FROM NODE 64.20 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.74 DOWNSTREAM(FEET) = 1006.00
 FLOW LENGTH(FEET) = 45.36 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.20
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.65
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.14
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 69.00 = 181.22 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.65	5.14	4.748	0.20(0.02)	0.10	0.1	63.00
2	0.65	5.22	4.708	0.20(0.02)	0.10	0.2	64.00

LONGEST FLOWPATH FROM NODE 64.00 TO NODE 69.00 = 181.22 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.67	5.09	4.774	0.20(0.02)	0.10	0.8	62.00
2	3.77	6.18	4.278	0.20(0.02)	0.10	1.0	60.00
3	3.75	6.63	4.112	0.20(0.02)	0.10	1.0	67.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.31	5.09	4.774	0.20(0.02)	0.10	1.0	62.00
2	4.32	5.14	4.748	0.20(0.02)	0.10	1.0	63.00
3	4.33	5.22	4.708	0.20(0.02)	0.10	1.0	64.00
4	4.35	6.18	4.278	0.20(0.02)	0.10	1.1	60.00
5	4.31	6.63	4.112	0.20(0.02)	0.10	1.1	67.00

TOTAL AREA(ACRES) = 1.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.35 Tc(MIN.) = 6.181
 EFFECTIVE AREA(ACRES) = 1.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.1
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 69.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.53
 FLOW LENGTH(FEET) = 114.36 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.49

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.35
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 6.47
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.47
RAINFALL INTENSITY(INCH/HR) = 4.17
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.11
TOTAL STREAM AREA(ACRES) = 1.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.35

FLOW PROCESS FROM NODE 70.00 TO NODE 71.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 48.85
ELEVATION DATA: UPSTREAM(FEET) = 1012.86 DOWNSTREAM(FEET) = 1012.04

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.05 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.22
TOTAL AREA(ACRES) = 0.05 PEAK FLOW RATE(CFS) = 0.22

FLOW PROCESS FROM NODE 71.00 TO NODE 72.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.32 DOWNSTREAM(FEET) = 1008.33
FLOW LENGTH(FEET) = 18.59 MANNING'S N = 0.012

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.50
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.22
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.05
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 72.00 = 67.44 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 72.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.05
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.09 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.09 SUBAREA RUNOFF(CFS) = 0.39
EFFECTIVE AREA(ACRES) = 0.14 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.1 PEAK FLOW RATE(CFS) = 0.60

FLOW PROCESS FROM NODE 72.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.33 DOWNSTREAM(FEET) = 1004.53
FLOW LENGTH(FEET) = 152.62 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.09
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.60
PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 5.55
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 73.00 = 220.06 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.55

RAINFALL INTENSITY(INCH/HR) = 4.55
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.14
 TOTAL STREAM AREA(ACRES) = 0.14
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.60

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.31	5.39	4.625	0.20(0.02)	0.10	1.0	62.00
1	4.32	5.44	4.601	0.20(0.02)	0.10	1.0	63.00
1	4.33	5.51	4.564	0.20(0.02)	0.10	1.0	64.00
1	4.35	6.47	4.167	0.20(0.02)	0.10	1.1	60.00
1	4.31	6.92	4.012	0.20(0.02)	0.10	1.1	67.00
2	0.60	5.55	4.548	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.91	5.39	4.625	0.20(0.02)	0.10	1.1	62.00
2	4.92	5.44	4.601	0.20(0.02)	0.10	1.1	63.00
3	4.93	5.51	4.564	0.20(0.02)	0.10	1.1	64.00
4	4.93	5.55	4.548	0.20(0.02)	0.10	1.1	70.00
5	4.91	6.47	4.167	0.20(0.02)	0.10	1.3	60.00
6	4.85	6.92	4.012	0.20(0.02)	0.10	1.3	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.93 Tc(MIN.) = 5.55
 EFFECTIVE AREA(ACRES) = 1.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.3
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.55

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.548

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.07	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.07 SUBAREA RUNOFF(CFS) = 0.29
 EFFECTIVE AREA(ACRES) = 1.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 4.97

FLOW PROCESS FROM NODE 73.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.53 DOWNSTREAM(FEET) = 1004.06
 FLOW LENGTH(FEET) = 25.11 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.47
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.97
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 5.60
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 74.00 TO NODE 75.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 137.19
 ELEVATION DATA: UPSTREAM(FEET) = 1012.59 DOWNSTREAM(FEET) = 1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.16	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 0.69

TOTAL AREA(ACRES) = 0.16 PEAK FLOW RATE(CFS) = 0.69

FLOW PROCESS FROM NODE 75.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.04 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.04 SUBAREA RUNOFF(CFS) = 0.17
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 0.86

FLOW PROCESS FROM NODE 75.00 TO NODE 78.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.75 DOWNSTREAM(FEET) = 1008.49
FLOW LENGTH(FEET) = 80.20 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.53
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.86
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 5.53
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 78.00 = 217.39 FEET.

FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.557
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.05 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.05 SUBAREA RUNOFF(CFS) = 0.20
EFFECTIVE AREA(ACRES) = 0.25 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.02

FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.557
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.08 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.33
EFFECTIVE AREA(ACRES) = 0.33 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.35

FLOW PROCESS FROM NODE 78.00 TO NODE 84.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.33 DOWNSTREAM(FEET) = 1008.05
FLOW LENGTH(FEET) = 53.04 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.47
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.35
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 5.78
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.78
RAINFALL INTENSITY(INCH/HR) = 4.44
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.33
TOTAL STREAM AREA(ACRES) = 0.33
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.35

FLOW PROCESS FROM NODE 79.00 TO NODE 80.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 39.08
ELEVATION DATA: UPSTREAM(FEET) = 1011.89 DOWNSTREAM(FEET) = 1009.46

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D         0.07   0.20 0.100 75   5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.30
TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.30

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FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1008.85 DOWNSTREAM(FEET) = 1008.27
FLOW LENGTH(FEET) = 115.81 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.31
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.30
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 5.84
LONGEST FLOWPATH FROM NODE 79.00 TO NODE 83.00 = 154.89 FEET.

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FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 5.84
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.420
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         D         0.13   0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.13 SUBAREA RUNOFF(CFS) = 0.51
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

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TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 0.79

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*****
FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 5.84
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.420
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         D         0.03   0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.03 SUBAREA RUNOFF(CFS) = 0.12
EFFECTIVE AREA(ACRES) = 0.23 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 0.91

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FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1008.27 DOWNSTREAM(FEET) = 1008.05
FLOW LENGTH(FEET) = 43.34 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.09
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.91
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 6.07
LONGEST FLOWPATH FROM NODE 79.00 TO NODE 84.00 = 198.23 FEET.

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FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.07
RAINFALL INTENSITY(INCH/HR) = 4.32
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.23
TOTAL STREAM AREA(ACRES) = 0.23

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PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.91

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.35	5.78	4.442	0.20(0.02)	0.10	0.3	74.00
2	0.91	6.07	4.323	0.20(0.02)	0.10	0.2	79.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.24	5.78	4.442	0.20(0.02)	0.10	0.5	74.00
2	2.22	6.07	4.323	0.20(0.02)	0.10	0.6	79.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.24 Tc(MIN.) = 5.78
 EFFECTIVE AREA(ACRES) = 0.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.6
 LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.78

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.442

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.08	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.32

EFFECTIVE AREA(ACRES) = 0.63 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.50

FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.05 DOWNSTREAM(FEET) = 1004.06

FLOW LENGTH(FEET) = 38.25 MANNING'S N = 0.012

DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 12.39

ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 2.50

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.84

LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.50	5.84	4.420	0.20(0.02)	0.10	0.6	74.00
2	2.48	6.12	4.302	0.20(0.02)	0.10	0.6	79.00

LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.95	5.44	4.598	0.20(0.02)	0.10	1.2	62.00
2	4.96	5.49	4.574	0.20(0.02)	0.10	1.2	63.00
3	4.97	5.57	4.538	0.20(0.02)	0.10	1.2	64.00
4	4.97	5.60	4.522	0.20(0.02)	0.10	1.2	70.00
5	4.94	6.53	4.147	0.20(0.02)	0.10	1.3	60.00
6	4.89	6.98	3.994	0.20(0.02)	0.10	1.4	67.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.38	5.44	4.598	0.20(0.02)	0.10	1.8	62.00
2	7.40	5.49	4.574	0.20(0.02)	0.10	1.8	63.00
3	7.42	5.57	4.538	0.20(0.02)	0.10	1.8	64.00
4	7.43	5.60	4.522	0.20(0.02)	0.10	1.8	70.00
5	7.47	5.84	4.420	0.20(0.02)	0.10	1.9	74.00
6	7.43	6.12	4.302	0.20(0.02)	0.10	1.9	79.00
7	7.33	6.53	4.147	0.20(0.02)	0.10	2.0	60.00
8	7.19	6.98	3.994	0.20(0.02)	0.10	2.0	67.00

TOTAL AREA(ACRES) = 2.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.47 Tc(MIN.) = 5.835

EFFECTIVE AREA(ACRES) = 1.87 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 2.0

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 86.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1004.06 DOWNSTREAM(FEET) = 1003.09
FLOW LENGTH(FEET) = 94.15 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.82
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.47
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 6.07
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 86.00 = 662.77 FEET.

FLOW PROCESS FROM NODE 86.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1003.09 DOWNSTREAM(FEET) = 997.90
FLOW LENGTH(FEET) = 28.30 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.92
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.47
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.09
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 691.07 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.0 TC(MIN.) = 6.09
EFFECTIVE AREA(ACRES) = 1.87 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 7.47

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.38	5.70	4.480	0.20(0.02)	0.10	1.8	62.00
2	7.40	5.75	4.458	0.20(0.02)	0.10	1.8	63.00
3	7.42	5.82	4.425	0.20(0.02)	0.10	1.8	64.00
4	7.43	5.86	4.410	0.20(0.02)	0.10	1.8	70.00
5	7.47	6.09	4.315	0.20(0.02)	0.10	1.9	74.00
6	7.43	6.37	4.204	0.20(0.02)	0.10	1.9	79.00
7	7.33	6.79	4.058	0.20(0.02)	0.10	2.0	60.00
8	7.19	7.24	3.913	0.20(0.02)	0.10	2.0	67.00

=====

END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA - PHASE 4 *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY ULTIMATE OUTLET 5 *
* 100-YEAR STORM EVENT CD *

FILE NAME: O5P100R.DAT
TIME/DATE OF STUDY: 17:06 11/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.21
ELEVATION DATA: UPSTREAM(FEET) = 1025.10 DOWNSTREAM(FEET) = 1013.75

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.891
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.632
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.22 0.20 0.100 91 5.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.11
TOTAL AREA(ACRES) = 0.22 PEAK FLOW RATE(CFS) = 1.11

FLOW PROCESS FROM NODE 61.00 TO NODE 61.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 62.22 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.05
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.11
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.02
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.02
RAINFALL INTENSITY(INCH/HR) = 5.56
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.22
TOTAL STREAM AREA(ACRES) = 0.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.11

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 216.08
ELEVATION DATA: UPSTREAM(FEET) = 1014.87 DOWNSTREAM(FEET) = 1012.43

$T_c = K * [(LENGTH * 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.400
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.371
SUBAREA T_c AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.51 0.20 0.100 91 6.40
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.46
TOTAL AREA(ACRES) = 0.51 PEAK FLOW RATE(CFS) = 2.46

FLOW PROCESS FROM NODE 68.00 TO NODE 61.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.88 DOWNSTREAM(FEET) = 1006.61
FLOW LENGTH(FEET) = 34.79 MANNING'S N = 0.012
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.27
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.46
PIPE TRAVEL TIME(MIN.) = 0.07 T_c (MIN.) = 6.47
LONGEST FLOWPATH FROM NODE 67.00 TO NODE 61.10 = 250.87 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 61.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.47
RAINFALL INTENSITY(INCH/HR) = 5.34
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.51

TOTAL STREAM AREA(ACRES) = 0.51
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.46

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.11	6.02	5.563	0.20(0.02)	0.10	0.2	60.00
2	2.46	6.47	5.338	0.20(0.02)	0.10	0.5	67.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	3.49	6.02	5.563	0.20(0.02)	0.10	0.7	60.00
2	3.52	6.47	5.338	0.20(0.02)	0.10	0.7	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.52 T_c (MIN.) = 6.47
EFFECTIVE AREA(ACRES) = 0.73 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.7
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 61.10 = 376.43 FEET.

FLOW PROCESS FROM NODE 61.10 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.61 DOWNSTREAM(FEET) = 1006.32
FLOW LENGTH(FEET) = 27.37 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.58
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.52
PIPE TRAVEL TIME(MIN.) = 0.08 T_c (MIN.) = 6.55
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.55
RAINFALL INTENSITY(INCH/HR) = 5.30
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.73
 TOTAL STREAM AREA(ACRES) = 0.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.52

 FLOW PROCESS FROM NODE 62.00 TO NODE 65.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 143.63
 ELEVATION DATA: UPSTREAM(FEET) = 1018.55 DOWNSTREAM(FEET) = 1013.89

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.27 0.20 0.100 91 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.50
 TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 1.50

 FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.25 DOWNSTREAM(FEET) = 1006.32
 FLOW LENGTH(FEET) = 17.81 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.47
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.50
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
 LONGEST FLOWPATH FROM NODE 62.00 TO NODE 66.00 = 161.44 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 66.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 5.02
 RAINFALL INTENSITY(INCH/HR) = 6.17
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.27
 TOTAL STREAM AREA(ACRES) = 0.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.50

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.49	6.10	5.520	0.20(0.02)	0.10	0.7	60.00
1	3.52	6.55	5.300	0.20(0.02)	0.10	0.7	67.00
2	1.50	5.02	6.173	0.20(0.02)	0.10	0.3	62.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.71	5.02	6.173	0.20(0.02)	0.10	0.8	62.00
2	4.83	6.10	5.520	0.20(0.02)	0.10	1.0	60.00
3	4.81	6.55	5.300	0.20(0.02)	0.10	1.0	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.83 Tc(MIN.) = 6.10
 EFFECTIVE AREA(ACRES) = 0.96 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.0
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 66.00 = 403.80 FEET.

 FLOW PROCESS FROM NODE 66.00 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.32 DOWNSTREAM(FEET) = 1006.00
 FLOW LENGTH(FEET) = 25.35 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.61
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.83
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.17
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

 FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 10

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-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE      63.00 TO NODE      63.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 102.77
ELEVATION DATA: UPSTREAM(FEET) = 1016.40  DOWNSTREAM(FEET) = 1013.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL              D      0.08     0.20     0.100     91  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.44
TOTAL AREA(ACRES) = 0.08  PEAK FLOW RATE(CFS) = 0.44

*****
FLOW PROCESS FROM NODE      63.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.45  DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 16.38  MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.91
ESTIMATED PIPE DIAMETER(INCH) = 6.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.44
PIPE TRAVEL TIME(MIN.) = 0.03  Tc(MIN.) = 5.03
LONGEST FLOWPATH FROM NODE 63.00 TO NODE 64.20 = 119.15 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.03
RAINFALL INTENSITY(INCH/HR) = 6.16
AREA-AVERAGED Fm(INCH/HR) = 0.02

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AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.08
TOTAL STREAM AREA(ACRES) = 0.08
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.44

*****
FLOW PROCESS FROM NODE      64.00 TO NODE      64.10 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.21
ELEVATION DATA: UPSTREAM(FEET) = 1015.39  DOWNSTREAM(FEET) = 1013.54

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL              D      0.07     0.20     0.100     91  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.39
TOTAL AREA(ACRES) = 0.07  PEAK FLOW RATE(CFS) = 0.39

*****
FLOW PROCESS FROM NODE      64.10 TO NODE      64.20 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.49  DOWNSTREAM(FEET) = 1008.74
FLOW LENGTH(FEET) = 36.65  MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 2.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.78
ESTIMATED PIPE DIAMETER(INCH) = 6.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.39
PIPE TRAVEL TIME(MIN.) = 0.11  Tc(MIN.) = 5.11
LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

*****
FLOW PROCESS FROM NODE      64.20 TO NODE      64.20 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

```

TIME OF CONCENTRATION(MIN.) = 5.11
 RAINFALL INTENSITY(INCH/HR) = 6.11
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.07
 TOTAL STREAM AREA(ACRES) = 0.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.44	5.03	6.163	0.20(0.02)	0.10	0.1	63.00
2	0.39	5.11	6.114	0.20(0.02)	0.10	0.1	64.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.83	5.03	6.163	0.20(0.02)	0.10	0.1	63.00
2	0.83	5.11	6.114	0.20(0.02)	0.10	0.2	64.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 0.83 Tc(MIN.) = 5.03
 EFFECTIVE AREA(ACRES) = 0.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.2
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 64.20 = 135.86 FEET.

FLOW PROCESS FROM NODE 64.20 TO NODE 69.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.74 DOWNSTREAM(FEET) = 1006.00
 FLOW LENGTH(FEET) = 45.36 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.65
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.83
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 5.13
 LONGEST FLOWPATH FROM NODE 64.00 TO NODE 69.00 = 181.22 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.83	5.13	6.095	0.20(0.02)	0.10	0.1	63.00
2	0.83	5.20	6.047	0.20(0.02)	0.10	0.2	64.00

LONGEST FLOWPATH FROM NODE 64.00 TO NODE 69.00 = 181.22 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.71	5.08	6.128	0.20(0.02)	0.10	0.8	62.00
2	4.83	6.17	5.487	0.20(0.02)	0.10	1.0	60.00
3	4.81	6.62	5.270	0.20(0.02)	0.10	1.0	67.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.54	5.08	6.128	0.20(0.02)	0.10	1.0	62.00
2	5.55	5.13	6.095	0.20(0.02)	0.10	1.0	63.00
3	5.56	5.20	6.047	0.20(0.02)	0.10	1.0	64.00
4	5.59	6.17	5.487	0.20(0.02)	0.10	1.1	60.00
5	5.53	6.62	5.270	0.20(0.02)	0.10	1.1	67.00

TOTAL AREA(ACRES) = 1.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.59 Tc(MIN.) = 6.166
 EFFECTIVE AREA(ACRES) = 1.11 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.1
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 69.00 = 429.15 FEET.

FLOW PROCESS FROM NODE 69.00 TO NODE 69.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

=====

FLOW PROCESS FROM NODE 69.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.53
 FLOW LENGTH(FEET) = 114.36 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.86

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.59
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 6.44
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.44
RAINFALL INTENSITY(INCH/HR) = 5.35
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.11
TOTAL STREAM AREA(ACRES) = 1.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.59

FLOW PROCESS FROM NODE 70.00 TO NODE 71.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 48.85
ELEVATION DATA: UPSTREAM(FEET) = 1012.86 DOWNSTREAM(FEET) = 1012.04

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.05	0.20	0.100	91	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.28
TOTAL AREA(ACRES) = 0.05 PEAK FLOW RATE(CFS) = 0.28

FLOW PROCESS FROM NODE 71.00 TO NODE 72.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.32 DOWNSTREAM(FEET) = 1008.33
FLOW LENGTH(FEET) = 18.59 MANNING'S N = 0.012

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 6.000
DEPTH OF FLOW IN 6.0 INCH PIPE IS 1.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.99
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.28
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.04
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 72.00 = 67.44 FEET.

FLOW PROCESS FROM NODE 72.00 TO NODE 72.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 5.04
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.156
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.09	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.09 SUBAREA RUNOFF(CFS) = 0.50
EFFECTIVE AREA(ACRES) = 0.14 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.1 PEAK FLOW RATE(CFS) = 0.77

FLOW PROCESS FROM NODE 72.00 TO NODE 73.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.33 DOWNSTREAM(FEET) = 1004.53
FLOW LENGTH(FEET) = 152.62 MANNING'S N = 0.012
DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.34
ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.77
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 5.52
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 73.00 = 220.06 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.52

RAINFALL INTENSITY(INCH/HR) = 5.85
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.14
 TOTAL STREAM AREA(ACRES) = 0.14
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.77

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.54	5.36	5.944	0.20(0.02)	0.10	1.0	62.00
1	5.55	5.41	5.913	0.20(0.02)	0.10	1.0	63.00
1	5.56	5.48	5.869	0.20(0.02)	0.10	1.0	64.00
1	5.59	6.44	5.350	0.20(0.02)	0.10	1.1	60.00
1	5.53	6.89	5.147	0.20(0.02)	0.10	1.1	67.00
2	0.77	5.52	5.846	0.20(0.02)	0.10	0.1	70.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.30	5.36	5.944	0.20(0.02)	0.10	1.1	62.00
2	6.32	5.41	5.913	0.20(0.02)	0.10	1.1	63.00
3	6.33	5.48	5.869	0.20(0.02)	0.10	1.1	64.00
4	6.33	5.52	5.846	0.20(0.02)	0.10	1.1	70.00
5	6.29	6.44	5.350	0.20(0.02)	0.10	1.3	60.00
6	6.21	6.89	5.147	0.20(0.02)	0.10	1.3	67.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.33 Tc(MIN.) = 5.52
 EFFECTIVE AREA(ACRES) = 1.15 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.3
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 73.00 = 543.51 FEET.

FLOW PROCESS FROM NODE 73.00 TO NODE 73.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.846
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN (MIN.)
 COMMERCIAL D 0.07 0.20 0.100 91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.07 SUBAREA RUNOFF(CFS) = 0.37
 EFFECTIVE AREA(ACRES) = 1.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 6.39

FLOW PROCESS FROM NODE 73.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.53 DOWNSTREAM(FEET) = 1004.06
 FLOW LENGTH(FEET) = 25.11 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.19
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.39
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.57
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1<<<<<

FLOW PROCESS FROM NODE 74.00 TO NODE 75.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 137.19
 ELEVATION DATA: UPSTREAM(FEET) = 1012.59 DOWNSTREAM(FEET) = 1009.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ LAND USE SCS SOIL AREA (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN (MIN.) Tc (MIN.)
 COMMERCIAL D 0.16 0.20 0.100 91 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.89
 TOTAL AREA(ACRES) = 0.16 PEAK FLOW RATE(CFS) = 0.89

FLOW PROCESS FROM NODE 75.00 TO NODE 75.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.04 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.04 SUBAREA RUNOFF(CFS) = 0.22
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.11

FLOW PROCESS FROM NODE 75.00 TO NODE 78.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.75 DOWNSTREAM(FEET) = 1008.49
FLOW LENGTH(FEET) = 80.20 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.75
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.11
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 5.49
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 78.00 = 217.39 FEET.

FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.867
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.05 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.05 SUBAREA RUNOFF(CFS) = 0.26
EFFECTIVE AREA(ACRES) = 0.25 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.32

FLOW PROCESS FROM NODE 78.00 TO NODE 78.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.867
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.08 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.42
EFFECTIVE AREA(ACRES) = 0.33 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.74

FLOW PROCESS FROM NODE 78.00 TO NODE 84.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.33 DOWNSTREAM(FEET) = 1008.05
FLOW LENGTH(FEET) = 53.04 MANNING'S N = 0.012
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.69
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.74
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 5.73
LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.73
RAINFALL INTENSITY(INCH/HR) = 5.73
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.33
TOTAL STREAM AREA(ACRES) = 0.33
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.74

FLOW PROCESS FROM NODE 79.00 TO NODE 80.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 39.08
 ELEVATION DATA: UPSTREAM(FEET) = 1011.89 DOWNSTREAM(FEET) = 1009.46

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.07	0.20	0.100	91	5.00

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 0.39
 TOTAL AREA(ACRES) = 0.07 PEAK FLOW RATE(CFS) = 0.39

 FLOW PROCESS FROM NODE 80.00 TO NODE 83.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1008.85 DOWNSTREAM(FEET) = 1008.27
 FLOW LENGTH(FEET) = 115.81 MANNING'S N = 0.012
 DEPTH OF FLOW IN 6.0 INCH PIPE IS 4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 2.42
 ESTIMATED PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.39
 PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 5.80
 LONGEST FLOWPATH FROM NODE 79.00 TO NODE 83.00 = 154.89 FEET.

 FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 5.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.684
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.13	0.20	0.100	91

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.13 SUBAREA RUNOFF(CFS) = 0.66
 EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.02

 FLOW PROCESS FROM NODE 83.00 TO NODE 83.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 5.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.684
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.03	0.20	0.100	91

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.03 SUBAREA RUNOFF(CFS) = 0.15
 EFFECTIVE AREA(ACRES) = 0.23 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.2 PEAK FLOW RATE(CFS) = 1.17

 FLOW PROCESS FROM NODE 83.00 TO NODE 84.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1008.27 DOWNSTREAM(FEET) = 1008.05
 FLOW LENGTH(FEET) = 43.34 MANNING'S N = 0.012
 DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.21
 ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.17
 PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 6.02
 LONGEST FLOWPATH FROM NODE 79.00 TO NODE 84.00 = 198.23 FEET.

 FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.02
 RAINFALL INTENSITY(INCH/HR) = 5.56
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.23
 TOTAL STREAM AREA(ACRES) = 0.23

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.17

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.74	5.73	5.725	0.20(0.02)	0.10	0.3	74.00
2	1.17	6.02	5.562	0.20(0.02)	0.10	0.2	79.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.88	5.73	5.725	0.20(0.02)	0.10	0.5	74.00
2	2.86	6.02	5.562	0.20(0.02)	0.10	0.6	79.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.88 Tc(MIN.) = 5.73
 EFFECTIVE AREA(ACRES) = 0.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.6
 LONGEST FLOWPATH FROM NODE 74.00 TO NODE 84.00 = 270.43 FEET.

FLOW PROCESS FROM NODE 84.00 TO NODE 84.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 5.73

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.725

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.08	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.41

EFFECTIVE AREA(ACRES) = 0.63 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 3.23

FLOW PROCESS FROM NODE 84.00 TO NODE 85.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.05 DOWNSTREAM(FEET) = 1004.06

FLOW LENGTH(FEET) = 38.25 MANNING'S N = 0.012

DEPTH OF FLOW IN 9.0 INCH PIPE IS 4.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.22

ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.23

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.77

LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

FLOW PROCESS FROM NODE 85.00 TO NODE 85.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.23	5.77	5.698	0.20(0.02)	0.10	0.6	74.00
2	3.19	6.07	5.536	0.20(0.02)	0.10	0.6	79.00

LONGEST FLOWPATH FROM NODE 74.00 TO NODE 85.00 = 308.68 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.37	5.41	5.912	0.20(0.02)	0.10	1.2	62.00
2	6.38	5.46	5.882	0.20(0.02)	0.10	1.2	63.00
3	6.39	5.53	5.838	0.20(0.02)	0.10	1.2	64.00
4	6.39	5.57	5.815	0.20(0.02)	0.10	1.2	70.00
5	6.35	6.49	5.326	0.20(0.02)	0.10	1.3	60.00
6	6.28	6.95	5.125	0.20(0.02)	0.10	1.4	67.00

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.51	5.41	5.912	0.20(0.02)	0.10	1.8	62.00
2	9.53	5.46	5.882	0.20(0.02)	0.10	1.8	63.00
3	9.56	5.53	5.838	0.20(0.02)	0.10	1.8	64.00
4	9.57	5.57	5.815	0.20(0.02)	0.10	1.8	70.00
5	9.61	5.77	5.698	0.20(0.02)	0.10	1.9	74.00
6	9.56	6.07	5.536	0.20(0.02)	0.10	1.9	79.00
7	9.42	6.49	5.326	0.20(0.02)	0.10	2.0	60.00
8	9.23	6.95	5.125	0.20(0.02)	0.10	2.0	67.00

TOTAL AREA(ACRES) = 2.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.61 Tc(MIN.) = 5.774

EFFECTIVE AREA(ACRES) = 1.87 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 2.0

LONGEST FLOWPATH FROM NODE 60.00 TO NODE 85.00 = 568.62 FEET.

END OF RATIONAL METHOD ANALYSIS



```

*****
FLOW PROCESS FROM NODE      85.00 TO NODE      86.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1004.06  DOWNSTREAM(FEET) = 1003.09
FLOW LENGTH(FEET) =  94.15  MANNING'S N =  0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  7.16
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =          9.61
PIPE TRAVEL TIME(MIN.) =  0.22  Tc(MIN.) =  5.99
LONGEST FLOWPATH FROM NODE      60.00 TO NODE      86.00 =  662.77 FEET.

*****
FLOW PROCESS FROM NODE      86.00 TO NODE      90.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1003.09  DOWNSTREAM(FEET) =  997.90
FLOW LENGTH(FEET) =  28.30  MANNING'S N =  0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS  5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.34
GIVEN PIPE DIAMETER(INCH) = 15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =          9.61
PIPE TRAVEL TIME(MIN.) =  0.02  Tc(MIN.) =  6.02
LONGEST FLOWPATH FROM NODE      60.00 TO NODE      90.00 =  691.07 FEET.

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =       2.0  TC(MIN.) =       6.02
EFFECTIVE AREA(ACRES) =  1.87  AREA-AVERAGED Fm(INCH/HR)=  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.100
PEAK FLOW RATE(CFS)   =       9.61

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
-----
  1      9.51  5.66  5.765  0.20( 0.02)  0.10      1.8  62.00
  2      9.53  5.70  5.737  0.20( 0.02)  0.10      1.8  63.00
  3      9.56  5.78  5.697  0.20( 0.02)  0.10      1.8  64.00
  4      9.57  5.81  5.675  0.20( 0.02)  0.10      1.8  70.00
  5      9.61  6.02  5.565  0.20( 0.02)  0.10      1.9  74.00
  6      9.56  6.31  5.414  0.20( 0.02)  0.10      1.9  79.00
  7      9.42  6.74  5.216  0.20( 0.02)  0.10      2.0  60.00
  8      9.23  7.19  5.025  0.20( 0.02)  0.10      2.0  67.00
=====

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APPENDIX C – HYDRAULIC (WSPGW) RESULTS

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-23-2021 Time: 8:38:30

DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4

PROPOSED CONDITION LINE C1

10 YEAR STORM EVENT - MHW CONDITION WSE=13.50

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope |      |      |      |      | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1002.500 | 6.990 | 6.510 | 13.500 | 3.62 | 1.15 | .02 | 13.52 | .00 | .67 | .00 | 2.000 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
124.610 | .0290 |      |      |      |      |      | .03 | 6.51 | .00 | .41 | .013 | .00 | .00 | PIPE
1127.110 | 10.600 | 2.933 | 13.533 | 3.62 | 1.15 | .02 | 13.55 | .00 | .67 | .00 | 2.000 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
17.770 | .0287 |      |      |      |      |      | .00 | 2.93 | .00 | .42 | .013 | .00 | .00 | PIPE
1144.880 | 11.110 | 2.435 | 13.545 | 3.62 | 1.15 | .02 | 13.57 | .00 | .67 | .00 | 2.000 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
5.690 | .0299 |      |      |      |      |      | .00 | 2.43 | .00 | .41 | .013 | .00 | .00 | PIPE
1150.570 | 11.280 | 2.266 | 13.546 | 3.62 | 1.15 | .02 | 13.57 | .00 | .67 | .00 | 2.000 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
JUNCT STR | .0218 |      |      |      |      |      | .00 | 2.27 | .00 | .013 | .00 | .00 | .00 | PIPE
1155.160 | 11.380 | 2.171 | 13.551 | 3.42 | 2.79 | .12 | 13.67 | .00 | .75 | .00 | 1.250 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
44.430 | .0203 |      |      |      |      |      | .12 | 2.17 | .00 | .53 | .013 | .00 | .00 | PIPE
1199.590 | 12.280 | 1.402 | 13.682 | 3.42 | 2.79 | .12 | 13.80 | .00 | .75 | .00 | 1.250 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
JUNCT STR | .0100 |      |      |      |      |      | .00 | 1.40 | .00 | .013 | .00 | .00 | .00 | PIPE
1199.690 | 12.281 | 1.510 | 13.791 | 1.04 | 1.92 | .06 | 13.85 | .00 | .45 | .00 | .830 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
37.183 | .0206 |      |      |      |      |      | .08 | 1.51 | .00 | .33 | .013 | .00 | .00 | PIPE
1236.873 | 13.047 | .830 | 13.877 | 1.04 | 1.92 | .06 | 13.93 | .00 | .45 | .00 | .830 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
3.803 | .0206 |      |      |      |      |      | .01 | .83 | .00 | .33 | .013 | .00 | .00 | PIPE
1240.676 | 13.125 | .753 | 13.878 | 1.04 | 2.02 | .06 | 13.94 | .00 | .45 | .48 | .830 | .000 | .00 | 1 .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
2.074 | .0206 |      |      |      |      |      | .00 | .75 | .34 | .33 | .013 | .00 | .00 | PIPE

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4
 PROPOSED CONDITION LINE C1
 10 YEAR STORM EVENT - MHW CONDITION WSE=13.50

Date:11-23-2021 Time: 8:38:30

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1242.750	13.168	.708	13.876	1.04	2.11	.07	13.95	.00	.45	.59	.830	.000	.00	1 .0
1.633	.0206					.0023	.00	.71	.41	.33	.013	.00	.00	PIPE
1244.383	13.202	.671	13.873	1.04	2.22	.08	13.95	.00	.45	.65	.830	.000	.00	1 .0
1.356	.0206					.0025	.00	.67	.46	.33	.013	.00	.00	PIPE
1245.739	13.229	.639	13.869	1.04	2.33	.08	13.95	.00	.45	.70	.830	.000	.00	1 .0
1.134	.0206					.0028	.00	.64	.51	.33	.013	.00	.00	PIPE
1246.873	13.253	.610	13.863	1.04	2.44	.09	13.96	.00	.45	.73	.830	.000	.00	1 .0
HYDRAULIC JUMP														
1246.873	13.253	.331	13.583	1.04	5.18	.42	14.00	.00	.45	.81	.830	.000	.00	1 .0
28.477	.0206					.0206	.59	.33	1.83	.33	.013	.00	.00	PIPE
1275.350	13.839	.331	14.170	1.04	5.18	.42	14.59	.00	.45	.81	.830	.000	.00	1 .0
20.660	.0206					.0199	.41	.33	1.83	.33	.013	.00	.00	PIPE
1296.010	14.265	.337	14.602	1.04	5.04	.39	15.00	.00	.45	.82	.830	.000	.00	1 .0
9.054	.0206					.0180	.16	.34	1.77	.33	.013	.00	.00	PIPE
1305.064	14.451	.349	14.801	1.04	4.81	.36	15.16	.00	.45	.82	.830	.000	.00	1 .0
4.112	.0206					.0158	.06	.35	1.65	.33	.013	.00	.00	PIPE
1309.176	14.536	.362	14.898	1.04	4.58	.33	15.22	.00	.45	.82	.830	.000	.00	1 .0
2.421	.0206					.0139	.03	.36	1.54	.33	.013	.00	.00	PIPE

▲ FILE: C1P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4

Date:11-23-2021 Time: 8:38:30

PROPOSED CONDITION LINE C1
 10 YEAR STORM EVENT - MHW CONDITION WSE=13.50

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1311.597	14.586	.376	14.962	1.04	4.37	.30	15.26	.00	.45	.83	.830	.000	.00	1 .0
	1.544	.0206				.0122	.02	.38	1.43	.33	.013	.00	.00	PIPE
1313.141	14.618	.390	15.008	1.04	4.17	.27	15.28	.00	.45	.83	.830	.000	.00	1 .0
	.994	.0206				.0107	.01	.39	1.34	.33	.013	.00	.00	PIPE
1314.135	14.638	.404	15.043	1.04	3.97	.25	15.29	.00	.45	.83	.830	.000	.00	1 .0
	.617	.0206				.0094	.01	.40	1.25	.33	.013	.00	.00	PIPE
1314.753	14.651	.420	15.071	1.04	3.79	.22	15.29	.00	.45	.83	.830	.000	.00	1 .0
	.330	.0206				.0083	.00	.42	1.16	.33	.013	.00	.00	PIPE
1315.083	14.658	.436	15.094	1.04	3.61	.20	15.30	.00	.45	.83	.830	.000	.00	1 .0
	.107	.0206				.0073	.00	.44	1.08	.33	.013	.00	.00	PIPE
1315.190	14.660	.454	15.114	1.04	3.43	.18	15.30	.00	.45	.83	.830	.000	.00	1 .0



T1 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4									0
T2 PROPOSED CONDITION LINE C1									
T3 10 YEAR STORM EVENT - MHW CONDITION WSE=13.50									
SO	1002.500	6.990	1						13.500
R	1127.110	10.600	1	.013				.000	.000 1
R	1144.880	11.110	1	.013				.000	-90.000 1
R	1150.570	11.280	1	.013				.000	.000 0
JX	1155.160	11.380	1	2	.013	.200		12.110	45.0 .000
R	1199.590	12.280	3	.013				.000	.000 1
JX	1199.690	12.281	3	2	.013	2.380		12.281	45.0 .000
R	1315.190	14.660	2	.013				.000	.000 0
SH	1315.190	14.660	2						14.660
CD	1	4	1	.000	2.000	.000	.000	.000	.00
CD	2	4	1	.000	0.830	.000	.000	.000	.00
CD	3	4	1	.000	1.250	.000	.000	.000	.00
CD	4	4	1	.000	1.000	.000	.000	.000	.00
Q		1.040	.0						

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B
PROPOSED STORM DRAIN LATERAL C2
10-YEAR STORM - MHW CONDITION WSE=4.41

Date: 3-18-2021 Time: 5:15:44

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem  | Ch Slope |      |      |      |      |      | HF     | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall  | ZR | Type Ch
***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |*****
1000.000 | -3.600 | 8.760 | 5.160 | 22.90 | 3.24 | .16 | 5.32  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 3.000 | .0200 |         |         |         |         | .0012  | .00   | 8.76  | .00   | 1.01  | .013   | .00   | .00 | PIPE
1003.000 | -3.540 | 8.704 | 5.164 | 22.90 | 3.24 | .16 | 5.33  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 3.440 | .0174 |         |         |         |         | .0012  | .00   | 8.70  | .00   | 1.04  | .013   | .00   | .00 | PIPE
1006.440 | -3.480 | 8.648 | 5.168 | 22.90 | 3.24 | .16 | 5.33  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 3.680 | .0190 |         |         |         |         | .0012  | .00   | 8.65  | .00   | 1.02  | .013   | .00   | .00 | PIPE
1010.120 | -3.410 | 8.582 | 5.172 | 22.90 | 3.24 | .16 | 5.33  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 16.030 | .0000 |         |         |         |         | .0012  | .02   | .00   | .00   | .00   | .013   | .00   | .00 | PIPE
1026.150 | -3.410 | 8.623 | 5.213 | 22.90 | 3.24 | .16 | 5.38  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 95.280 | .0218 |         |         |         |         | .0012  | .11   | 8.62  | .00   | .98   | .013   | .00   | .00 | PIPE
1121.430 | -1.330 | 6.655 | 5.325 | 22.90 | 3.24 | .16 | 5.49  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 5.370 | .0186 |         |         |         |         | .0012  | .01   | .00   | .00   | 1.03  | .013   | .00   | .00 | PIPE
1126.800 | -1.230 | 6.574 | 5.344 | 22.90 | 3.24 | .16 | 5.51  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 47.720 | .0189 |         |         |         |         | .0012  | .06   | 6.57  | .00   | 1.02  | .013   | .00   | .00 | PIPE
1174.520 | -.330  | 5.730 | 5.400 | 22.90 | 3.24 | .16 | 5.56  | .00   | 1.54  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
JUNCT STR | .0215 |         |         |         |         |         | .0011  | .01   | 5.73  | .00   | .013   | .00   | .00 | PIPE
1179.180 | -.230  | 5.688 | 5.458 | 20.97 | 2.97 | .14 | 5.59  | .00   | 1.47  | .00   | 3.000  | .000   | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
         | 15.210 | .0184 |         |         |         |         | .0010  | .02   | 5.69  | .00   | .98   | .013   | .00   | .00 | PIPE

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WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B
PROPOSED STORM DRAIN LATERAL C2
10-YEAR STORM - MHW CONDITION WSE=4.41

Date: 3-18-2021 Time: 5:15:44

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1194.390	.050	5.423	5.473	20.97	2.97	.14	5.61	.00	1.47	.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35.950	.0186					.0010	.04	.00	.00	.98	.013	.00	.00	PIPE
1230.340	.720	4.816	5.536	20.97	2.97	.14	5.67	.00	1.47	.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76.880	.0186					.0010	.08	4.82	.00	.98	.013	.00	.00	PIPE
1307.220	2.150	3.462	5.612	20.97	2.97	.14	5.75	.00	1.47	.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.608	.0186					.0010	.03	.00	.00	.98	.013	.00	.00	PIPE
1334.828	2.664	3.000	5.664	20.97	2.97	.14	5.80	3.00	1.47	.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.232	.0186					.0009	.01	3.00	.00	.98	.013	.00	.00	PIPE
1348.060	2.910	2.754	5.664	20.97	3.09	.15	5.81	.00	1.47	1.65	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.000	.0200					.0009	.00	2.75	.27	.96	.013	.00	.00	PIPE
1350.060	2.950	2.712	5.662	20.97	3.12	.15	5.81	.00	1.47	1.77	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRANS STR	.0000					.0009	.01	2.71	.28		.013	.00	.00	PIPE
1363.390	2.950	2.725	5.675	20.97	3.11	.15	5.83	.00	1.47	1.73	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.840	.0052					.0009	.00	2.73	.28	1.38	.013	.00	.00	PIPE
1367.230	2.970	2.707	5.677	20.97	3.12	.15	5.83	.00	1.47	1.78	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	.0215					.0007	.00	2.71	.28		.013	.00	.00	PIPE
1371.890	3.070	2.647	5.717	17.17	2.60	.11	5.82	.00	1.33	1.93	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.690	.0037					.0006	.00	2.65	.25	1.36	.013	.00	.00	PIPE

▲ FILE: C2P10H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

Date: 3-18-2021 Time: 5:15:44

PROPOSED STORM DRAIN LATERAL C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1374.580	3.080	2.638	5.718	17.17	2.61	.11	5.82	.02	1.33	1.95	3.000	.000	.00	1 .0
30.159	.0051					.0006	.02	2.66	.25	1.25	.013	.00	.00	PIPE
1404.739	3.234	2.493	5.726	17.17	2.74	.12	5.84	.02	1.33	2.25	3.000	.000	.00	1 .0
13.051	.0051					.0007	.01	2.52	.29	1.25	.013	.00	.00	PIPE
1417.790	3.300	2.429	5.729	17.17	2.80	.12	5.85	.00	1.33	2.35	3.000	.000	.00	1 .0
23.330	.0051					.0007	.02	2.43	.31	1.24	.013	.00	.00	PIPE
1441.120	3.420	2.314	5.734	17.17	2.94	.13	5.87	.00	1.33	2.52	3.000	.000	.00	1 .0
JUNCT STR	.3750							2.31	.34		.013	.00	.00	PIPE
1445.120	4.920	1.025	5.945	7.01	5.45	.46	6.41	.00	1.03	1.40	1.500	.000	.00	1 .0
2.539	.0050					.0064	.02	1.03	1.00	1.16	.013	.00	.00	PIPE
1447.659	4.933	1.071	6.004	7.01	5.20	.42	6.42	.00	1.03	1.36	1.500	.000	.00	1 .0
3.578	.0050					.0060	.02	1.07	.92	1.16	.013	.00	.00	PIPE
1451.237	4.950	1.071	6.021	7.01	5.20	.42	6.44	.00	1.03	1.36	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1451.237	4.950	.949	5.900	7.01	5.95	.55	6.45	.00	1.03	1.45	1.500	.000	.00	1 .0
1.663	.0050					.0084	.01	.95	1.16	1.16	.013	.00	.00	PIPE
1452.900	4.959	.949	5.908	7.01	5.95	.55	6.46	.00	1.03	1.45	1.500	.000	.00	1 .0
4.320	.0050					.0090	.04	.95	1.16	1.16	.013	.00	.00	PIPE

FILE: C2P10H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 3-18-2021 Time: 5:15:44

DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

PROPOSED STORM DRAIN LATERAL C2

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1457.220	4.980	.912	5.892	7.01	6.24	.60	6.50	.04	1.03	1.46	1.500	.000	.00	1 .0
4.520	.0051					.0101	.05	.95	1.25	1.15	.013	.00	.00	PIPE
1461.740	5.003	.879	5.882	7.01	6.52	.66	6.54	.04	1.03	1.48	1.500	.000	.00	1 .0
5.163	.0051					.0113	.06	.92	1.35	1.15	.013	.00	.00	PIPE
1466.903	5.029	.845	5.875	7.01	6.83	.73	6.60	.05	1.03	1.49	1.500	.000	.00	1 .0
5.250	.0051					.0128	.07	.89	1.45	1.15	.013	.00	.00	PIPE
1472.153	5.056	.813	5.869	7.01	7.17	.80	6.67	.05	1.03	1.49	1.500	.000	.00	1 .0
5.237	.0051					.0145	.08	.87	1.56	1.15	.013	.00	.00	PIPE
1477.389	5.083	.783	5.866	7.01	7.52	.88	6.74	.06	1.03	1.50	1.500	.000	.00	1 .0
5.162	.0051					.0165	.09	.84	1.68	1.15	.013	.00	.00	PIPE
1482.552	5.109	.754	5.863	7.01	7.89	.97	6.83	.06	1.03	1.50	1.500	.000	.00	1 .0
5.064	.0051					.0187	.09	.82	1.80	1.15	.013	.00	.00	PIPE
1487.616	5.135	.726	5.861	7.01	8.27	1.06	6.92	.07	1.03	1.50	1.500	.000	.00	1 .0
4.944	.0051					.0213	.11	.80	1.94	1.15	.013	.00	.00	PIPE
1492.560	5.160	.700	5.860	7.01	8.67	1.17	7.03	.00	1.03	1.50	1.500	.000	.00	1 .0
3.847	.0372					.0216	.08	.70	2.08	.61	.013	.00	.00	PIPE
1496.407	5.303	.719	6.022	7.01	8.38	1.09	7.11	.00	1.03	1.50	1.500	.000	.00	1 .0
4.027	.0372					.0194	.08	.72	1.97	.61	.013	.00	.00	PIPE

FILE: C2P10H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 3-18-2021 Time: 5:15:44

DANA POINT HARBOR COMMERCIAL CORE PARKING STRUCTURE AREA PH 2B

PROPOSED STORM DRAIN LATERAL C2

10-YEAR STORM - MHW CONDITION WSE=4.41

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1511.120	5.850	1.216	7.066	6.73	4.39	.30	7.37	.00	1.00	1.17	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.813	-.0054					.0040	.02	1.22	.68	.00	.013	.00	.00	PIPE
1514.932	5.829	1.277	7.107	6.73	4.20	.27	7.38	.00	1.00	1.07	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.738	-.0054					.0037	.02	1.28	.60	.00	.013	.00	.00	PIPE
1519.671	5.804	1.341	7.145	6.73	4.04	.25	7.40	.00	1.00	.92	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.675	-.0054					.0036	.02	1.34	.53	.00	.013	.00	.00	PIPE
1525.345	5.773	1.408	7.181	6.73	3.91	.24	7.42	.00	1.00	.72	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.629	-.0054					.0036	.02	1.41	.45	.00	.013	.00	.00	PIPE
1531.974	5.738	1.478	7.216	6.73	3.82	.23	7.44	.00	1.00	.36	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.194	-.0054					.0039	.01	1.48	.30	.00	.013	.00	.00	PIPE
1534.168	5.726	1.500	7.226	6.73	3.81	.23	7.45	.00	1.00	.00	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
34.472	-.0054					.0041	.14	1.50	.00	.00	.013	.00	.00	PIPE
1568.640	5.540	1.827	7.367	6.73	3.81	.23	7.59	.00	1.00	.00	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.2000					.0046	.02	1.83	.00		.013	.00	.00	PIPE
----- WARNING - Junction Analysis - Large Lateral Flow(s) -----														
1572.640	6.340	1.257	7.597	1.55	2.86	.13	7.72	.00	.56	.00	.830	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -



Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-29-2021 Time: 4:15:53

DANA POINT HARBOR COMMERCIAL CORE BLDG 6 TO 12 PH 4

PROPOSED STORM DRAIN LINE C3

10-YEAR STORM - MHW CONDITION WSE=11.80

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem  | Ch Slope |      |      |      |      |      | HF      | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall  | ZR | Type Ch
***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |*****
1002.550 | 5.860 | 5.940 | 11.800 | 12.37 | 3.94 | .24 | 12.04 | .00 | 1.26 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
28.040 | .0118 |      |      |      |      |      | .08 | 5.94 | .00 | 1.00 | .013 | .00 | .00 | PIPE
1030.590 | 6.190 | 5.694 | 11.884 | 12.37 | 3.94 | .24 | 12.12 | .00 | 1.26 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
17.670 | .0113 |      |      |      |      |      | .05 | .00 | .00 | 1.02 | .013 | .00 | .00 | PIPE
1048.260 | 6.390 | 5.581 | 11.971 | 12.37 | 3.94 | .24 | 12.21 | .00 | 1.26 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
3.130 | .0096 |      |      |      |      |      | .01 | 5.58 | .00 | 1.07 | .013 | .00 | .00 | PIPE
1051.390 | 6.420 | 5.560 | 11.980 | 12.37 | 3.94 | .24 | 12.22 | .00 | 1.26 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
JUNCT STR | .9990 |      |      |      |      |      | .0028 | 5.56 | .00 | .013 | .00 | .00 | PIPE
1051.400 | 6.430 | 5.610 | 12.040 | 11.57 | 3.68 | .21 | 12.25 | .00 | 1.22 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
87.450 | .0114 |      |      |      |      |      | .0026 | 5.61 | .00 | .97 | .013 | .00 | .00 | PIPE
1138.850 | 7.430 | 4.839 | 12.269 | 11.57 | 3.68 | .21 | 12.48 | .00 | 1.22 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
JUNCT STR | .9990 |      |      |      |      |      | .0024 | 4.84 | .00 | .013 | .00 | .00 | PIPE
1138.860 | 7.440 | 4.880 | 12.320 | 10.55 | 3.36 | .18 | 12.49 | .00 | 1.16 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
75.530 | .0115 |      |      |      |      |      | .0022 | 4.88 | .00 | .92 | .013 | .00 | .00 | PIPE
1214.390 | 8.310 | 4.174 | 12.484 | 10.55 | 3.36 | .18 | 12.66 | .00 | 1.16 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
JUNCT STR | .9990 |      |      |      |      |      | .0018 | 4.17 | .00 | .013 | .00 | .00 | PIPE
1214.400 | 8.320 | 4.203 | 12.523 | 8.48 | 2.70 | .11 | 12.64 | .00 | 1.04 | .00 | 2.000 | .000 | .00 | 1 .0
         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
65.820 | .0115 |      |      |      |      |      | .0014 | 4.20 | .00 | .82 | .013 | .00 | .00 | PIPE

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE BLDG 6 TO 12 PH 4
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM - MHW CONDITION WSE=11.80

Date:11-29-2021 Time: 4:15:53

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1280.220	9.080	3.535	12.615	8.48	2.70	.11	12.73	.00	1.04	.00	2.000	.000	.00	1 .0
JUNCT STR	.9990					.0012	.00	3.54	.00		.013	.00	.00	PIPE
1280.230	9.090	3.595	12.685	7.05	2.24	.08	12.76	.00	.94	.00	2.000	.000	.00	1 .0
9.810	.0102					.0010	.01	3.60	.00	.76	.013	.00	.00	PIPE
1290.040	9.190	3.505	12.695	7.05	2.24	.08	12.77	.00	.94	.00	2.000	.000	.00	1 .0
JUNCT STR	.9990					.0009	.00	3.50	.00		.013	.00	.00	PIPE
1290.050	9.200	3.525	12.725	6.33	2.01	.06	12.79	.00	.89	.00	2.000	.000	.00	1 .0
14.500	.0103					.0008	.01	3.53	.00	.72	.013	.00	.00	PIPE
1304.550	9.350	3.386	12.736	6.33	2.01	.06	12.80	.00	.89	.00	2.000	.000	.00	1 .0
JUNCT STR	.9990					.0006	.00	3.39	.00		.013	.00	.00	PIPE
1304.560	9.360	3.431	12.791	4.75	6.05	.57	13.36	.00	.90	.00	1.000	.000	.00	1 .0
10.000	.0100					.0178	.18	3.43	.00	1.00	.013	.00	.00	PIPE
1314.560	9.460	3.509	12.969	4.75	6.05	.57	13.54	.00	.90	.00	1.000	.000	.00	1 .0
61.050	.0113					.0178	1.09	3.51	.00	1.00	.013	.00	.00	PIPE
1375.610	10.150	3.904	14.054	4.75	6.05	.57	14.62	.00	.90	.00	1.000	.000	.00	1 .0
17.170	.0111					.0178	.31	.00	.00	1.00	.013	.00	.00	PIPE
1392.780	10.340	4.100	14.440	4.75	6.05	.57	15.01	.00	.90	.00	1.000	.000	.00	1 .0
29.810	.0111					.0178	.53	4.10	.00	1.00	.013	.00	.00	PIPE

▲ FILE: C3P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

PAGE 3

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE BLDG 6 TO 12 PH 4

Date:11-29-2021 Time: 4:15:53

PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM - MHW CONDITION WSE=11.80

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1422.590	10.670	4.300	14.970	4.75	6.05	.57	15.54	.00	.90	.00	1.000	.000	.00	1 .0
JUNCT STR	.9990					.0106	.00	4.30	.00		.013	.00	.00	PIPE
1422.600	10.680	4.838	15.518	2.06	2.62	.11	15.63	.00	.61	.00	1.000	.000	.00	1 .0
99.030	.0177					.0033	.33	4.84	.00	.46	.013	.00	.00	PIPE
1521.630	12.430	3.419	15.849	2.06	2.62	.11	15.96	.00	.61	.00	1.000	.000	.00	1 .0

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T1 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4										0
T2 PROPOSED CONDITION LINE C4										
T3 10 YEAR STORM EVENT - MHW CONDITION WSE=10.02										
SO	1005.650	3.740	1							10.02
R	1039.950	4.280	1	.013				.000	.000	0
R	1057.620	4.550	1	.013				-45.000	.000	0
R	1156.230	6.090	1	.013				.000	.000	0
JX	1156.240	6.100	1	2	.013	.150		45.0		.000
R	1169.800	6.632	1	.013				.000	.000	0
R	1187.470	6.590	1	.013				-45.000	.000	0
R	1211.380	6.970	1	.013				.000	.000	0
SH	1211.380	6.970	1							6.970
CD	1	4	1	.000	1.500	.000	.000	.000	.00	
CD	2	4	1	.000	0.830	.000	.000	.000	.00	
CD	3	4	1	.000	1.500	.000	.000	.000	.00	
Q		2.720	.0							

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-29-2021 Time: 9: 1:59

DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4

PROPOSED CONDITION LINE C4

10 YEAR STORM EVENT - MHW CONDITION WSE=10.02

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope |      |      |      |      | SF Ave | HF  | SE Dpth | Froude N | Norm Dp | "N"  | X-Fall | ZR | Type Ch
*****
1005.650 | 3.740 | 6.280 | 10.020 | 2.87 | 1.62 | .04 | 10.06 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
34.300 | .0157 |      |      |      |      | .0007 | .03 | 6.28 | .00 | .48 | .013 | .00 | .00 | PIPE
1039.950 | 4.280 | 5.766 | 10.046 | 2.87 | 1.62 | .04 | 10.09 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
17.670 | .0153 |      |      |      |      | .0007 | .01 | .00 | .00 | .48 | .013 | .00 | .00 | PIPE
1057.620 | 4.550 | 5.515 | 10.065 | 2.87 | 1.62 | .04 | 10.11 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
98.610 | .0156 |      |      |      |      | .0007 | .07 | 5.51 | .00 | .48 | .013 | .00 | .00 | PIPE
1156.230 | 6.090 | 4.048 | 10.138 | 2.87 | 1.62 | .04 | 10.18 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
JUNCT STR | .9990 |      |      |      |      | .0007 | .00 | 4.05 | .00 | .00 | .013 | .00 | .00 | PIPE
1156.240 | 6.100 | 4.046 | 10.146 | 2.72 | 1.54 | .04 | 10.18 | .00 | .63 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
13.560 | .0392 |      |      |      |      | .0007 | .01 | 4.05 | .00 | .37 | .013 | .00 | .00 | PIPE
1169.800 | 6.632 | 3.523 | 10.155 | 2.72 | 1.54 | .04 | 10.19 | .00 | .63 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
17.670 | -.0024 |      |      |      |      | .0007 | .01 | .00 | .00 | .00 | .013 | .00 | .00 | PIPE
1187.470 | 6.590 | 3.582 | 10.172 | 2.72 | 1.54 | .04 | 10.21 | .00 | .63 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
23.910 | .0159 |      |      |      |      | .0007 | .02 | 3.58 | .00 | .46 | .013 | .00 | .00 | PIPE
1211.380 | 6.970 | 3.218 | 10.188 | 2.72 | 1.54 | .04 | 10.22 | .00 | .63 | .00 | 1.500 | .000 | .00 | 1 | .0
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
    
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T1	DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4								0
T2	PROPOSED CONDITION LINE C4-1								
T3	10 YEAR STORM EVENT - MHW CONDITION WSE=10.02								
SO	1004.350	3.900	1					10.020	
R	1035.580	6.770	1	.013					45.000 .000 0
R	1053.640	8.430	1	.013					.000 00.000 0
SH	1053.640	8.430	1					6.590	
CD	1	4	1	.000	1.500	.000	.000	.000	.00
CD	2	4	1	.000	0.830	.000	.000	.000	.00
CD	3	4	1	.000	1.250	.000	.000	.000	.00
CD	4	4	1	.000	1.000	.000	.000	.000	.00
Q		1.390	.0						

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4
 PROPOSED CONDITION LINE C4-1

Date:12-17-2021 Time: 1:28: 9

10 YEAR STORM EVENT - MHW CONDITION WSE=10.02

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****
1004.350 | 3.900 | 6.120 | 10.020 | 1.39 | .79 | .01 | 10.03 | .00 | .44 | .00 | 1.500 | .000 | .00 | 1 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
31.230 | .0919 | | | | | .0002 | .01 | .00 | .00 | .21 | .013 | .00 | .00 | PIPE
      | | | | | | | | | | | | | | | |
1035.580 | 6.770 | 3.257 | 10.027 | 1.39 | .79 | .01 | 10.04 | .00 | .44 | .00 | 1.500 | .000 | .00 | 1 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
18.060 | .0919 | | | | | .0002 | .00 | 3.26 | .00 | .21 | .013 | .00 | .00 | PIPE
      | | | | | | | | | | | | | | | |
1053.640 | 8.430 | 1.600 | 10.030 | 1.39 | .79 | .01 | 10.04 | .00 | .44 | .00 | 1.500 | .000 | .00 | 1 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
    
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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 2-2021 Time: 8:45:55

DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4

PROPOSED CONDITION LINE D

100 YEAR STORM EVENT MHHW CONDITION WSE=5.13

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem  | Ch Slope |      |      |      |      | SF Ave | HF    | SE Dpth | Froude N | Norm Dp | "N"    | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
100.000 | -2.100 | 7.230 | 5.130 | 14.73 | 8.34 | 1.08 | 6.21 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
21.190  | .1557  |      |      |      |      |      | .42  | 7.23 | .00 | .62 | .013  | .00  | .00 | PIPE
121.190 | 1.200  | 4.347 | 5.547 | 14.73 | 8.34 | 1.08 | 6.63 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
10.100  | .2050  |      |      |      |      |      | .20  | 4.35 | .00 | .57 | .013  | .00  | .00 | PIPE
131.290 | 3.270  | 2.475 | 5.745 | 14.73 | 8.34 | 1.08 | 6.82 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
JUNCT STR | .0048  |      |      |      |      |      | .08  | 2.48 | .00 | .00 | .013  | .00  | .00 | PIPE
135.500 | 3.290  | 2.538 | 5.828 | 14.73 | 8.34 | 1.08 | 6.91 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
3.950   | .0051  |      |      |      |      |      | .08  | 2.54 | .00 | 1.50 | .013  | .00  | .00 | PIPE
139.450 | 3.310  | 2.650 | 5.960 | 14.73 | 8.34 | 1.08 | 7.04 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
35.290  | .0048  |      |      |      |      |      | .69  | .00  | .00 | 1.50 | .013  | .00  | .00 | PIPE
174.740 | 3.480  | 3.327 | 6.807 | 14.73 | 8.34 | 1.08 | 7.89 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
82.550  | .0051  |      |      |      |      |      | 1.62 | 3.33 | .00 | 1.50 | .013  | .00  | .00 | PIPE
257.290 | 3.900  | 4.638 | 8.538 | 14.73 | 8.34 | 1.08 | 9.62 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
TRANS STR | .0050  |      |      |      |      |      | .08  | 4.64 | .00 | .00 | .013  | .00  | .00 | PIPE
261.290 | 3.920  | 4.696 | 8.616 | 14.73 | 8.34 | 1.08 | 9.70 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
5.360   | .0037  |      |      |      |      |      | .11  | 4.70 | .00 | 1.50 | .013  | .00  | .00 | PIPE
266.650 | 3.940  | 4.890 | 8.830 | 14.73 | 8.34 | 1.08 | 9.91 | .00 | 1.40 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
JUNCT STR | .0024  |      |      |      |      |      | .0134 | .17 | .00 | .00 | .013  | .00  | .00 | PIPE

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4
 PROPOSED CONDITION LINE D
 100 YEAR STORM EVENT MHHW CONDITION WSE=5.13

Date:12- 2-2021 Time: 8:45:55

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
279.270	3.970	6.342	10.312	8.93	5.05	.40	10.71	.00	1.16	.00	1.500	.000	.00	1 .0
	.010					.0072	.00	.00	.00	.30	.013	.00	.00	PIPE
279.280	3.980	6.411	10.391	8.93	5.05	.40	10.79	.00	1.16	.00	1.500	.000	.00	1 .0
JUNCT STR	.0092					.0057	.16	6.41	.00		.013	.00	.00	PIPE
307.530	4.240	6.546	10.786	6.72	3.80	.22	11.01	.00	1.00	.00	1.500	.000	.00	1 .0
36.790	.0073					.0041	.15	6.55	.00	.97	.013	.00	.00	PIPE
344.320	4.510	6.426	10.936	6.72	3.80	.22	11.16	.00	1.00	.00	1.500	.000	.00	1 .0



Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-29-2021 Time: 5:11:16

DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4

PROPOSED CONDITION LINE D

10 YEAR STORM EVENT MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
100.000	-2.100	6.510	4.410	9.61	5.44	.46	4.87	.00	1.20	.00	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.190	.1557					.0084	.18	6.51	.00	.49	.013	.00	.00	PIPE
121.190	1.200	3.387	4.587	9.61	5.44	.46	5.05	.00	1.20	.00	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.601	.2050					.0083	.08	3.39	.00	.46	.013	.00	.00	PIPE
130.791	3.168	1.500	4.668	9.61	5.44	.46	5.13	.00	1.20	.00	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.467	.2050					.0078	.00	1.50	.00	.46	.013	.00	.00	PIPE
131.258	3.264	1.361	4.624	9.61	5.70	.51	5.13	.00	1.20	.87	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.031	.2050					.0074	.00	1.36	.72	.46	.013	.00	.00	PIPE
131.290	3.270	1.347	4.617	9.61	5.75	.51	5.13	.00	1.20	.91	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	.0048					.0073	.03	1.35	.75		.013	.00	.00	PIPE
135.500	3.290	1.371	4.661	9.61	5.68	.50	5.16	.00	1.20	.84	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.950	.0051					.0073	.03	1.37	.71	1.50	.013	.00	.00	PIPE
139.450	3.310	1.387	4.697	9.61	5.63	.49	5.19	.01	1.20	.79	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29.436	.0048					.0075	.22	1.40	.68	1.50	.013	.00	.00	PIPE
168.886	3.452	1.500	4.952	9.61	5.44	.46	5.41	1.50	1.20	.00	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.854	.0048					.0081	.05	1.50	.00	1.50	.013	.00	.00	PIPE
174.740	3.480	1.547	5.027	9.61	5.44	.46	5.49	.00	1.20	.00	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82.550	.0051					.0084	.69	1.55	.00	1.50	.013	.00	.00	PIPE

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA-PHASE 4
 PROPOSED CONDITION LINE D
 10 YEAR STORM EVENT MHW CONDITION WSE=4.41

Date:11-29-2021 Time: 5:11:16

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
257.290	3.900	1.864	5.764	9.61	5.44	.46	6.22	.00	1.20	.00	1.500	.000	.00	1 .0
TRANS STR	.0050					.0084	.03	1.86	.00		.013	.00	.00	PIPE
261.290	3.920	1.878	5.798	9.61	5.44	.46	6.26	.00	1.20	.00	1.500	.000	.00	1 .0
5.360	.0037					.0084	.04	1.88	.00	1.50	.013	.00	.00	PIPE
266.650	3.940	1.948	5.888	9.61	5.44	.46	6.35	.00	1.20	.00	1.500	.000	.00	1 .0
JUNCT STR	.0024					.0059	.07	.00	.00		.013	.00	.00	PIPE
279.270	3.970	2.522	6.492	6.15	3.48	.19	6.68	.00	.96	.00	1.500	.000	.00	1 .0
.010	.9990					.0034	.00	.00	.00	.25	.013	.00	.00	PIPE
279.280	3.980	2.550	6.530	6.15	3.48	.19	6.72	.00	.96	.00	1.500	.000	.00	1 .0
JUNCT STR	.0092					.0027	.08	2.55	.00		.013	.00	.00	PIPE
307.530	4.240	2.476	6.716	4.72	2.67	.11	6.83	.00	.83	.00	1.500	.000	.00	1 .0
36.790	.0073					.0020	.07	2.48	.00	.77	.013	.00	.00	PIPE
344.320	4.510	2.280	6.790	4.72	2.67	.11	6.90	.00	.83	.00	1.500	.000	.00	1 .0



DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E

100-YEAR STORM - MHHW CONDITION WSE=5.13

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem  | Ch Slope |      |      |      |      | SF Ave | HF   | SE Dpth | Froude N | Norm Dp | "N"    | X-Fall | ZR | Type Ch
***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |*****
100.000 | -2.100 | 7.230 | 5.130 | 9.61 | 7.83 | .95 | 6.08 | .00 | 1.17 | .00 | 1.250 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
15.870  | .2773  |      |      |      |      |      | .35 | 7.23 | .00 | .45 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
115.870 | 2.300  | 3.181 | 5.481 | 9.61 | 7.83 | .95 | 6.43 | .00 | 1.17 | .00 | 1.250 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
7.840   | .0842  |      |      |      |      |      | .17 | 3.18 | .00 | .63 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
123.710 | 2.960  | 2.695 | 5.655 | 9.61 | 7.83 | .95 | 6.61 | .00 | 1.17 | .00 | 1.250 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
4.680   | .0342  |      |      |      |      |      | .10 | 2.69 | .00 | .85 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
128.390 | 3.120  | 2.686 | 5.806 | 9.61 | 5.44 | .46 | 6.27 | .00 | 1.20 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
3.170   | .0095  |      |      |      |      |      | .03 | 2.69 | .00 | 1.16 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
131.560 | 3.150  | 2.682 | 5.832 | 9.61 | 5.44 | .46 | 6.29 | .00 | 1.20 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
35.340  | .0099  |      |      |      |      |      | .30 | 2.68 | .00 | 1.13 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
166.900 | 3.500  | 2.765 | 6.265 | 9.61 | 5.44 | .46 | 6.72 | .00 | 1.20 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
36.120  | .0100  |      |      |      |      |      | .30 | 2.76 | .00 | 1.13 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
203.020 | 3.860  | 2.707 | 6.567 | 9.61 | 5.44 | .46 | 7.03 | .00 | 1.20 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
JUNCT STR | 1.0005 |      |      |      |      |      | .0060 | 2.71 | .00 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
203.030 | 3.870  | 3.046 | 6.916 | 6.38 | 3.61 | .20 | 7.12 | .00 | .98 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
6.520   | .0092  |      |      |      |      |      | .02 | 3.05 | .00 | .87 | .013 | .00 | .00 | PIPE
         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
209.550 | 3.930  | 3.010 | 6.940 | 6.38 | 3.61 | .20 | 7.14 | .00 | .98 | .00 | 1.500 | .000 | .00 | 1 .0
         | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -
35.170  | .0100  |      |      |      |      |      | .13 | 3.01 | .00 | .85 | .013 | .00 | .00 | PIPE
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WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E
100-YEAR STORM - MHHW CONDITION WSE=5.13

Date:12- 2-2021 Time: 8:31:22

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
L/Elem  | Ch Slope |          |          |          |          | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | *****
244.720 | 4.280 | 2.849 | 7.129 | 6.38 | 3.61 | .20 | 7.33 | .00 | .98 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
5.830   | .0086 |          |          |          |          |          | .02 | 2.85 | .00 | .89 | .013 | .00 | .00 | PIPE
250.550 | 4.330 | 2.821 | 7.151 | 6.38 | 3.61 | .20 | 7.35 | .00 | .98 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
JUNCT STR | 1.0006 |          |          |          |          |          | .00 | 2.82 | .00 | .013 | .00 | .00 | .00 | PIPE
250.560 | 4.340 | 2.929 | 7.269 | 4.83 | 2.73 | .12 | 7.38 | .00 | .84 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
74.560   | .0101 |          |          |          |          |          | .16 | 2.93 | .00 | .71 | .013 | .00 | .00 | PIPE
325.120 | 5.090 | 2.336 | 7.426 | 4.83 | 2.73 | .12 | 7.54 | .00 | .84 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
8.300   | .0096 |          |          |          |          |          | .02 | 2.34 | .00 | .72 | .013 | .00 | .00 | PIPE
333.420 | 5.170 | 2.282 | 7.452 | 4.83 | 2.73 | .12 | 7.57 | .00 | .84 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-
31.190   | .0099 |          |          |          |          |          | .07 | 2.28 | .00 | .72 | .013 | .00 | .00 | PIPE
364.610 | 5.480 | 2.038 | 7.518 | 4.83 | 2.73 | .12 | 7.63 | .00 | .84 | .00 | 1.500 | .000 | .00 | 1 | .0
         | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-   | -|-

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DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt/or I.D., ZL, No Wth Prs/Pip, L/Elem, Ch Slope, SF Ave, HF, SE Dpth, Froude N, Norm Dp, "N", X-Fall, ZR, Type Ch. Rows include station numbers like 100.000, 115.870, 123.710, etc.

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-29-2021 Time: 4:23:48

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
187.946	3.710	1.158	4.868	6.25	4.27	.28	5.15	.00	.97	1.26	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.259	.0100					.0042	.02	1.16	.70	.83	.013	.00	.00	PIPE
192.206	3.752	1.106	4.858	6.25	4.48	.31	5.17	.00	.97	1.32	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.262	.0100					.0047	.02	1.11	.77	.83	.013	.00	.00	PIPE
195.468	3.785	1.057	4.842	6.25	4.69	.34	5.18	.00	.97	1.37	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.117	.0100					.0053	.00	1.06	.84	.83	.013	.00	.00	PIPE
195.585	3.786	1.013	4.799	6.25	4.92	.38	5.17	.00	.97	1.41	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HYDRAULIC JUMP														
195.585	3.786	.856	4.642	6.25	6.00	.56	5.20	.00	.97	1.48	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.148	.0100					.0086	.02	.86	1.26	.83	.013	.00	.00	PIPE
197.732	3.807	.890	4.698	6.25	5.72	.51	5.21	.00	.97	1.47	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.261	.0100					.0076	.03	.89	1.17	.83	.013	.00	.00	PIPE
201.993	3.850	.927	4.776	6.25	5.45	.46	5.24	.00	.97	1.46	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.027	.0100					.0068	.01	.93	1.08	.83	.013	.00	.00	PIPE
203.020	3.860	.966	4.826	6.25	5.19	.42	5.25	.00	.97	1.44	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	1.0005					.0039	.00	.97	1.00		.013	.00	.00	PIPE
203.030	3.870	1.349	5.219	4.17	2.49	.10	5.31	.00	.78	.90	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.520	.0092					.0014	.01	1.35	.32	.67	.013	.00	.00	PIPE

▲ FILE: EP10H.WSW

W S P G W - CIVILDESIGN Version 14.07

PAGE 3

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA

Date:11-29-2021 Time: 4:23:48

PROPOSED STORM DRAIN LINE E
10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
209.550	3.930	1.291	5.221	4.17	2.58	.10	5.32	.00	.78	1.04	1.500	.000	.00	1 .0
6.873	.0100					.0015	.01	1.29	.36	.66	.013	.00	.00	PIPE
216.423	3.998	1.223	5.222	4.17	2.70	.11	5.33	.00	.78	1.16	1.500	.000	.00	1 .0
5.805	.0100					.0017	.01	1.22	.41	.66	.013	.00	.00	PIPE
222.229	4.056	1.164	5.220	4.17	2.83	.12	5.34	.00	.78	1.25	1.500	.000	.00	1 .0
5.042	.0100					.0019	.01	1.16	.46	.66	.013	.00	.00	PIPE
227.271	4.106	1.110	5.217	4.17	2.97	.14	5.35	.00	.78	1.32	1.500	.000	.00	1 .0
4.437	.0100					.0021	.01	1.11	.51	.66	.013	.00	.00	PIPE
231.708	4.151	1.062	5.212	4.17	3.12	.15	5.36	.00	.78	1.36	1.500	.000	.00	1 .0
3.917	.0100					.0023	.01	1.06	.56	.66	.013	.00	.00	PIPE
235.625	4.189	1.017	5.206	4.17	3.27	.17	5.37	.00	.78	1.40	1.500	.000	.00	1 .0
3.442	.0100					.0026	.01	1.02	.60	.66	.013	.00	.00	PIPE
239.066	4.224	.975	5.199	4.17	3.43	.18	5.38	.00	.78	1.43	1.500	.000	.00	1 .0
2.981	.0100					.0029	.01	.97	.66	.66	.013	.00	.00	PIPE
242.048	4.253	.936	5.189	4.17	3.60	.20	5.39	.00	.78	1.45	1.500	.000	.00	1 .0
2.529	.0100					.0033	.01	.94	.71	.66	.013	.00	.00	PIPE
244.576	4.279	.899	5.177	4.17	3.77	.22	5.40	.00	.78	1.47	1.500	.000	.00	1 .0
.144	.0100					.0035	.00	.90	.77	.66	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
244.720	4.280	.896	5.176	4.17	3.78	.22	5.40	.00	.78	1.47	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.608	.0086					.0038	.01	.90	.77	.69	.013	.00	.00	PIPE
247.328	4.302	.862	5.164	4.17	3.97	.24	5.41	.00	.78	1.48	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.932	.0086					.0043	.01	.86	.83	.69	.013	.00	.00	PIPE
249.259	4.319	.829	5.148	4.17	4.16	.27	5.42	.00	.78	1.49	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.144	.0086					.0048	.01	.83	.90	.69	.013	.00	.00	PIPE
250.404	4.329	.798	5.126	4.17	4.37	.30	5.42	.00	.78	1.50	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.146	.0086					.0052	.00	.80	.96	.69	.013	.00	.00	PIPE
250.550	4.330	.788	5.118	4.17	4.43	.31	5.42	.00	.78	1.50	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	1.0006					.0037	.00	.79	.99		.013	.00	.00	PIPE
250.560	4.340	.985	5.325	3.66	2.97	.14	5.46	.00	.73	1.42	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.321	.0101					.0022	.01	.99	.56	.61	.013	.00	.00	PIPE
253.881	4.373	.945	5.319	3.66	3.12	.15	5.47	.00	.73	1.45	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.950	.0101					.0025	.01	.95	.61	.61	.013	.00	.00	PIPE
256.831	4.403	.908	5.311	3.66	3.27	.17	5.48	.00	.73	1.47	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.569	.0101					.0028	.01	.91	.66	.61	.013	.00	.00	PIPE
259.401	4.429	.873	5.302	3.66	3.43	.18	5.48	.00	.73	1.48	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.307	.0101					.0032	.00	.87	.71	.61	.013	.00	.00	PIPE

FILE: EP10H.WSW

W S P G W - CIVILDESIGN Version 14.07

PAGE 5

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-29-2021 Time: 4:23:48

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

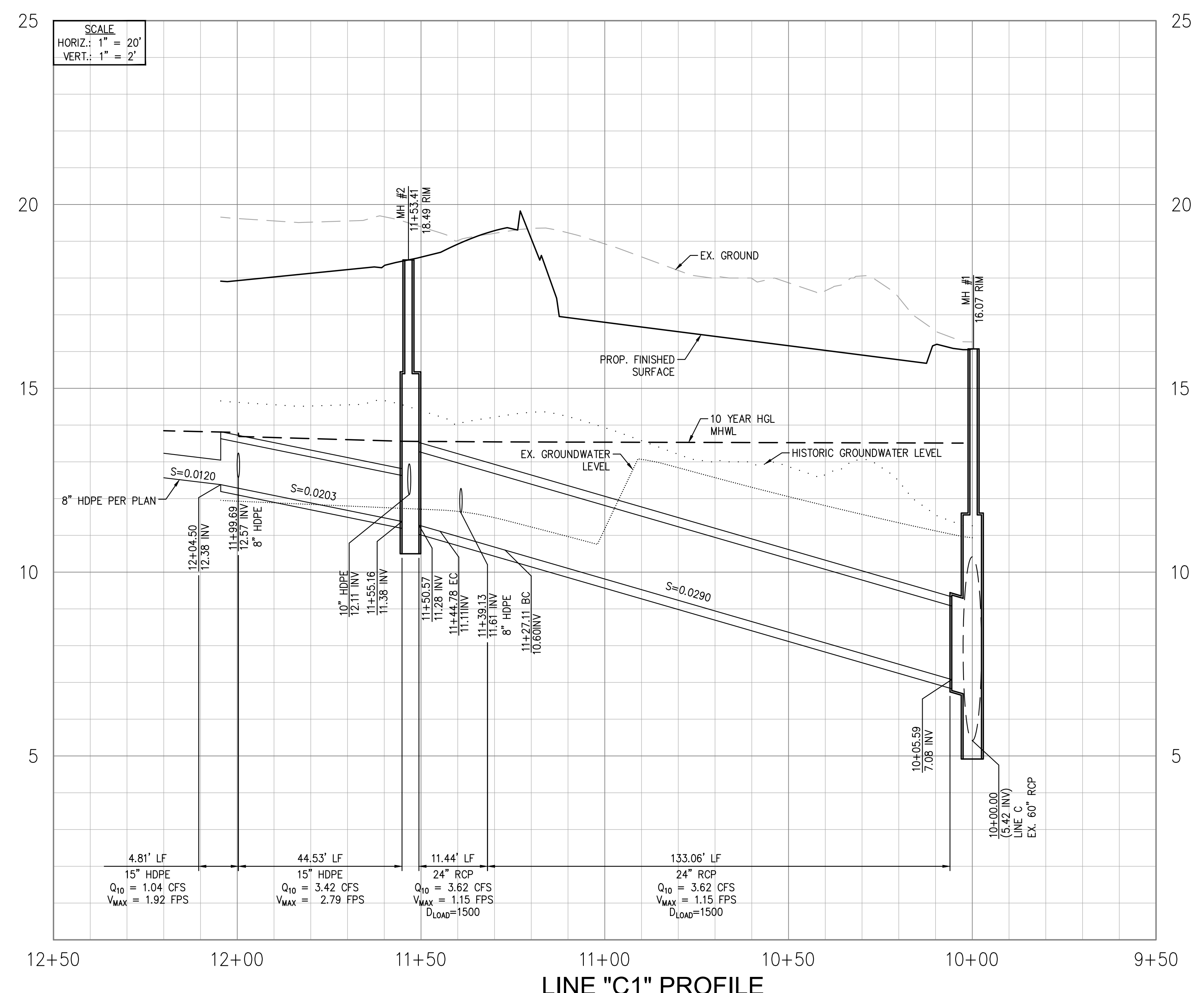
10-YEAR STORM - MHW CONDITION WSE=4.41

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
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L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
364.610	5.480	.731	6.211	3.66	4.28	.28	6.50	.00	.73	1.50	1.500	.000	.00	1 .0
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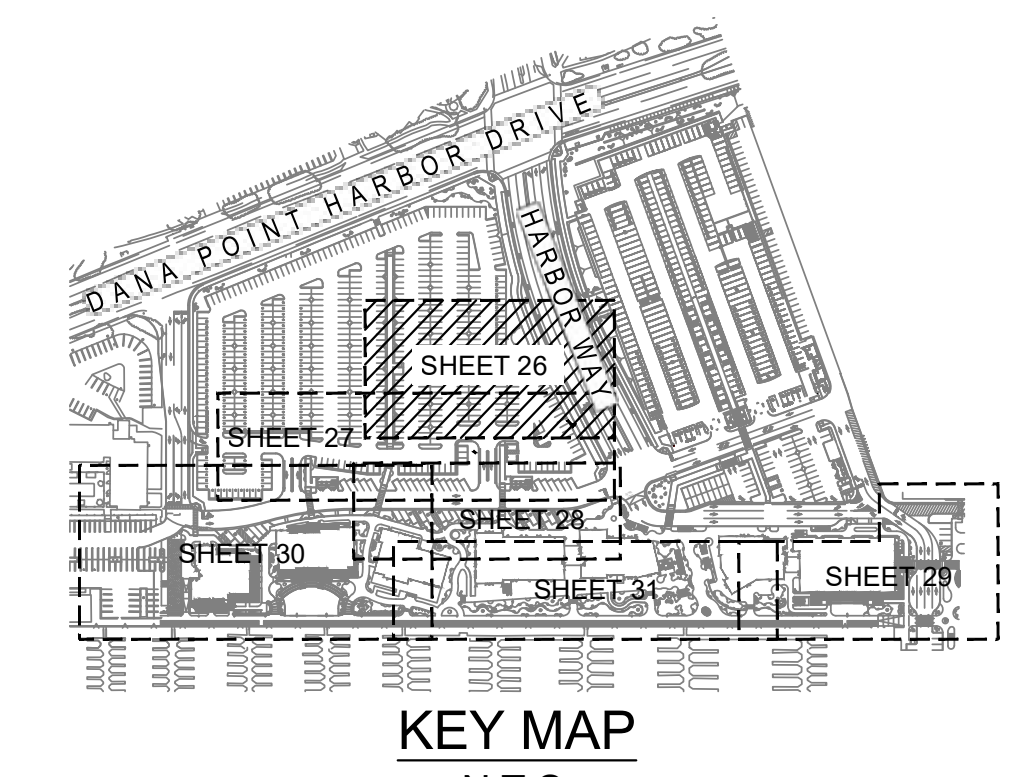
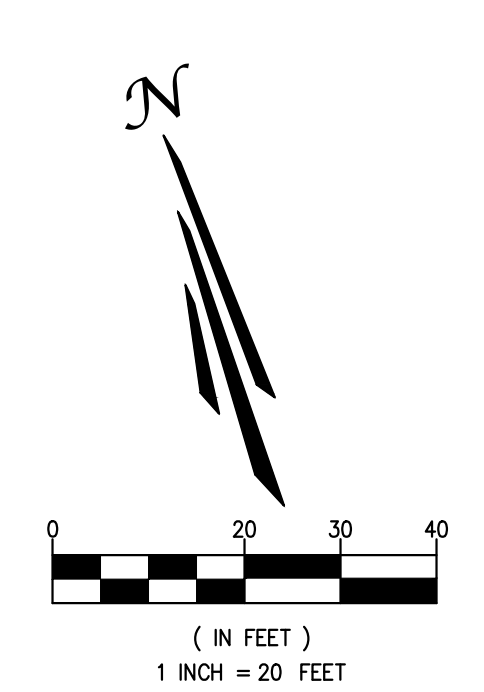
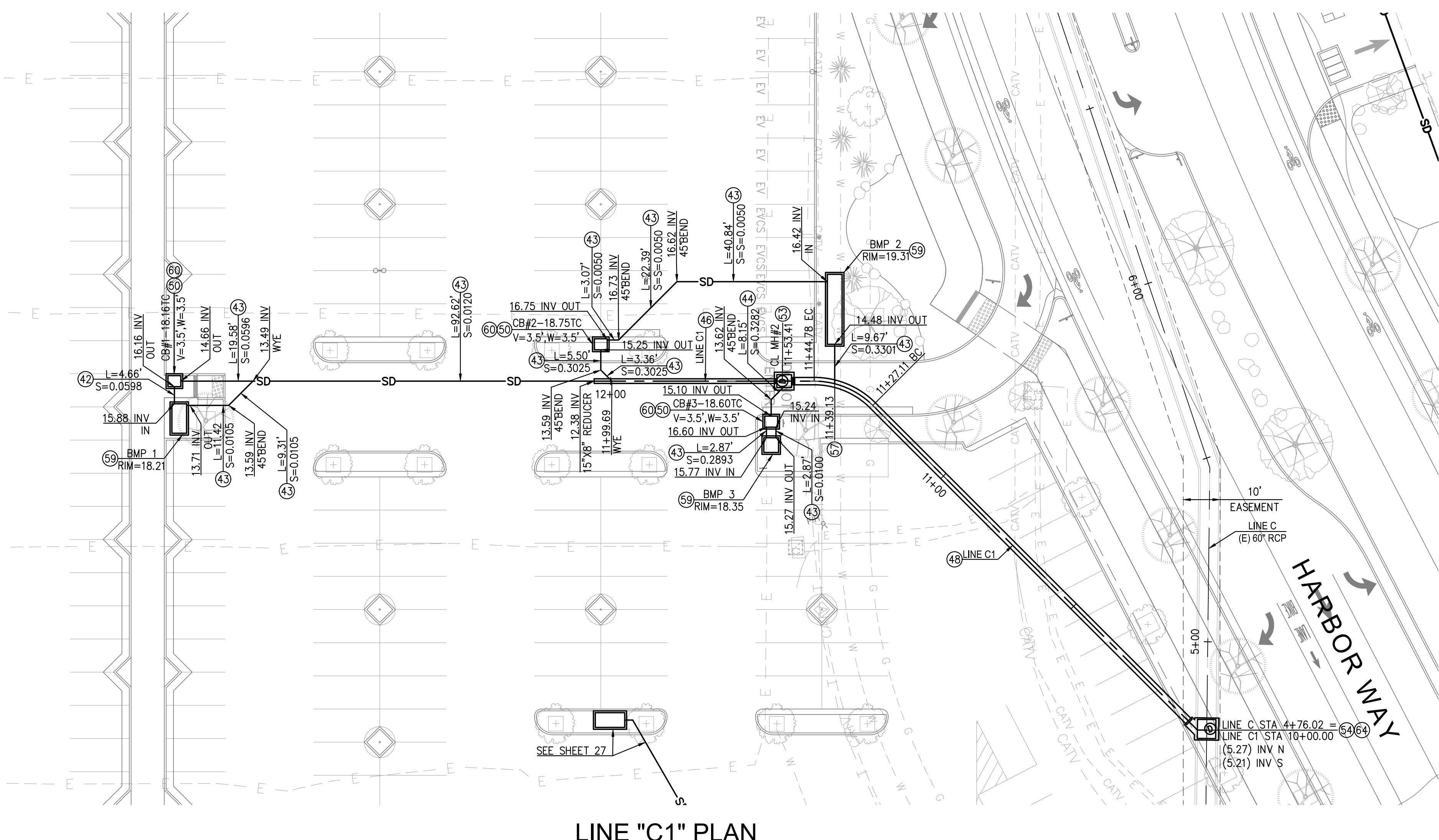
APPENDIX D – STORM DRAIN PLAN AND PROFILES



BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-8-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
12	STORMVAULT-10 PACK STORMSAFE
13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-B-C
16	MWS-L-6-8-B-C
17	MWS-L-6-8-B-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE

LINE	STA TO STA	Q10	V	So	Dc	Dn
C1	10+02.50 - 11+50.57	3.62	1.15	0.029	0.67	0.42
	11+50.57 - 11+55.16	3.62	1.15	0.029	0.67	0.00
	11+55.16 - 11+99.69	3.42	2.79	0.020	0.75	0.53
	11+99.69 - 12+04.50	1.04	1.92	0.020	0.45	0.33

- STORM DRAIN CONSTRUCTION NOTES**
1. ALL REINFORCED CONCRETE PIPE TO BE CONSTRUCTED WITH WATER TIGHT JOINTS.
 2. ALL MANHOLES TO BE BOLTED DOWN.
 3. STENCILING PER DETAIL ON SHEET 34 SHALL BE MOUNTED ON TOP OF EVERY STORM DRAIN INLET.
 4. CONTRACTOR TO VERIFY POINT OF CONNECTIONS AND NOTE ANY DISCREPANCIES.
40. INSTALL 3" PVC SCH 80, INCLUDING ALL BENDS AND FITTINGS.
 41. INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 42. INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 43. INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 44. INSTALL 10" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 45. INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 46. INSTALL 15" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 47. INSTALL 18" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 48. INSTALL 24" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 49. INSTALL 36" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 50. CONSTRUCT CURB OPENING INLET TYPE I PER OCPW STD. PLAN 1301. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
 51. CONSTRUCT CURB OPENING INLET TYPE II PER OCPW STD. PLAN 1302. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
 52. CONSTRUCT CURB DRAIN PER DETAIL ON SHEET 34.
 53. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I, PER OCPW STD. PLAN 321-2-0C
 54. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW STD. PLAN 320-2-0C
 55. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE PER OCPW STD. PLAN 322-2-0C
 56. CONSTRUCT JUNCTION STRUCTURE, TYPE IV, PER OCPW STD. PLAN 331-3-0C
 57. CONSTRUCT JUNCTION STRUCTURE, TYPE VI, PER OCPW. STD. PLAN 332-2-0C
 58. CONNECT TO EXISTING PARKING STRUCTURE MANHOLE PER PERMIT GRD20-0021. ADJUST TO GRADE EXISTING MANHOLE.
 59. INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEETS 34 TO 37. SEE MODEL NUMBER PER TABLE HEREON.
 60. INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-8 PER DETAIL ON SHEET 37
 61. INSTALL 3"x12" RECTANGULAR PIPE CURB-0-LET OR APPROVED EQUAL.
 62. INSTALL CLEANOUT STRUCTURE PER DETAIL ON SHEET 34
 63. INSTALL FLOGARD CATCH BASIN INSERT FILTER, CURB INLET STYLE PER DETAIL ON SHEET 39.
 64. REMOVE INTERFERING PORTIONS OF EXISTING 60-INCH RCP.
 65. REMOVE INTERFERING PORTION OF EXISTING 15-INCH RCP.
 66. INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEETS 38 AND 39. SEE MODEL NUMBER PER TABLE HEREON.
 67. CONSTRUCT TRANSITION STRUCTURE PER OCPW. STD. PLAN 340-2-0C
 68. REMOVE EXISTING MANHOLE AND/OR STORM DRAIN STRUCTURE.
 69. CONNECT TO ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION
 70. CONNECT TO LANDSCAPE DRAIN. SEE LANDSCAPE PLANS FOR CONTINUATION AND ADDITIONAL INFORMATION.
 71. CONNECT TO WALL SUBDRAIN. SEE RETAINING WALL PLANS ON SHEETS 43 TO 46.
 72. INSTALL TRENCH DRAIN PER LANDSCAPE ARCHITECT PLANS AND DETAIL ON SHEET 39.
 73. REMOVE EXISTING STORM DRAIN PIPE, CATCH BASIN AND/OR GRATED INLET.
 74. INSTALL SLOT DRAIN PER LANDSCAPE ARCHITECT PLANS.



- LEGEND**
- PROPERTY LINE
 - LEASE LINE
 - EXISTING STORM DRAIN
 - PROPOSED STORM DRAIN <12"
 - PROPOSED STORM DRAIN >12"
 - PROPOSED MANHOLE
 - PROPOSED CATCH BASIN
 - ▭ PROPOSED MODULAR WETLAND SYSTEM
 - PROPOSED AREA DRAIN
 - ▭ PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
 - ▭ PROPOSED GRATED INLET
 - W --- PROPOSED WATER LINE
 - SS --- PROPOSED SEWER LINE
 - W --- EXISTING WATER LINE
 - S --- EXISTING SEWER LINE
- | | |
|---------------------|--------------------------------|
| WM WATER METER | (E) EXISTING |
| CL CENTER LINE | (P) PROPOSED |
| PL PROPERTY LINE | INV INVERT |
| R/W RIGHT-OF-WAY | L LENGTH |
| FS FINISHED SURFACE | S SLOPE |
| TC TOP OF CURB | LAT LATERAL |
| TG TOP OF GRATE | CB CATCH BASIN |
| CS SANITARY SEWER | MH MANHOLE |
| SD STORM DRAIN | EC END OF CURVE |
| DW DOMESTIC WATER | BC BEGINNING OF CURVE |
| RW RECLAIMED WATER | RCP REINFORCED CONCRETE PIPE |
| FH FIRE HYDRANT | HDPE HIGH DENSITY POLYETHYLENE |
| ST STREET LIGHT | JT DRY UTILITY JOINT TRENCH |
- PERMIT No. GRD21-0090
WDID # 930C389422

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
5					
4					
3					
2					
1					

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Ontario San Diego Boise Denver Portland

JACOB VANDERVIS R.C.E. No. C46301 9/9/22 DATE

DRAWN BY: DATE: GEOTECHNICAL ENGINEER SEAL

DESIGNED BY: DATE: GEOTECHNICAL ENGINEER GMU GEOTECHNICAL, INC.

CHECKED BY: DATE:

RECOMMENDED BY: DATE:

GEORGE P. SILVER, M.S., P.E. DATE: 9/9/22
P.E. 2336, PRINCIPAL, GEOTECHNICAL ENGINEER

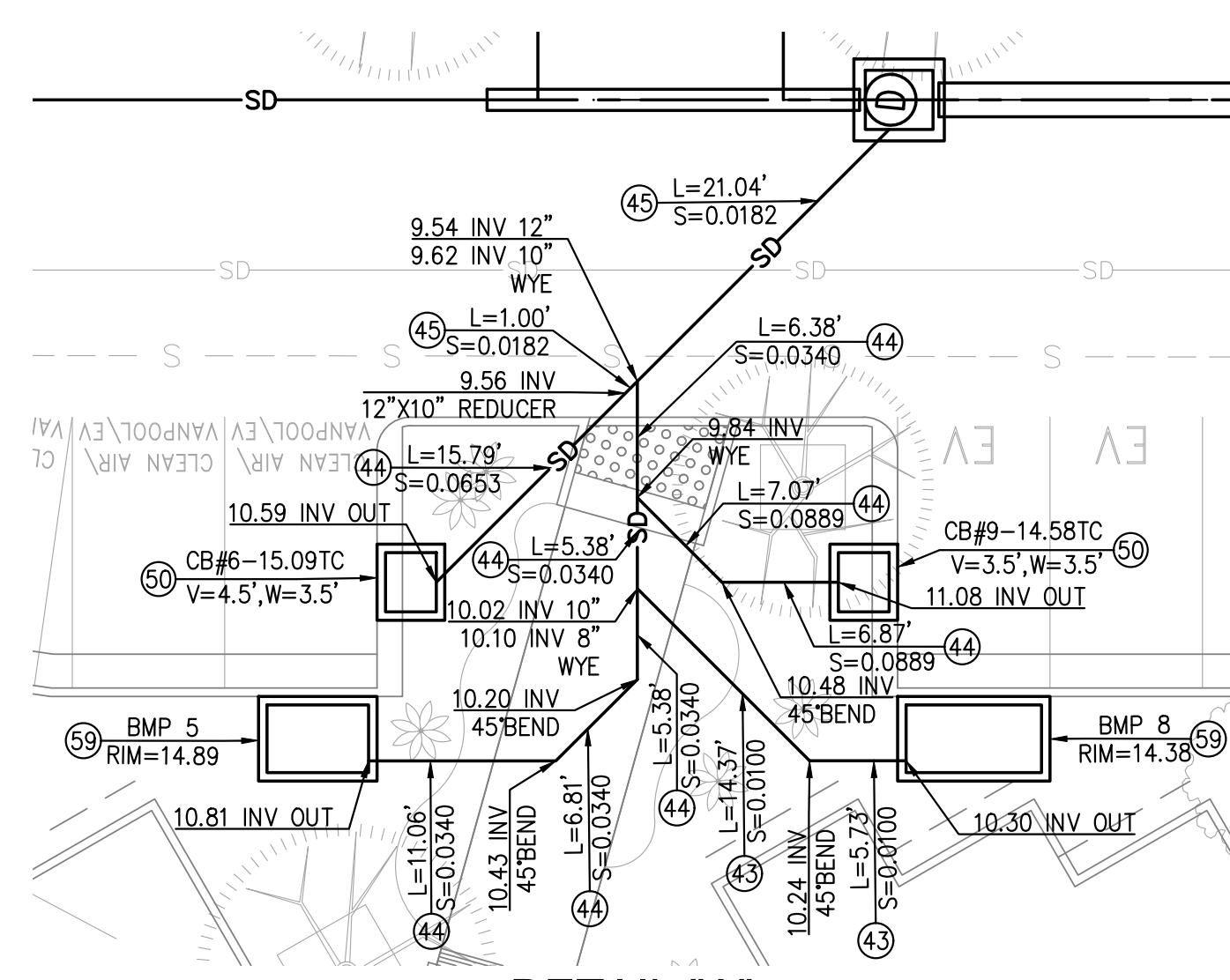
DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM IWARD PROPERTIES **R.D. OLSON** DEVELOPMENT **BELLWETHER** FINANCIAL GROUP

BUILDINGS 6-12 AND SURFACE PARKING LOT PRECISE GRADING PLANS

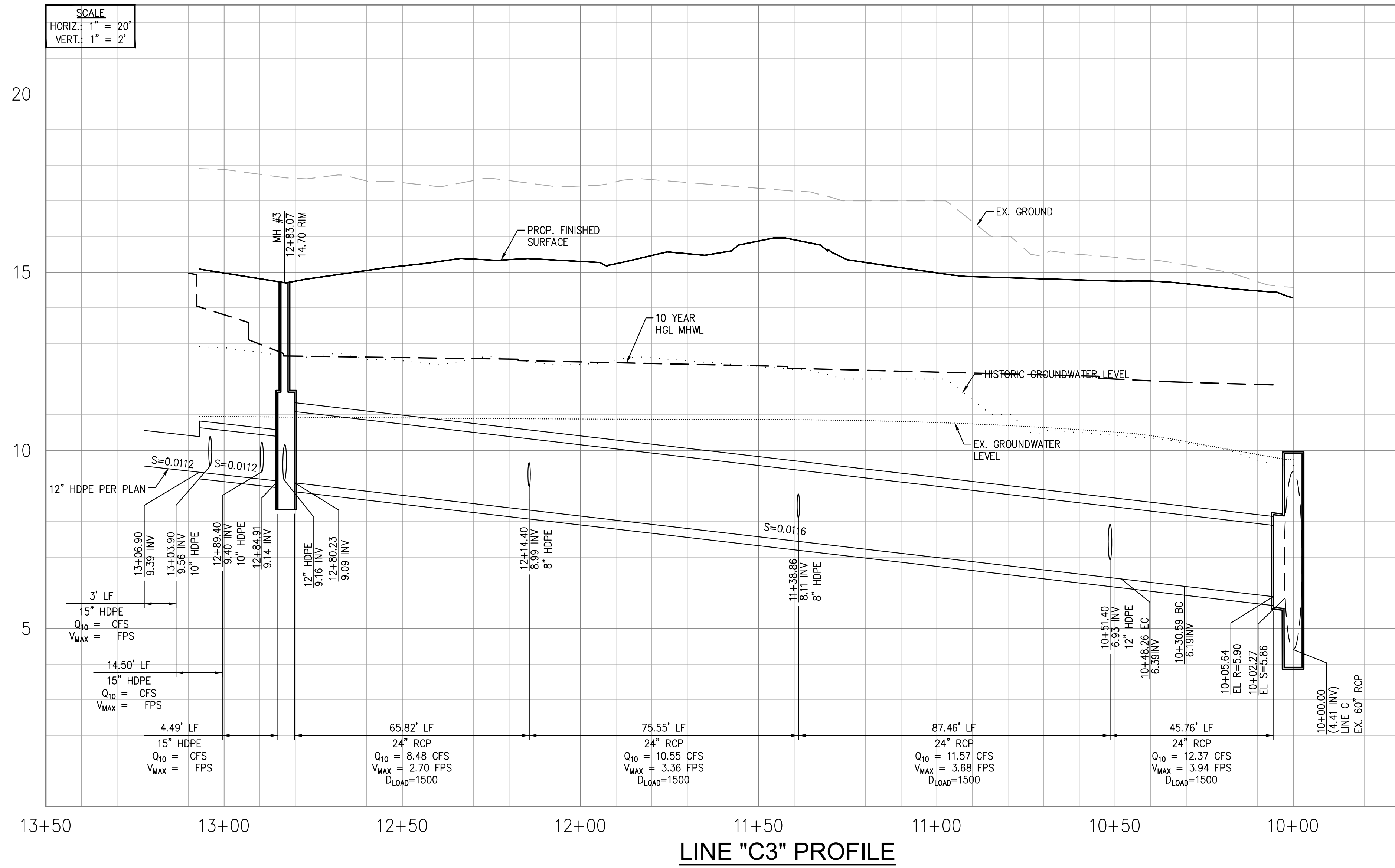
STORM DRAIN PLAN

SHT 26 OF 51

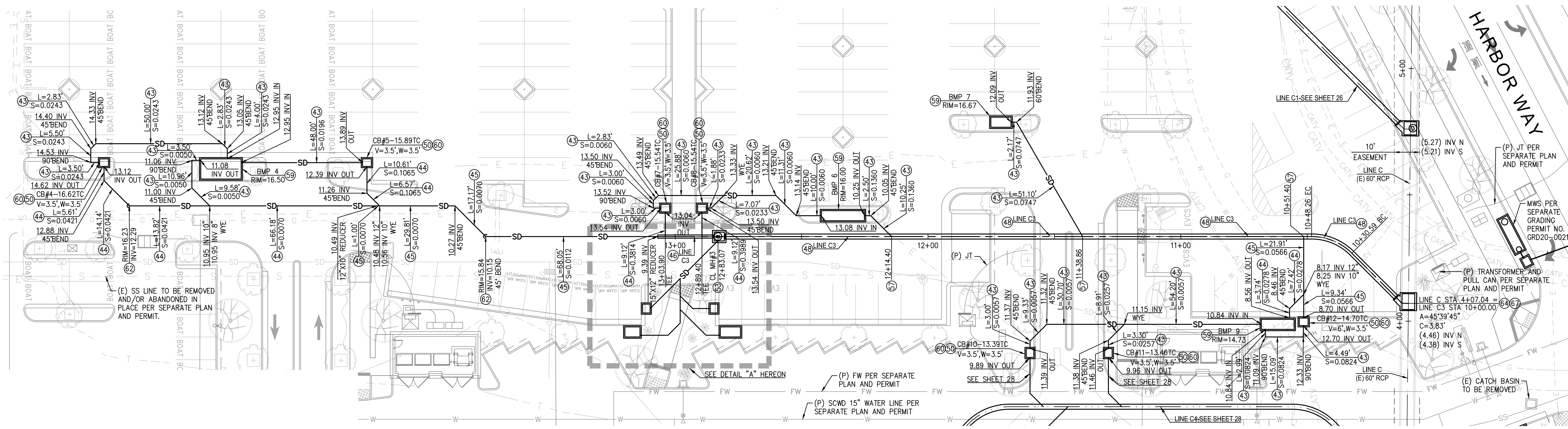


DETAIL "A"
SCALE: 1"=10"

NORMAL DEPTH HYDRAULIC DATA						
LINE	STA TO STA	Q10	V	So	Dc	Dn
C3	10+05.54 - 10+51.40	12.37	3.94	0.012	1.26	1.00
	10+51.40 - 11+38.86	11.57	3.68	0.012	1.22	0.97
	11+38.86 - 12+14.40	10.55	3.36	0.012	1.16	0.92
	12+14.40 - 12+80.23	8.48	2.70	0.012	1.04	0.82



LINE "C3" PROFILE



LINE "C3" PLAN

BMP SUMMARY	
BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-8-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
12	STORMVAULT-10 PACK STORMSAFE
13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-V
16	MWS-L-6-8-C
17	MWS-L-6-8-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE

- STORM DRAIN GENERAL NOTES:
1. ALL REINFORCED CONCRETE PIPE TO BE CONSTRUCTED WITH WATER TIGHT JOINTS.
 2. ALL MANHOLES TO BE BOLTED DOWN.
 3. STENCILING PER DETAIL ON SHEET 34 SHALL BE MOUNTED ON TOP OF EVERY STORM DRAIN INLET.
 4. CONTRACTOR TO VERIFY POINT OF CONNECTIONS AND NOTE ANY DISCREPANCIES.

STORM DRAIN CONSTRUCTION NOTES

40. INSTALL 3" PVC SDH 80, INCLUDING ALL BENDS AND FITTINGS.
41. INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
42. INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
43. INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
44. INSTALL 10" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
45. INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
46. INSTALL 15" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
47. INSTALL 18" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
48. INSTALL 24" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
49. INSTALL 36" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
50. CONSTRUCT CURB OPENING INLET TYPE I PER OCPW STD. PLAN 1301. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
51. CONSTRUCT CURB OPENING INLET TYPE II PER OCPW STD. PLAN 1302. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
52. CONSTRUCT CURB DRAIN PER DETAIL ON SHEET 34.
53. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I, PER OCPW STD. PLAN 321-2-0C
54. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW STD. PLAN 320-2-0C
55. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE PER OCPW STD. PLAN 322-2-0C
56. CONSTRUCT JUNCTION STRUCTURE, TYPE IV, PER OCPW STD. PLAN 331-3-0C
57. CONSTRUCT JUNCTION STRUCTURE, TYPE VI, PER OCPW STD. PLAN 332-2-0C
58. CONNECT TO EXISTING PARKING STRUCTURE MANHOLE PER PERMIT GRD20-0021. ADJUST TO GRADE EXISTING MANHOLE.
59. INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEETS 34 TO 37. SEE MODEL NUMBER PER TABLE HEREON.
60. INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-8 PER DETAIL ON SHEET 37
61. INSTALL 3"x12" RECTANGULAR PIPE CURB-0-LET OR APPROVED EQUAL.
62. INSTALL CLEANOUT STRUCTURE PER DETAIL ON SHEET 34
63. INSTALL FLOODGATE CATCH BASIN INSERT FILTER, CURB INLET STYLE PER DETAIL ON SHEET 39.
64. REMOVE INTERFERING PORTIONS OF EXISTING 60-INCH RCP.
65. REMOVE INTERFERING PORTION OF EXISTING 15-INCH RCP.
66. INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEETS 38 AND 39. SEE MODEL NUMBER PER TABLE HEREON.
67. CONSTRUCT TRANSITION STRUCTURE PER OCPW STD. PLAN 340-2-0C
68. REMOVE EXISTING MANHOLE AND/OR STORM DRAIN STRUCTURE.
69. CONNECT TO ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION
70. CONNECT TO LANDSCAPE DRAIN. SEE LANDSCAPE PLANS FOR CONTINUATION AND ADDITIONAL INFORMATION.
71. CONNECT TO WALL SUBDRAIN. SEE RETAINING WALL PLANS ON SHEETS 43 TO 46.
72. INSTALL TRENCH DRAIN PER LANDSCAPE ARCHITECT PLANS AND DETAIL ON SHEET 39.
73. REMOVE EXISTING STORM DRAIN PIPE, CATCH BASIN AND/OR GRATED INLET.
74. INSTALL SLOT DRAIN PER LANDSCAPE ARCHITECT PLANS.

LEGEND

- PROPERTY LINE
- LEASE LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN <12"
- PROPOSED STORM DRAIN >12"
- PROPOSED MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED MODULAR WETLAND SYSTEM
- PROPOSED AREA DRAIN
- PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
- PROPOSED GRATED INLET
- W --- PROPOSED WATER LINE
- SS --- PROPOSED SEWER LINE
- W --- EXISTING WATER LINE
- S --- EXISTING SEWER LINE

- WM WATER METER (E) EXISTING
- CL CENTER LINE (P) PROPOSED
- PL PROPERTY LINE INV INVERT
- R/W RIGHT-OF-WAY L LENGTH
- FS FINISHED SURFACE S SLOPE
- TC TOP OF CURB LAT LATERAL
- TG TOP OF GRATE CATCH BASIN
- SS SANITARY SEWER MH MANHOLE
- SD STORM DRAIN EC END OF CURVE
- DW DOMESTIC WATER BC BEGINNING OF CURVE
- RW RECLAIMED WATER RCP REINFORCED CONCRETE PIPE
- FH FIRE HYDRANT HDP HIGH DENSITY POLYETHYLENE
- ST STREET LIGHT JT DRY UTILITY JOINT TRENCH

PERMIT No. GRD21-0090
WDID # 930C389422

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
5					
4					
3					
2					
1					

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TAIT
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Los Angeles Sacramento San Francisco Dallas Phoenix
Ontario San Diego Boise Denver Portland

JACOB VANDERVIS R.C.E. No. C46301 DATE 9/9/22

DRAWN BY:	DATE:	GEOTECHNICAL ENGINEER SEAL
DESIGNED BY:	DATE:	
CHECKED BY:	DATE:	
RECOMMENDED BY:	DATE:	

GEOTECHNICAL ENGINEER
GMU GEOTECHNICAL, INC.

GREGORY P. SILVER, M.S., P.E. DATE: 9/9/22, PRINCIPAL, GEOTECHNICAL ENGINEER

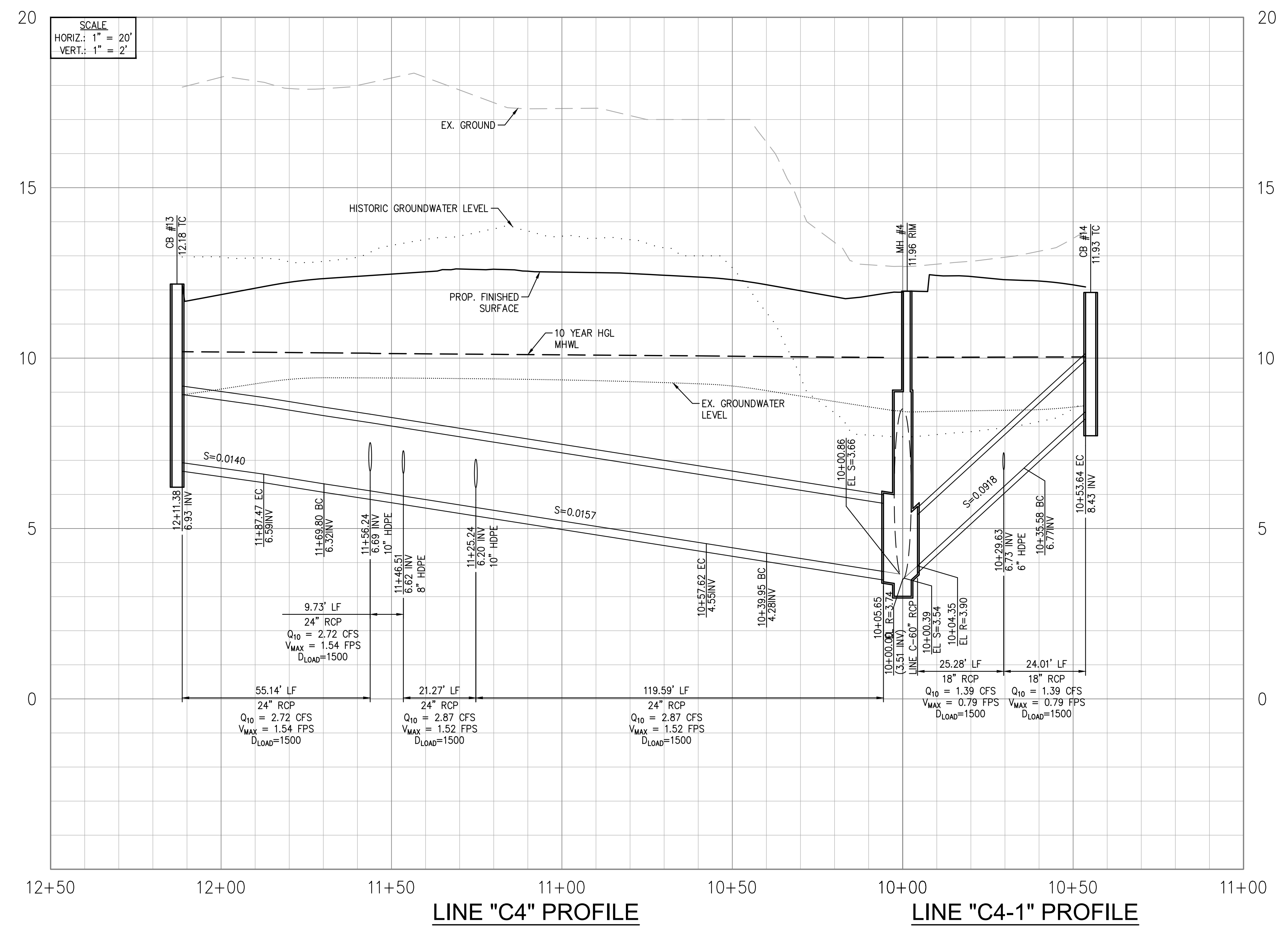
DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM IWARD PROPERTIES **R.D. OLSON** DEVELOPMENT **BELLWETHER** FINANCIAL GROUP

BUILDINGS 6-12 AND SURFACE PARKING LOT PRECISE GRADING PLANS

STORM DRAIN PLAN

SHT 27 OF 51



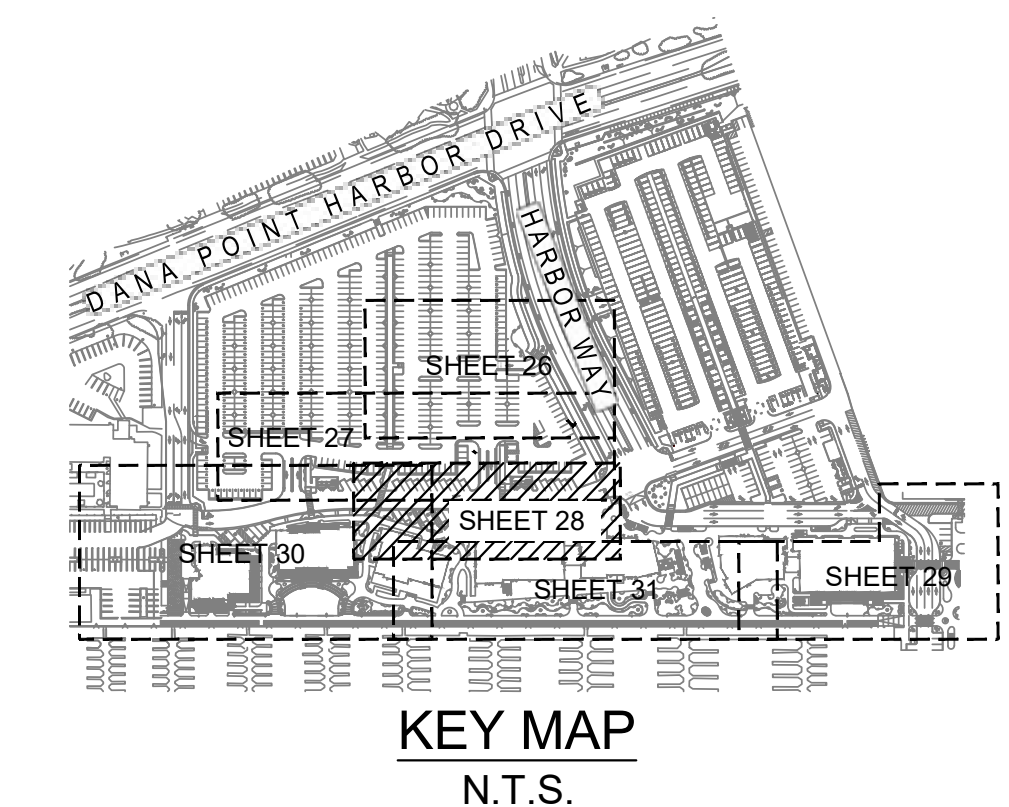
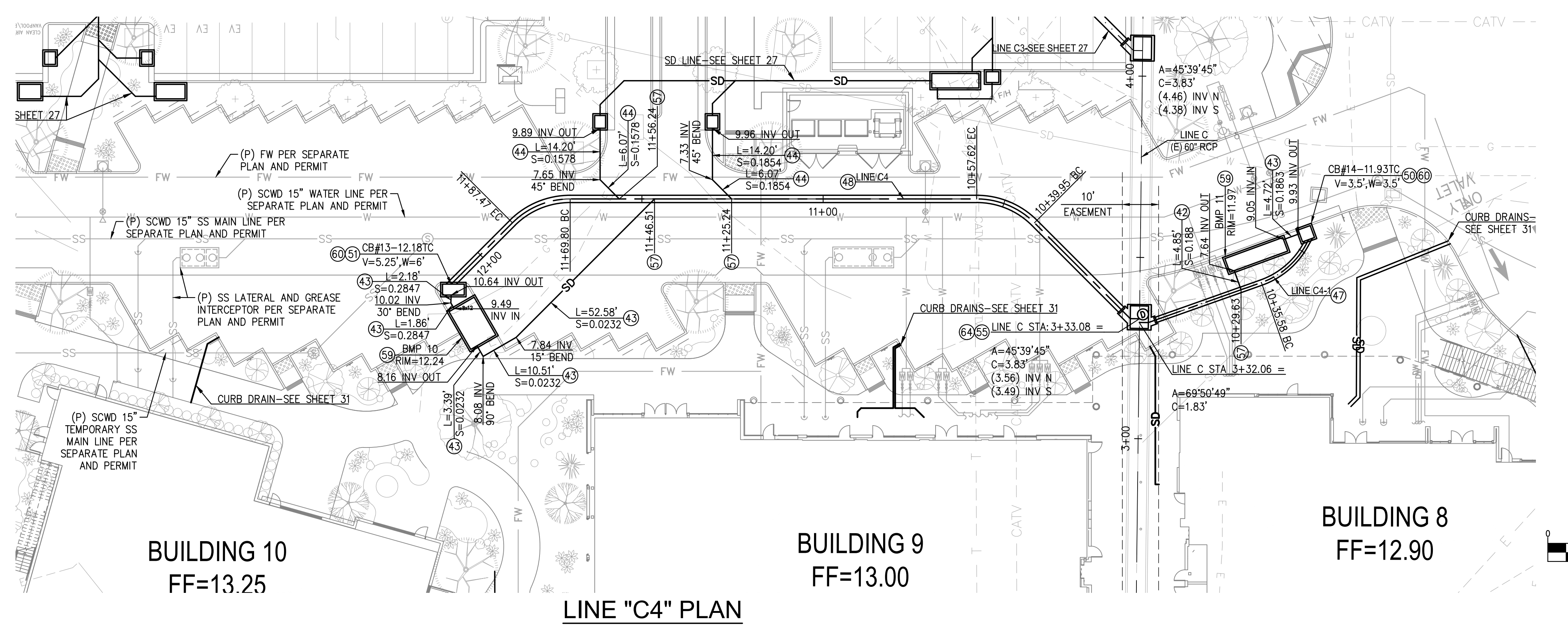
BMP SUMMARY

BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-8-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
12	STORMVAULT-10 PACK STORMSAFE
13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-V
16	MWS-L-6-8-V
17	MWS-L-6-8-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE

NORMAL DEPTH HYDRAULIC DATA

LINE	STA TO STA	Q10	V	So	Dc	Dn
C4	10+05.65 - 11+56.24	2.87	1.62	0.016	0.64	0.48
	11+56.24 - 12+11.38	2.72	1.54	0.016	0.63	0.37
C4-1	10+04.35 - 10+53.64	1.39	0.79	0.092	0.44	0.21

- STORM DRAIN CONSTRUCTION NOTES**
- INSTALL 3" PVC SCH 80, INCLUDING ALL BENDS AND FITTINGS.
 - INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
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 - INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
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 - INSTALL 18" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 - INSTALL 24" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
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 - CONSTRUCT CURB OPENING INLET TYPE II PER OCPW STD. PLAN 1302. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
 - CONSTRUCT CURB DRAIN PER DETAIL ON SHEET 34.
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I, PER OCPW STD. PLAN 321-2-OC
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW STD. PLAN 320-2-OC
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE PER OCPW STD. PLAN 322-2-OC
 - CONSTRUCT JUNCTION STRUCTURE, TYPE IV, PER OCPW STD. PLAN 331-3-OC
 - CONSTRUCT JUNCTION STRUCTURE, TYPE VI, PER OCPW STD. PLAN 332-2-OC
 - CONNECT TO EXISTING PARKING STRUCTURE MANHOLE PER PERMIT GRD20-0021. ADJUST TO GRADE EXISTING MANHOLE.
 - INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEETS 34 TO 37. SEE MODEL NUMBER PER TABLE HEREON.
 - INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-B PER DETAIL ON SHEET 37
 - INSTALL 3"x12" RECTANGULAR PIPE CURB-0-LET OR APPROVED EQUAL.
 - INSTALL CLEANOUT STRUCTURE PER DETAIL ON SHEET 34
 - INSTALL FLOGARD CATCH BASIN INSERT FILTER, CURB INLET STYLE PER DETAIL ON SHEET 39.
 - REMOVE INTERFERING PORTIONS OF EXISTING 60-INCH RCP.
 - REMOVE INTERFERING PORTION OF EXISTING 15-INCH RCP.
 - INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEETS 38 AND 39. SEE MODEL NUMBER PER TABLE HEREON.
 - CONSTRUCT TRANSITION STRUCTURE PER OCPW STD. PLAN 340-2-OC
 - REMOVE EXISTING MANHOLE AND/OR STORM DRAIN STRUCTURE.
 - CONNECT TO ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION
 - CONNECT TO LANDSCAPE DRAIN. SEE LANDSCAPE PLANS FOR CONTINUATION AND ADDITIONAL INFORMATION.
 - CONNECT TO WALL SUBDRAIN. SEE RETAINING WALL PLANS ON SHEETS 43 TO 46.
 - INSTALL TRENCH DRAIN PER LANDSCAPE ARCHITECT PLANS AND DETAIL ON SHEET 39.
 - REMOVE EXISTING STORM DRAIN PIPE, CATCH BASIN AND/OR GRATED INLET.
 - INSTALL SLOT DRAIN PER LANDSCAPE ARCHITECT PLANS.



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JACOB VANDERVIS R.C.E. No. C46301 9/9/22 DATE

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RECOMMENDED BY: DATE

GEOTECHNICAL ENGINEER SEAL
GEOTECHNICAL ENGINEER
GMU GEOTECHNICAL, INC.

GEORGE P. SILVER, M.S., P.E. DATE: 9/9/22
P.E. 2336, PRINCIPAL, GEOTECHNICAL ENGINEER

DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

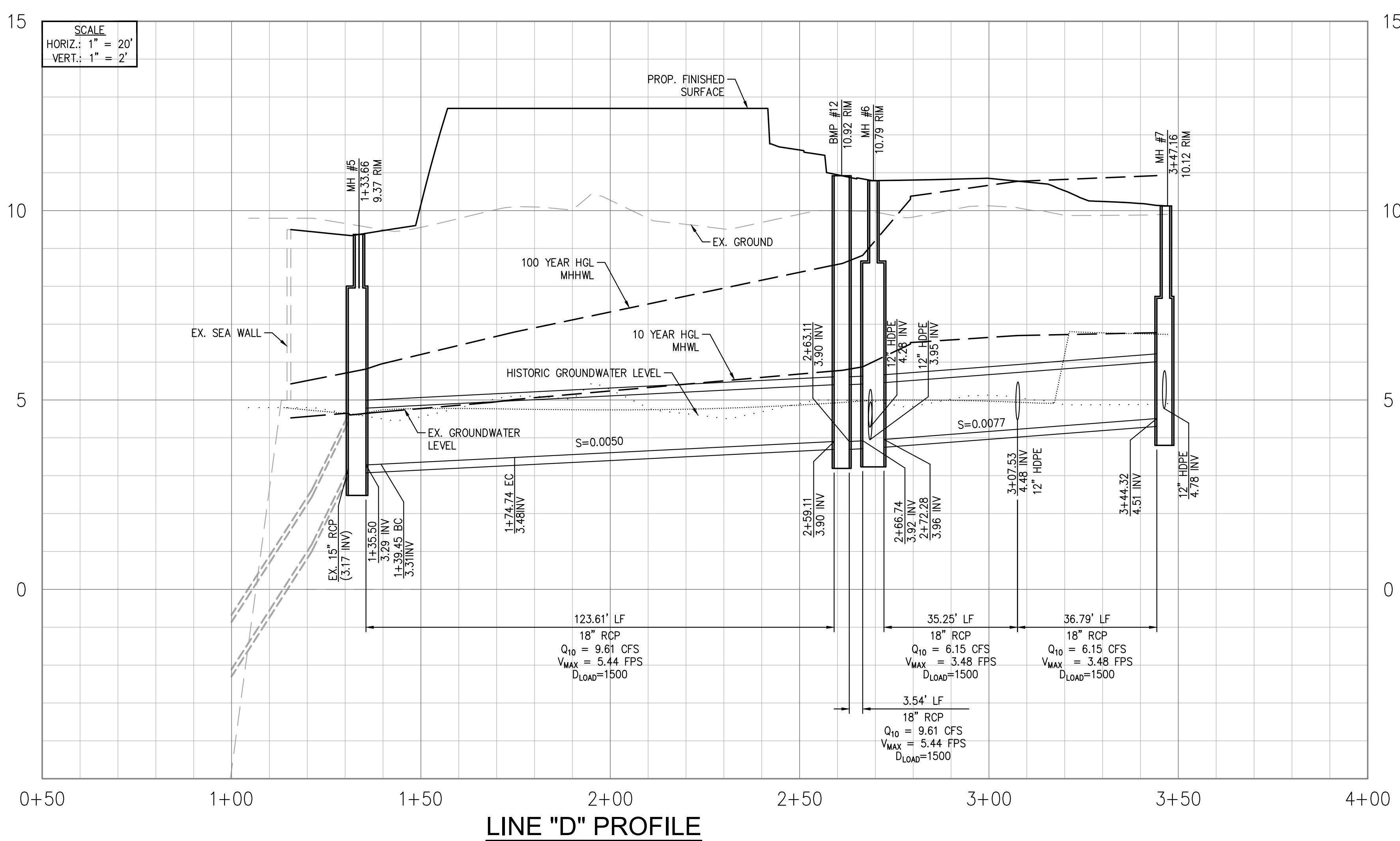
B W P BURNHAM IWARD PROPERTIES
R.D. OLSON DEVELOPMENT
BELLWETHER FINANCIAL GROUP

BUILDINGS 6-12 AND SURFACE PARKING LOT PRECISE GRADING PLANS

STORM DRAIN PLAN

PERMIT No. GRD21-0090
WDID # 930C389422

SHT 28 OF 51

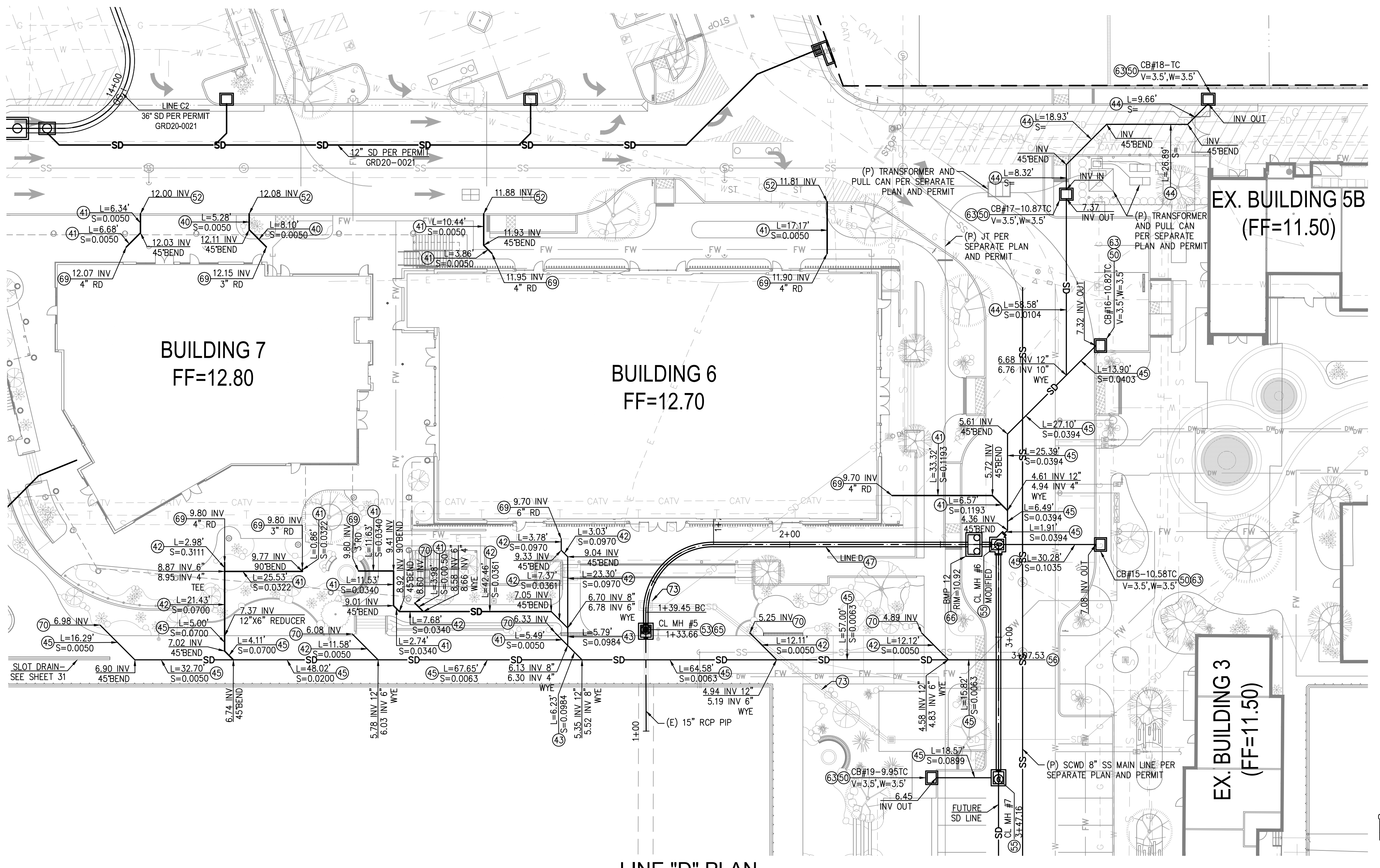


NORMAL DEPTH HYDRAULIC DATA

LINE	STA TO STA	Q10	V	So	Dc	Dn
D	1+35.50 - 2+79.28	9.61	5.44	0.005	1.20	0.49
	2+79.28 - 3+44.32	6.15	3.48	0.008	0.96	0.25

BMP SUMMARY

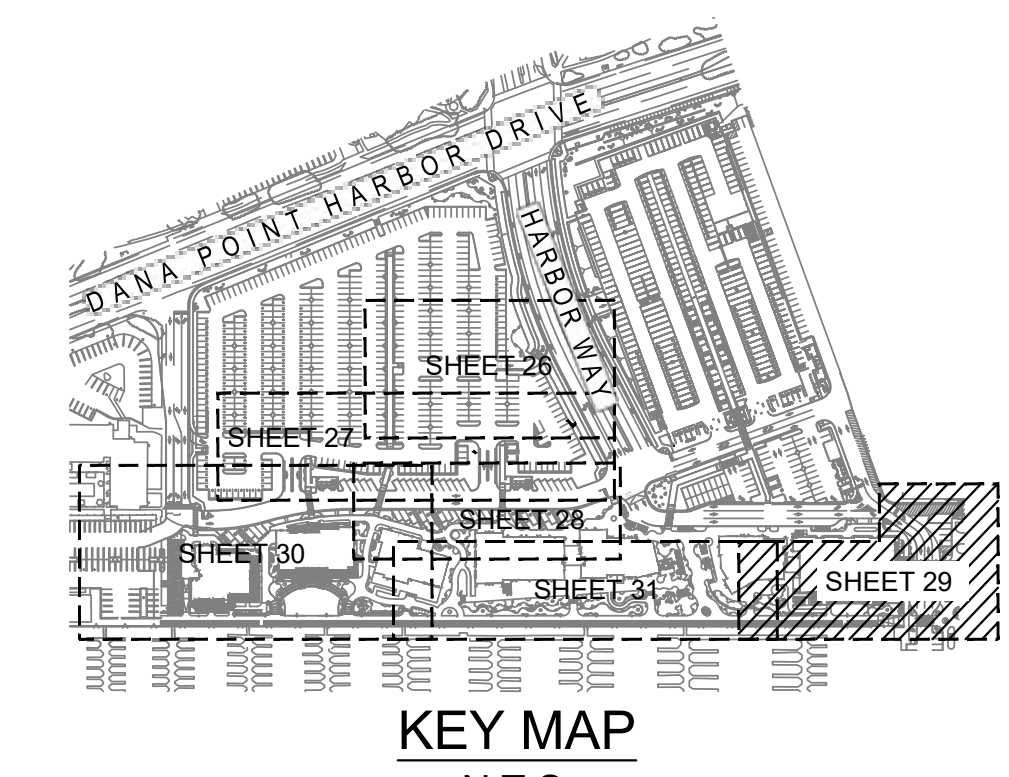
BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-4-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
12	STORMVAULT-10 PACK STORMSAFE
13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-V
16	MWS-L-6-8-C
17	MWS-L-6-8-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE



- STORM DRAIN GENERAL NOTES:
1. ALL REINFORCED CONCRETE PIPE TO BE CONSTRUCTED WITH WATER TIGHT JOINTS.
 2. ALL MANHOLES TO BE BOLTED DOWN.
 3. STENCILING PER DETAIL ON SHEET 34 SHALL BE MOUNTED ON TOP OF EVERY STORM DRAIN INLET.
 4. CONTRACTOR TO VERIFY POINT OF CONNECTIONS AND NOTE ANY DISCREPANCIES.

- STORM DRAIN CONSTRUCTION NOTES
40. INSTALL 3" PVC SOH 80, INCLUDING ALL BENDS AND FITTINGS.
 41. INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 42. INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
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 52. CONSTRUCT CURB DRAIN PER DETAIL ON SHEET 34.
 53. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I, PER OCPW STD. PLAN 321-2-0C
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 55. CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE PER OCPW STD. PLAN 322-2-0C
 56. CONSTRUCT JUNCTION STRUCTURE, TYPE IV, PER OCPW STD. PLAN 331-3-0C
 57. CONSTRUCT JUNCTION STRUCTURE, TYPE VI, PER OCPW STD. PLAN 332-2-0C
 58. CONNECT TO EXISTING PARKING STRUCTURE MANHOLE PER PERMIT GRD20-0021. ADJUST TO GRADE EXISTING MANHOLE.
 59. INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEETS 34 TO 37. SEE MODEL NUMBER PER TABLE HEREON.
 60. INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-8 PER DETAIL ON SHEET 37
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 65. REMOVE INTERFERING PORTION OF EXISTING 15-INCH RCP.
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 67. CONSTRUCT TRANSITION STRUCTURE PER OCPW. STD. PLAN 340-2-0C
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 69. CONNECT TO ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION
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 74. INSTALL SLOT DRAIN PER LANDSCAPE ARCHITECT PLANS.

- LEGEND
- PROPERTY LINE
 - LEASE LINE
 - EXISTING STORM DRAIN
 - SD --- PROPOSED STORM DRAIN <12"
 - SD --- PROPOSED STORM DRAIN >12"
 - PROPOSED MANHOLE
 - PROPOSED CATCH BASIN
 - PROPOSED MODULAR WETLAND SYSTEM
 - PROPOSED AREA DRAIN
 - PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
 - PROPOSED GRATED INLET
 - W --- PROPOSED WATER LINE
 - SS --- PROPOSED SEWER LINE
 - W --- EXISTING WATER LINE
 - SS --- EXISTING SEWER LINE
- WM WATER METER (E) EXISTING
 CL CENTER LINE (P) PROPOSED
 INV INVERT (N) INVERT
 R/W RIGHT-OF-WAY L LENGTH
 FS FINISHED SURFACE S SLOPE
 TC TOP OF CURB LAT LATERAL
 TG TOP OF GRATE CATCH BASIN
 SS SANITARY SEWER MH MANHOLE
 SD STORM DRAIN EC END OF CURVE
 DW DOMESTIC WATER BC BEGINNING OF CURVE
 RW RECLAIMED WATER RCP REINFORCED CONCRETE PIPE
 FH FIRE HYDRANT HDPE HIGH DENSITY POLYETHYLENE
 ST STREET LIGHT JT DRY UTILITY JOINT TRENCH



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JACOB VANDERVIS R.C.E. No. C46301 DATE 9/9/22

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DESIGNED BY: DATE: GEOTECHNICAL ENGINEER GMU GEOTECHNICAL, INC.

CHECKED BY: DATE: GEOTECHNICAL ENGINEER

RECOMMENDED BY: DATE: GEOTECHNICAL ENGINEER

DANA POINT HARBOR REVITALIZATION
 DANA POINT HARBOR PARTNERS, LLC

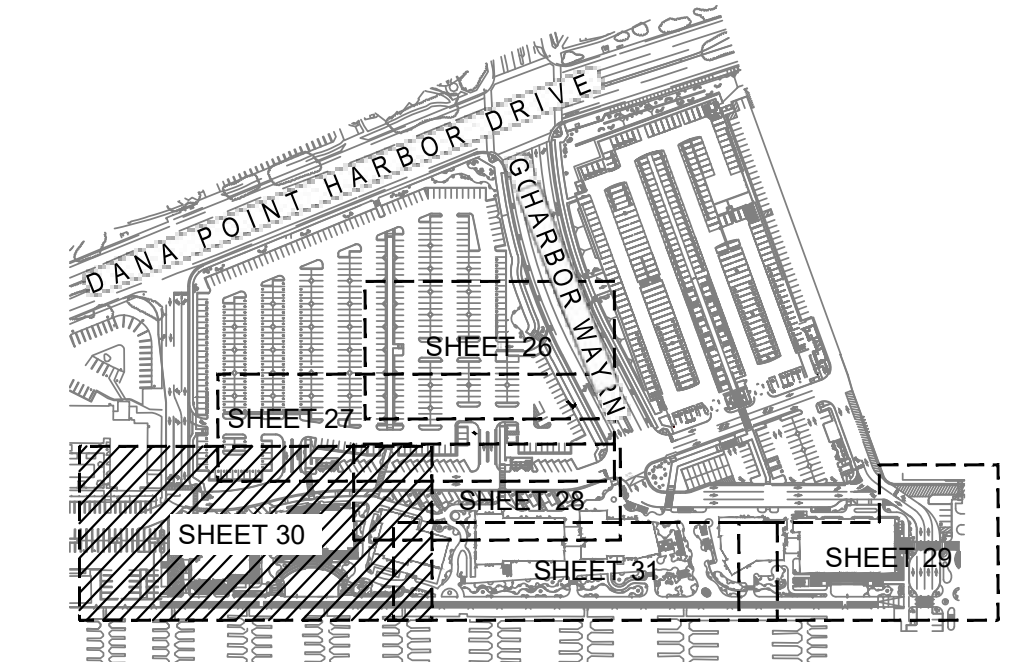
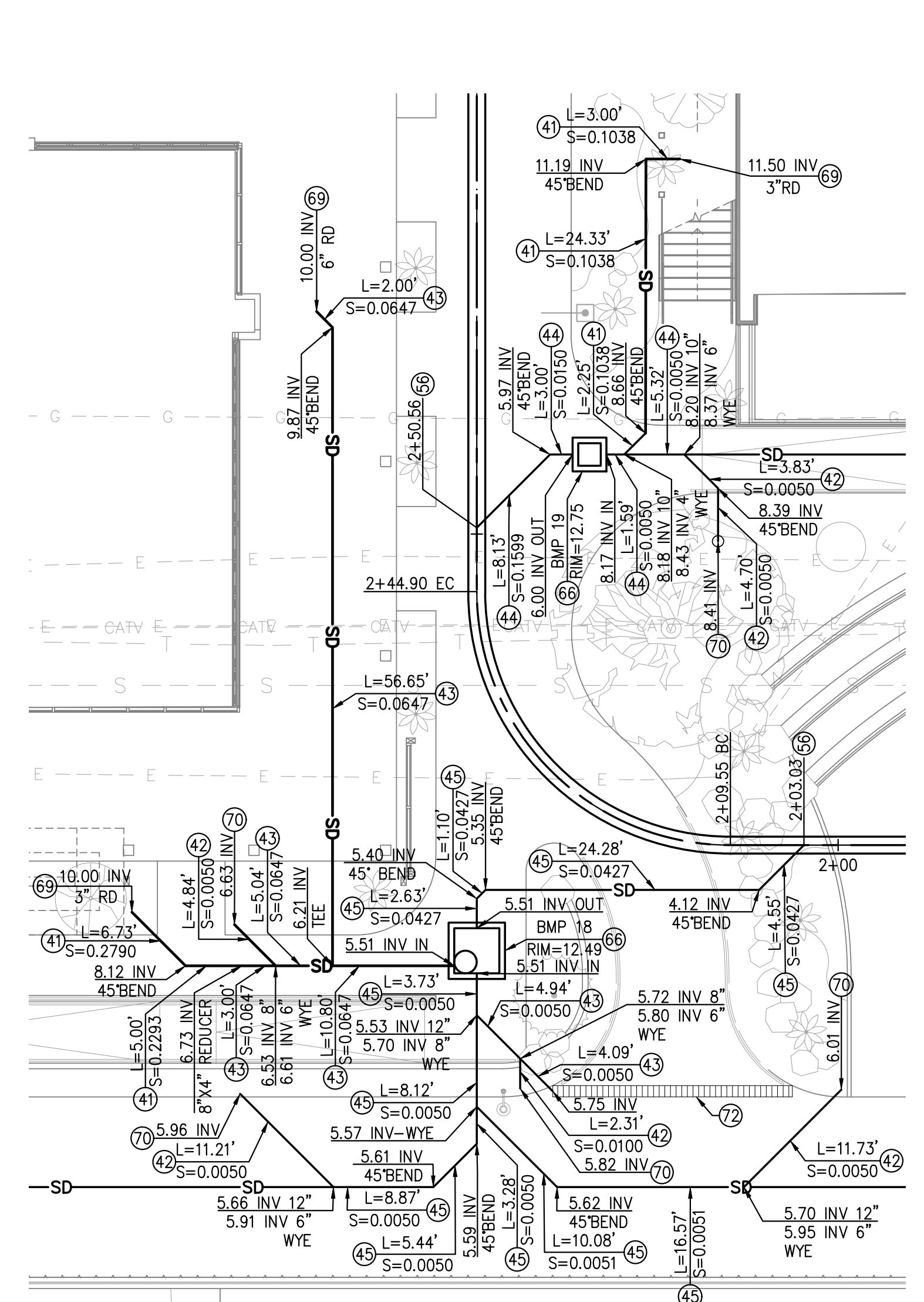
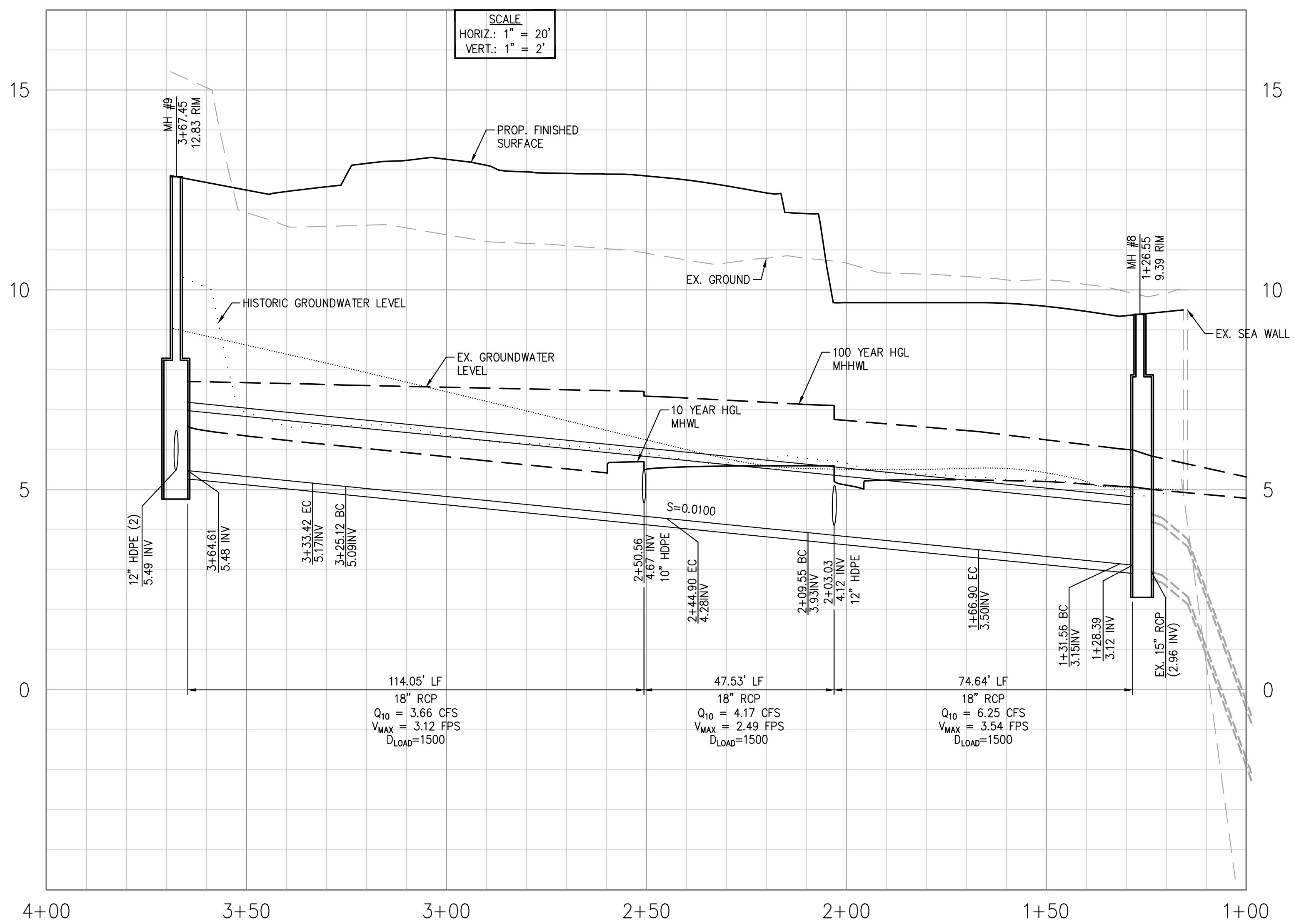
BWP BURNHAM IWARD PROPERTIES R.D. OLSON DEVELOPMENT BELLWETHER FINANCIAL GROUP

BUILDINGS 6-12 AND SURFACE PARKING LOT PRECISE GRADING PLANS

STORM DRAIN PLAN

PERMIT No. GRD21-0090
 WDI # 930C389422

SHT 29 OF 51



- STORM DRAIN GENERAL NOTES:**
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- STORM DRAIN CONSTRUCTION NOTES**
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 60. INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-8 PER DETAIL ON SHEET 37.
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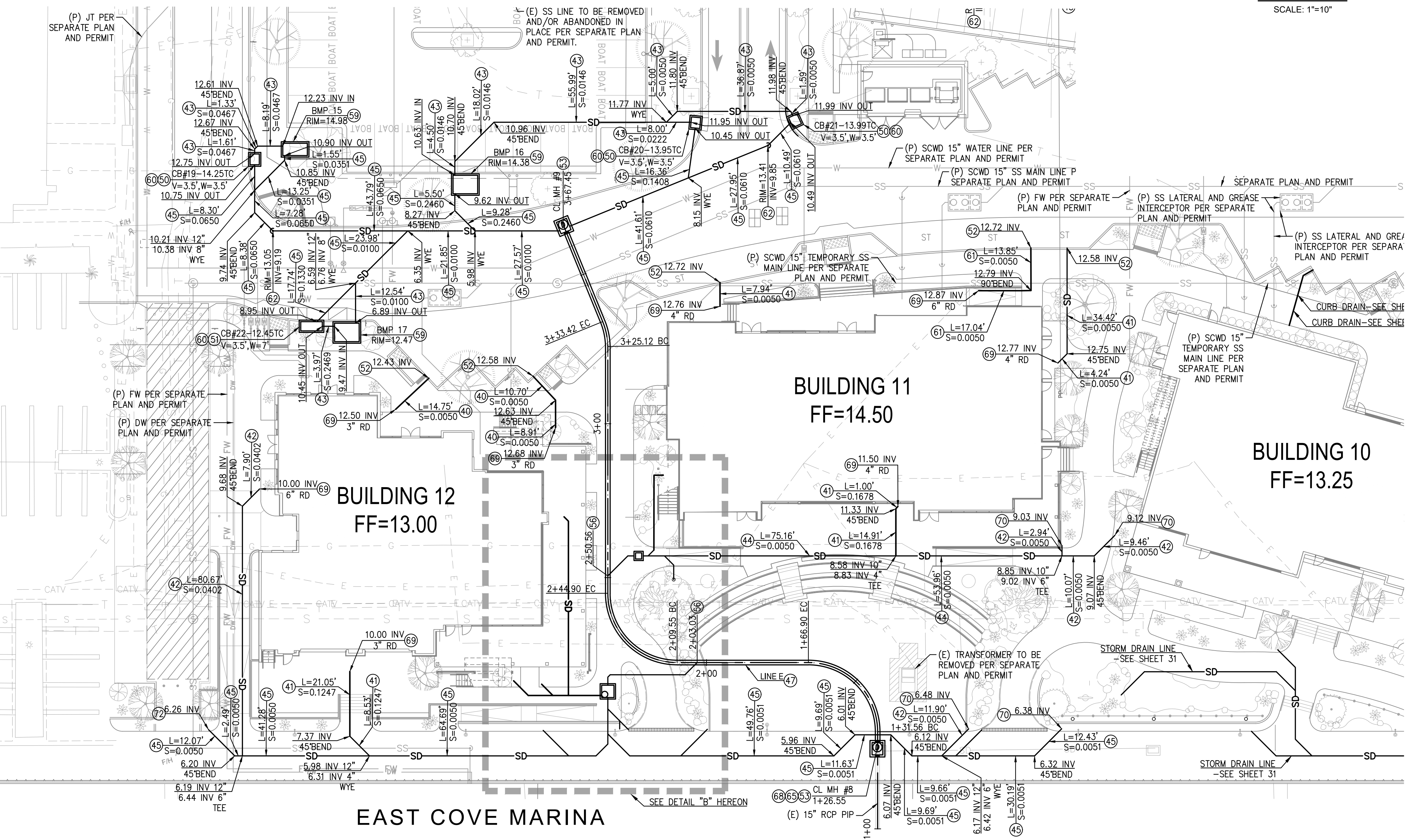
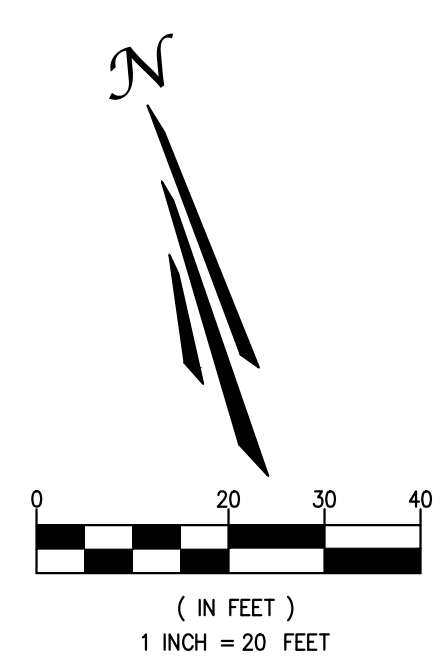
NORMAL DEPTH HYDRAULIC DATA

LINE	STA TO STA	Q10	V	So	Dc	Dn
E	1+28.39 - 2+03.03	6.25	3.54	0.010	0.97	0.85
	2+03.03 - 2+50.56	4.17	2.49	0.010	0.78	0.67
	2+50.56 - 3+64.61	3.66	3.12	0.010	0.73	0.61

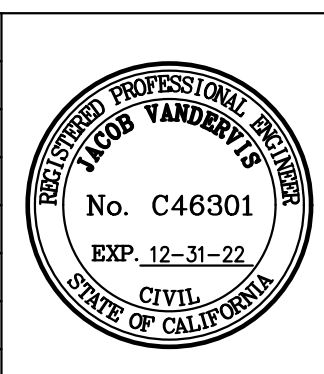
BMP SUMMARY

BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-8-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
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13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-V
16	MWS-L-6-8-C
17	MWS-L-6-8-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE

- LEGEND**
- PROPERTY LINE
 - LEASE LINE
 - - - EXISTING STORM DRAIN
 - SD --- PROPOSED STORM DRAIN <12"
 - SD --- PROPOSED STORM DRAIN >12"
 - PROPOSED MANHOLE
 - PROPOSED CATCH BASIN
 - PROPOSED MODULAR WETLAND SYSTEM
 - PROPOSED AREA DRAIN
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 - PROPOSED GRATED INLET
 - W --- PROPOSED WATER LINE
 - SS --- PROPOSED SEWER LINE
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 - SS --- EXISTING SEWER LINE



NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
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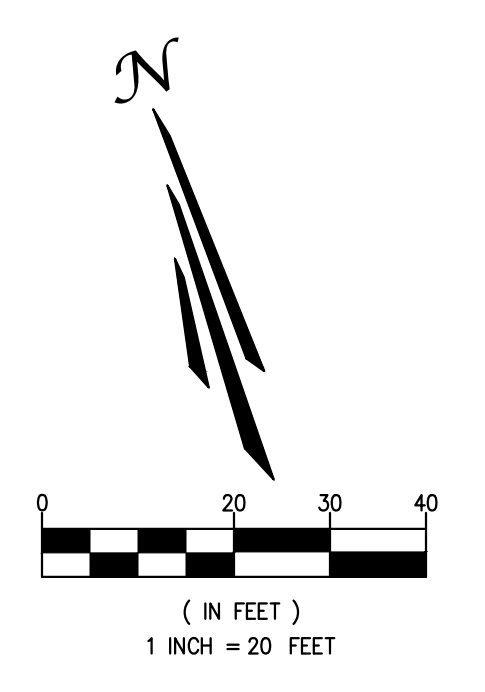
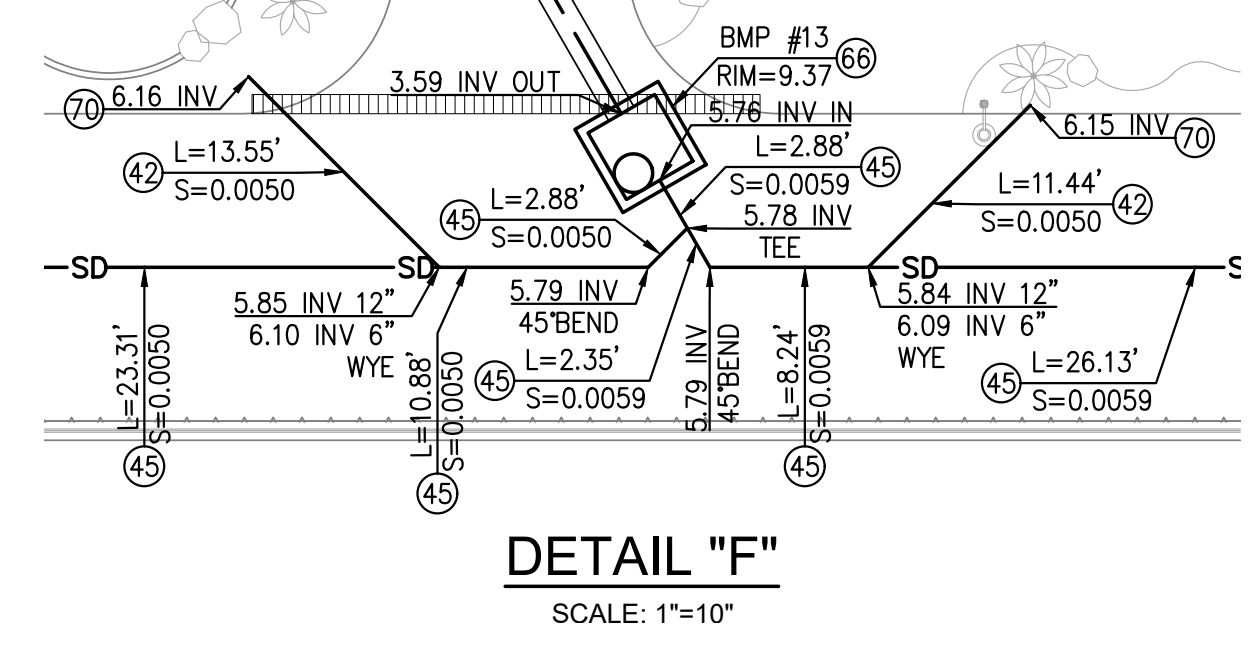
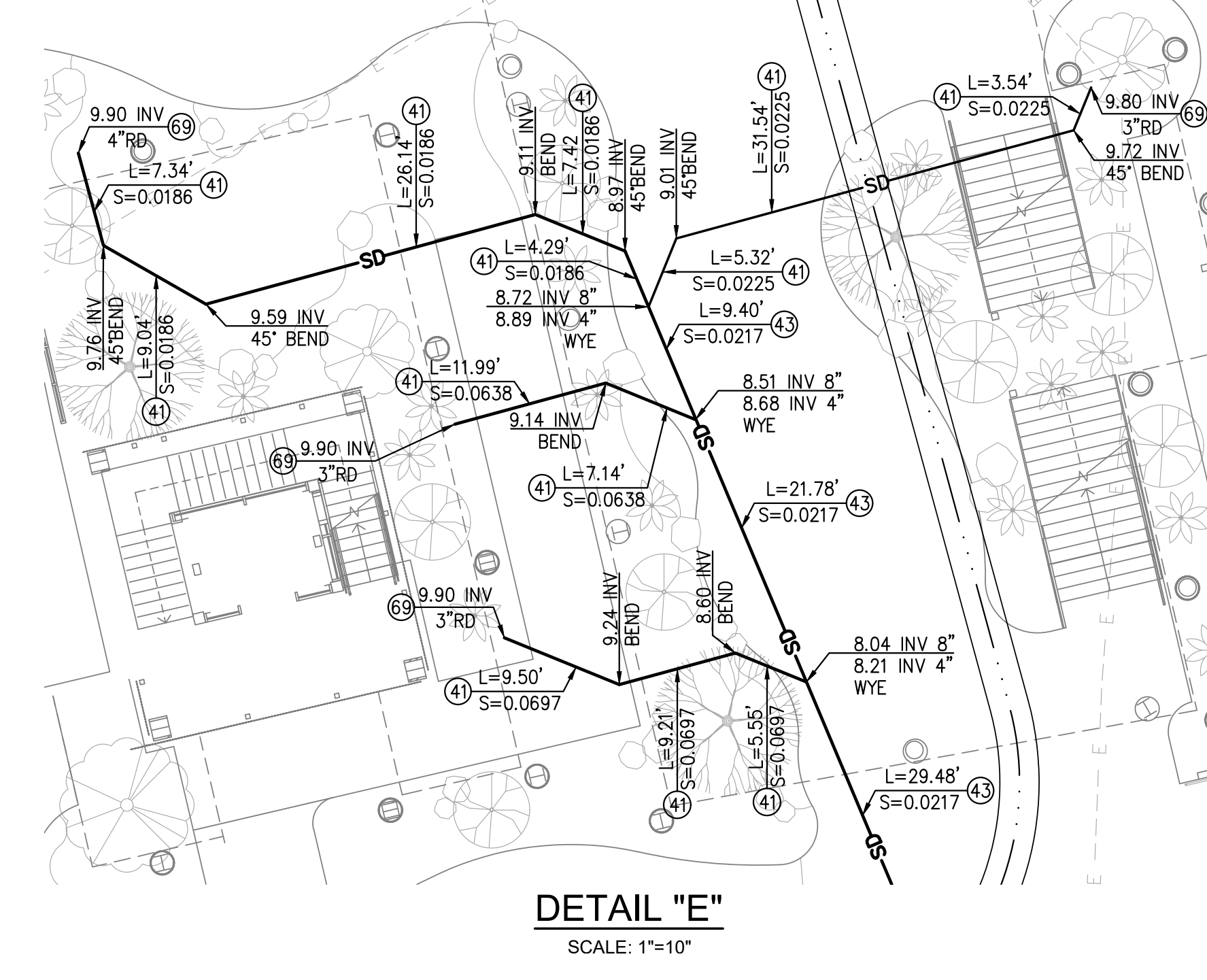
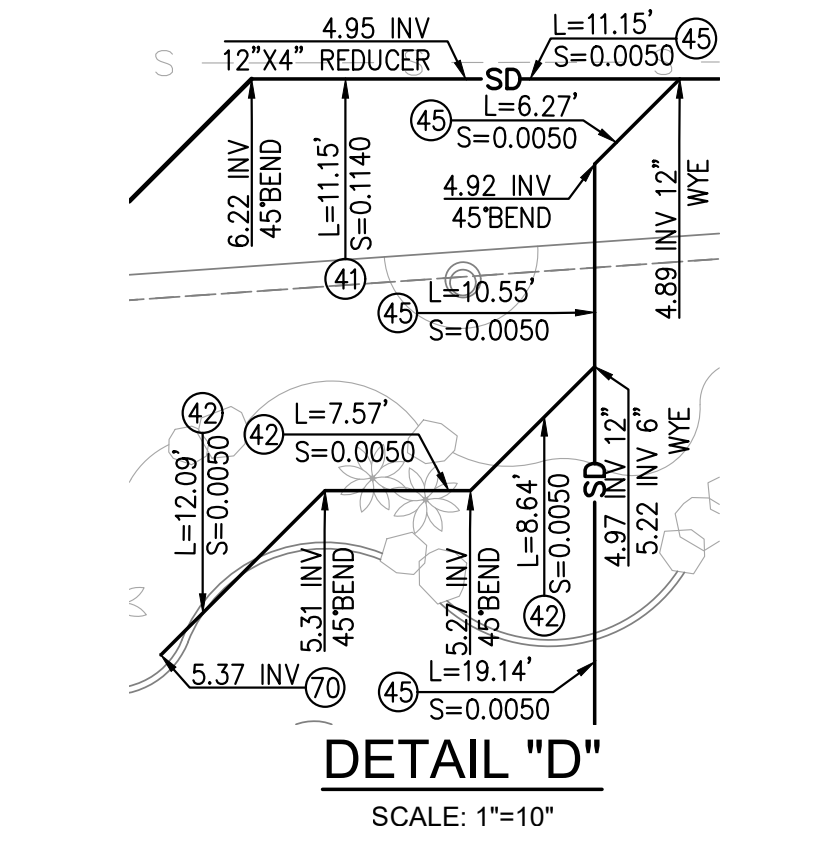
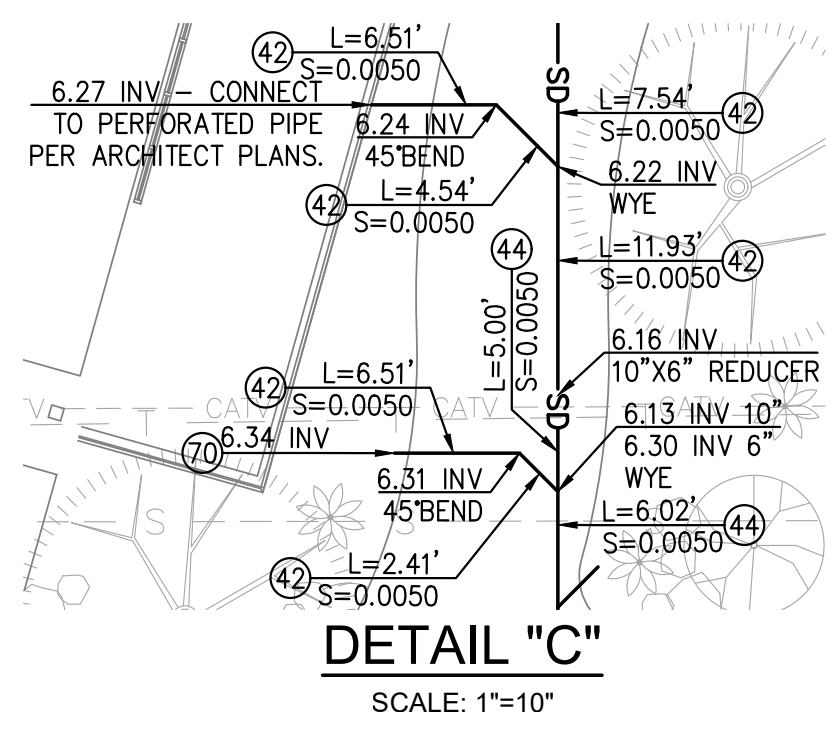
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DRAWN BY: DATE
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 RECOMMENDED BY: DATE

GEOTECHNICAL ENGINEER SEAL
 GEOTECHNICAL ENGINEER
 GMU GEOTECHNICAL, INC.
 GEORGE P. SILVER, M.S., P.E. DATE: 9/9/22
 P. SILVER, PRINCIPAL, GEOTECHNICAL ENGINEER

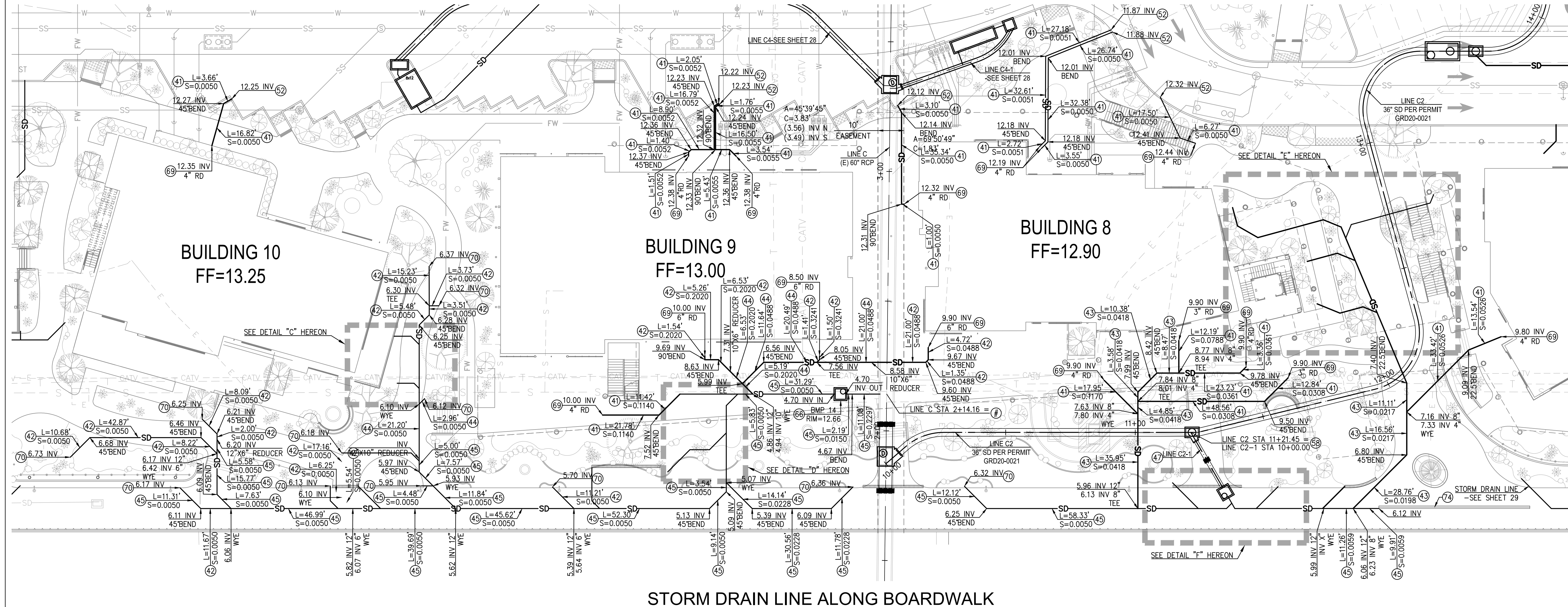
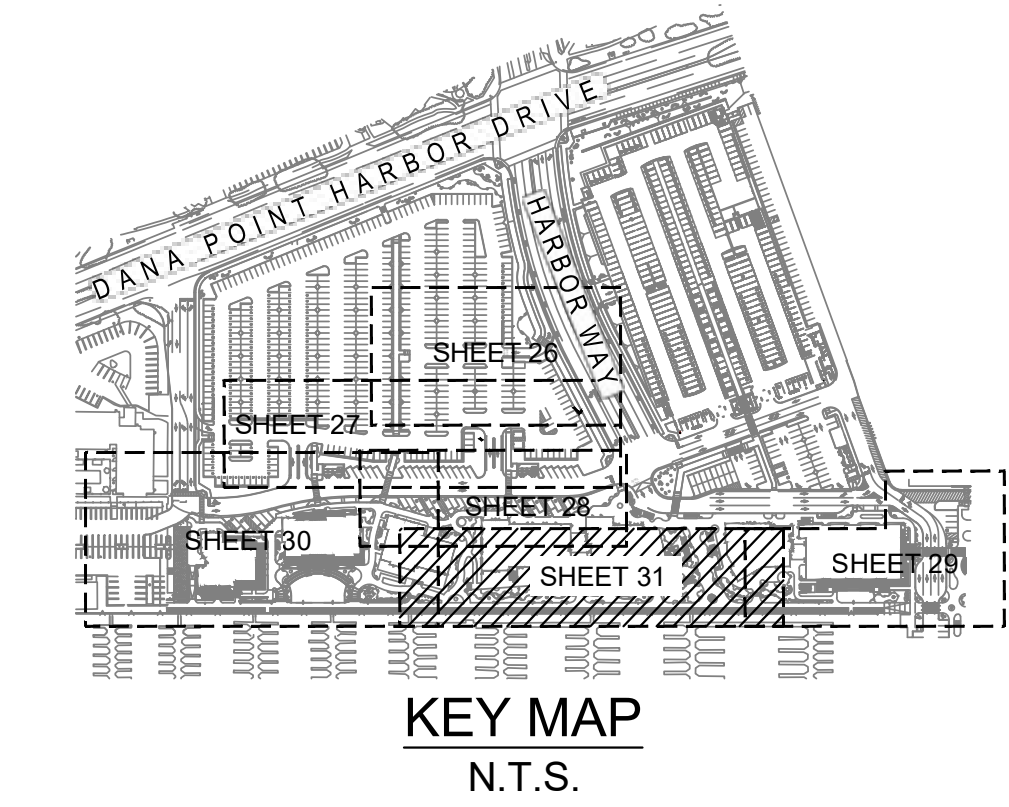
DANA POINT HARBOR REVITALIZATION
 DANA POINT HARBOR PARTNERS, LLC
 BWP BURNHAM IWARD PROPERTIES R.D. OLSON DEVELOPMENT BELLWETHER FINANCIAL GROUP

BUILDINGS 6-12 AND SURFACE PARKING LOT PRECISE GRADING PLANS
 STORM DRAIN PLAN
 PERMIT No. GRD21-0090
 WDI # 930C389422
 SHT 30 OF 51



BMP SUMMARY	
BMP NUMBER	MODULAR WETLANDS SYSTEM MODEL
1	MWS-L-4-8-V
2	MWS-L-4-19-V
3	MWS-L-4-4-V
4	MWS-L-8-16-V
5	MWS-L-4-6-C
6	MWS-L-4-17-V-HC
7	MWS-L-4-8-C
8	MWS-L-4-8-C
9	MWS-L-4-13-V-HC
10	MWS-L-8-12-V
11	MWS-L-4-17-V
12	STORMVAULT-10 PACK STORMSAFE
13	STORMVAULT-3 PACK STORMSAFE
14	STORMVAULT-3 PACK STORMSAFE
15	MWS-L-4-8-V
16	MWS-L-6-8-C
17	MWS-L-6-8-V-HC
18	STORMVAULT-3 PACK STORMSAFE
19	STORMVAULT-1 PACK STORMSAFE

- STORM DRAIN CONSTRUCTION NOTES**
- INSTALL 3" PVC SOH 80, INCLUDING ALL BENDS AND FITTINGS.
 - INSTALL 4" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 6" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 8" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 10" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 12" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 15" HDPE (ADS N-12) STORM DRAIN WITH WATERTIGHT JOINTS, INCLUDING ALL BENDS AND FITTINGS. STORM DRAIN TRENCH AND BEDDING PER GEOTECHNICAL RECOMMENDATIONS. SEE TRENCHING AND BEDDING DETAIL ON SHEET 39.
 - INSTALL 18" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 - INSTALL 24" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 - INSTALL 36" RCP STORM DRAIN WITH WATERTIGHT JOINTS AND BEDDING PER OCPW. STD. PLAN 1319 AND GEOTECHNICAL RECOMMENDATIONS.
 - CONSTRUCT CURB OPENING INLET TYPE I PER OCPW STD. PLAN 1301. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
 - CONSTRUCT CURB OPENING INLET TYPE II PER OCPW STD. PLAN 1302. W PER PLAN. STORM DRAIN INLET MARKING DETAIL ON SHEET 34.
 - CONSTRUCT CURB DRAIN PER DETAIL ON SHEET 34.
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE I, PER OCPW STD. PLAN 321-2-0C
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE, TYPE II, PER OCPW STD. PLAN 320-2-0C
 - CONSTRUCT JUNCTION STRUCTURE WITH MANHOLE PER OCPW STD. PLAN 322-2-0C
 - CONSTRUCT JUNCTION STRUCTURE, TYPE IV, PER OCPW STD. PLAN 331-3-0C
 - CONSTRUCT JUNCTION STRUCTURE, TYPE VI, PER OCPW STD. PLAN 332-2-0C
 - CONNECT TO EXISTING PARKING STRUCTURE MANHOLE PER PERMIT GRD20-0021. ADJUST TO GRADE EXISTING MANHOLE.
 - INSTALL MODULAR WETLAND UNIT PER DETAIL ON SHEETS 34 TO 37. SEE MODEL NUMBER PER TABLE HEREON.
 - INSTALL MODULAR TROUGH DIVERSION SYSTEM (DVERT) MODEL DVT-10-8 PER DETAIL ON SHEET 37
 - INSTALL 3"x12" RECTANGULAR PIPE CURB-0-LET OR APPROVED EQUAL.
 - INSTALL CLEANOUT STRUCTURE PER DETAIL ON SHEET 34
 - INSTALL FLOGARD CATCH BASIN INSERT FILTER, CURB INLET STYLE PER DETAIL ON SHEET 39.
 - REMOVE INTERFERING PORTIONS OF EXISTING 60-INCH RCP.
 - REMOVE INTERFERING PORTION OF EXISTING 15-INCH RCP.
 - INSTALL JENSEN STORMSAFE FILTRATION VAULT PER DETAIL ON SHEETS 38 AND 39. SEE MODEL NUMBER PER TABLE HEREON.
 - CONSTRUCT TRANSITION STRUCTURE PER OCPW. STD. PLAN 340-2-0C
 - REMOVE EXISTING MANHOLE AND/OR STORM DRAIN STRUCTURE.
 - CONNECT TO ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION
 - CONNECT TO LANDSCAPE DRAIN. SEE LANDSCAPE PLANS FOR CONTINUATION AND ADDITIONAL INFORMATION.
 - CONNECT TO WALL SUBDRAIN. SEE RETAINING WALL PLANS ON SHEETS 43 TO 46.
 - INSTALL TRENCH DRAIN PER LANDSCAPE ARCHITECT PLANS AND DETAIL ON SHEET 39.
 - REMOVE EXISTING STORM DRAIN PIPE, CATCH BASIN AND/OR GRATED INLET.
 - INSTALL SLOT DRAIN PER LANDSCAPE ARCHITECT PLANS.



LEGEND

	PROPERTY LINE
	LEASE LINE
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN <12"
	PROPOSED STORM DRAIN >12"
	PROPOSED MANHOLE
	PROPOSED CATCH BASIN
	PROPOSED MODULAR WETLAND SYSTEM
	PROPOSED AREA DRAIN
	PROPOSED CURB OPENING CATCH BASIN WITH GRATINGS
	PROPOSED GRATED INLET
	PROPOSED WATER LINE
	PROPOSED SEWER LINE
	EXISTING WATER LINE
	EXISTING SEWER LINE

WM	WATER METER	(E)	EXISTING
CL	CENTER LINE	(P)	PROPOSED
PL	PROPERTY LINE	IN	INVERT
R/W	RIGHT-OF-WAY	L	LENGTH
FS	FINISHED SURFACE	S	SLOPE
TC	TOP OF CURB	LH	LATERAL
TG	TOP OF GRATE	CB	CATCH BASIN
SS	SANITARY SEWER	MH	MANHOLE
SD	STORM DRAIN	EC	END OF CURVE
DW	DOMESTIC WATER	BC	BEGINNING OF CURVE
RW	RECLAIMED WATER	RCP	REINFORCED CONCRETE PIPE
FDH	FIRE HYDRANT	HDP	HIGH DENSITY POLYETHYLENE
ST	STREET LIGHT	JT	JOINT

PERMIT No. GRD21-0090
WDID # 930C389422

7					
6					
5					
4					
3					
2					
1					
NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

PREPARED UNDER THE SUPERVISION OF:

TAIT
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JACOB VANDERVIS R.C.E. No. C46301 DATE 9/9/22

DRAWN BY: DATE

DESIGNED BY: DATE

CHECKED BY: DATE

RECOMMENDED BY: DATE

GEOTECHNICAL ENGINEER SEAL

GEOTECHNICAL ENGINEER
GMU GEOTECHNICAL, INC.

GEORGE P. SILVER, M.S., P.E. DATE: 9/9/22
P.E. 2336, PRINCIPAL, GEOTECHNICAL ENGINEER

DANA POINT HARBOR REVITALIZATION
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BWP BURNHAM IWARD PROPERTIES **R.D. OLSON** DEVELOPMENT **BELLWETHER** FINANCIAL GROUP

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STORM DRAIN PLAN

SHT 31 OF 51

APPENDIX E – CATCH BASIN SIZING

Catch Basin ID	Node	Flow by/Sump	25 yr flow	Catch basin inflow 25 yr	Catch Basin Width (ft)	Spread (ft)	100 Year flow	Catch basin inflow	Catch Basin width (ft)2	Spread (ft)2
CB#4	31	Flow by	2.46	1.07	3.5	10.94	3.15	1.22	3.5	11.99
CB#5	34	Sump	2.25		3.5	12.56	3.04		3.5	15.012
CB#6	41	Sump	0.48		3.5	4.86	0.72		3.5	6.18
CB#8	37	Sump			4.5					
CB#1	11	Sump	1.24		3.5	8.28	1.6		3.5	10.1
CB#2	13	Sump	2.83		3.5	10.96	3.64		3.5	12.7
CB#3	15	Flow By	0.26	0.258	3.5	4.72	0.33	0.315	3.5	5.29
BMP#7	49	Flow by	1.212	0.563	3	9.73	1.515	0.636	3	10.55
CB#9	47	Sump	1.639		3.5	17.432	2.159		3.5	21.319
CB#7	43	Sump	0.86		3.5	7.29	1.11		3.5	8.41
CB#10	52	Sump	1.55		3.5	14.18	1.99		3.5	16.48
CB#11	83	Flow by	0.48	0.454	3.5	3.47	0.61	0.546	3.5	4.05
CB#13	81	Sump	3.706		6	18.1	4.774		6	21.2
CB#14	86	Sump	2.39		3.5	16.87	3.07		3.5	19.65
BMP#16	65	Sump	1.17		3	8.39	1.5		3	10.19
CB#15	61	Flow by	0.87	0.55	3.5	7.68	1.11	0.64	3.5	8.36
CB#16	63.1	Flow by	0.35	0.33	3.5	5.08	0.44	0.39	3.5	5.53
CB#17	64.1	Flow by	0.3	0.29	3.5	4.8	0.39	0.35	3.5	5.29
BMP#17	68	Sump	2.16		3	16.82	2.88		3	20
CB#18	83	Sump	0.48		3.5	5.42	0.61		3.5	6.07
CB#19	85	Sump	0.43		3.5	9.72	0.56		3.5	11.37
CB#20	60	Sump	0.3		3.5	7.89	0.39		3.5	9.18
CB#21	11	Sump	0.91		3.5	10.85	1.17		3.5	12.56
CB#22	21	Sump	2.49		7	27.86	3.19		7	32.86
CB#23	31	Sump	3.24		3.5	42.15	4.16		3.5	49.8

Hydraulic Analysis Report

Project Data

Project Title: DPH
Designer:
Project Date: Tuesday, June 22, 2021
Project Units: U.S. Customary Units
Notes:

Curb and Gutter Analysis: CB#4

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft
Cross-Slope of Pavement: 0.0210 ft/ft
Depressed Gutter Geometry
Cross-Slope of Gutter: 0.0175 ft/ft
Manning's n: 0.0150
Gutter Width: 2.0000 ft
Width of Spread: 10.9408 ft

Gutter Result Parameters

Design Flow: 2.4600 cfs
Gutter Depression: -0.0840 in
Area of Flow: 1.2499 ft²
Eo (Gutter Flow to Total Flow): 0.4097
Gutter Depth at Curb: 2.6731 in

Inlet Input Parameters

Inlet Location: Inlet on Grade
Inlet Type: Curb Opening
Length of Inlet: 3.5000 ft
Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 1.0732 cfs
Bypass Flow: 1.3868 cfs
Efficiency: 0.4363

Curb and Gutter Analysis: CB#5

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0280 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0070 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 9.0581 ft

Gutter Result Parameters

Design Flow: 2.2500 cfs

Gutter Depression: -0.5040 in

Area of Flow: 1.1067 ft²

E_o (Gutter Flow to Total Flow): 0.4451

Gutter Depth at Curb: 2.5395 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.3096 ft

Computed Width of Spread at Sag: 12.5555 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#6

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0260 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0180 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 5.3395 ft

Gutter Result Parameters

Design Flow: 0.4800 cfs

Gutter Depression: -0.1920 in

Area of Flow: 0.3546 ft²

E_o (Gutter Flow to Total Flow): 0.6877

Gutter Depth at Curb: 1.4739 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.1105 ft

Computed Width of Spread at Sag: 4.8662 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#1

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0260 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0180 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 7.4996 ft

Gutter Result Parameters

Design Flow: 1.2400 cfs

Gutter Depression: -0.1920 in

Area of Flow: 0.7152 ft²

E_o (Gutter Flow to Total Flow): 0.5426

Gutter Depth at Curb: 2.1479 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.2081 ft

Computed Width of Spread at Sag: 8.6185 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0380 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0100 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 8.2026 ft

Gutter Result Parameters

Design Flow: 2.8300 cfs

Gutter Depression: -0.6720 in

Area of Flow: 1.2224 ft²

Eo (Gutter Flow to Total Flow): 0.4800

Gutter Depth at Curb: 3.0684 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.3607 ft

Computed Width of Spread at Sag: 10.9657 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#3

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0220 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 4.7717 ft

Gutter Result Parameters

Design Flow: 0.2600 cfs

Gutter Depression: 0.0480 in

Area of Flow: 0.2317 ft²

E_o (Gutter Flow to Total Flow): 0.7736

Gutter Depth at Curb: 1.1932 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.2578 cfs

Bypass Flow: 0.0022 cfs

Efficiency: 0.9916

Curb and Gutter Analysis: BMP#7

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0170 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0060 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 9.7344 ft

Gutter Result Parameters

Design Flow: 1.2100 cfs

Gutter Depression: -0.2640 in

Area of Flow: 0.7835 ft²

E_o (Gutter Flow to Total Flow): 0.4266

Gutter Depth at Curb: 1.7218 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.0000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.5632 cfs

Bypass Flow: 0.6468 cfs

Efficiency: 0.4654

Curb and Gutter Analysis: CB#9

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0130 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0250 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 12.3792 ft

Gutter Result Parameters

Design Flow: 1.6390 cfs

Gutter Depression: 0.2880 in

Area of Flow: 1.0201 ft²

E_o (Gutter Flow to Total Flow): 0.4071

Gutter Depth at Curb: 2.2191 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.2506 ft

Computed Width of Spread at Sag: 17.4317 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#7

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0270 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0100 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 6.5707 ft

Gutter Result Parameters

Design Flow: 0.8600 cfs

Gutter Depression: -0.4080 in

Area of Flow: 0.5488 ft²

E_o (Gutter Flow to Total Flow): 0.5712

Gutter Depth at Curb: 1.7209 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.1630 ft

Computed Width of Spread at Sag: 7.2976 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#10

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0190 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 9.9823 ft

Gutter Result Parameters

Design Flow: 1.5500 cfs

Gutter Depression: -0.3360 in

Area of Flow: 0.9186 ft²

E_o (Gutter Flow to Total Flow): 0.4140

Gutter Depth at Curb: 1.9400 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.2415 ft

Computed Width of Spread at Sag: 14.1819 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#11

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0500 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0300 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 3.7467 ft

Gutter Result Parameters

Design Flow: 0.4800 cfs

Gutter Depression: -0.4800 in

Area of Flow: 0.3109 ft²

E_o (Gutter Flow to Total Flow): 0.8352

Gutter Depth at Curb: 1.7680 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.4536 cfs

Bypass Flow: 0.0264 cfs

Efficiency: 0.9449

Curb and Gutter Analysis: CB#13

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0210 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0067 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 3.7000 cfs

Gutter Result Parameters

Width of Spread: 12.8618 ft

Gutter Depression: -0.3432 in

Area of Flow: 1.7084 ft²

E_o (Gutter Flow to Total Flow): 0.3404

Gutter Depth at Curb: 2.8980 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 6.0000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 9.6000 ft

Effective Perimeter: 7.6800 ft

Area: 4.0000 ft²

Effective Area: 3.2000 ft²

Depth at curb face (upstream of local depression): 0.3527 ft

Computed Width of Spread at Sag: 18.1573 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#14

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0210 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 10.9928 ft

Gutter Result Parameters

Design Flow: 2.3900 cfs

Gutter Depression: -0.3840 in

Area of Flow: 1.2368 ft²

E_o (Gutter Flow to Total Flow): 0.3829

Gutter Depth at Curb: 2.3862 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.3223 ft

Computed Width of Spread at Sag: 16.8698 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: BMP#16

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0210 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0380 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 7.9175 ft

Gutter Result Parameters

Design Flow: 1.1700 cfs

Gutter Depression: 0.4080 in

Area of Flow: 0.6922 ft²

E_o (Gutter Flow to Total Flow): 0.5874

Gutter Depth at Curb: 2.4032 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.0000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 6.6000 ft

Effective Perimeter: 5.2800 ft

Area: 2.0000 ft²

Effective Area: 1.6000 ft²

Depth at curb face (upstream of local depression): 0.2102 ft

Computed Width of Spread at Sag: 8.3886 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#15

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0210 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 7.6822 ft

Gutter Result Parameters

Design Flow: 0.8700 cfs

Gutter Depression: -0.3840 in

Area of Flow: 0.5877 ft²

E_o (Gutter Flow to Total Flow): 0.5017

Gutter Depth at Curb: 1.5519 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.5507 cfs

Bypass Flow: 0.3193 cfs

Efficiency: 0.6330

Curb and Gutter Analysis: CB#16

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0225 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0200 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 5.0875 ft

Gutter Result Parameters

Design Flow: 0.3500 cfs

Gutter Depression: -0.0600 in

Area of Flow: 0.2862 ft²

E_o (Gutter Flow to Total Flow): 0.7270

Gutter Depth at Curb: 1.3136 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.3295 cfs

Bypass Flow: 0.0205 cfs

Efficiency: 0.9413

Curb and Gutter Analysis: CB#17

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0225 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0200 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 4.8089 ft

Gutter Result Parameters

Design Flow: 0.3000 cfs

Gutter Depression: -0.0600 in

Area of Flow: 0.2552 ft²

E_o (Gutter Flow to Total Flow): 0.7526

Gutter Depth at Curb: 1.2384 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 0.2912 cfs

Bypass Flow: 0.0088 cfs

Efficiency: 0.9706

Curb and Gutter Analysis: BMP#17

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0210 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0025 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 10.6330 ft

Gutter Result Parameters

Design Flow: 2.1600 cfs

Gutter Depression: -0.4440 in

Area of Flow: 1.1501 ft²

E_o (Gutter Flow to Total Flow): 0.3876

Gutter Depth at Curb: 2.2355 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.0000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 6.6000 ft

Effective Perimeter: 5.2800 ft

Area: 2.0000 ft²

Effective Area: 1.6000 ft²

Depth at curb face (upstream of local depression): 0.3163 ft

Computed Width of Spread at Sag: 16.8225 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#18

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0310 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 5.1198 ft

Gutter Result Parameters

Design Flow: 0.4800 cfs

Gutter Depression: -0.6240 in

Area of Flow: 0.3543 ft²

E_o (Gutter Flow to Total Flow): 0.6507

Gutter Depth at Curb: 1.2806 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.0000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 6.6000 ft

Effective Perimeter: 5.2800 ft

Area: 2.0000 ft²

Effective Area: 1.6000 ft²

Depth at curb face (upstream of local depression): 0.1160 ft

Computed Width of Spread at Sag: 5.4205 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#19

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0120 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 8.2545 ft

Gutter Result Parameters

Design Flow: 0.4300 cfs

Gutter Depression: -0.1680 in

Area of Flow: 0.3948 ft²

E_o (Gutter Flow to Total Flow): 0.4876

Gutter Depth at Curb: 1.0206 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.1027 ft

Computed Width of Spread at Sag: 9.7255 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#20

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0120 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 7.2679 ft

Gutter Result Parameters

Design Flow: 0.3000 cfs

Gutter Depression: -0.1680 in

Area of Flow: 0.3029 ft²

E_o (Gutter Flow to Total Flow): 0.5354

Gutter Depth at Curb: 0.8786 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.0808 ft

Computed Width of Spread at Sag: 7.8993 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#21

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0180 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0050 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 8.5235 ft

Gutter Result Parameters

Design Flow: 0.9100 cfs

Gutter Depression: -0.3120 in

Area of Flow: 0.6279 ft²

E_o (Gutter Flow to Total Flow): 0.4675

Gutter Depth at Curb: 1.5291 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 7.1000 ft

Effective Perimeter: 5.6800 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.1693 ft

Computed Width of Spread at Sag: 10.8497 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#22

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0120 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 0.0010 ft

Design Flow: 2.4900 cfs

Gutter Result Parameters

Width of Spread: 15.5236 ft

Gutter Depression: 0.0000 in

Area of Flow: 1.4459 ft²

E_o (Gutter Flow to Total Flow): 0.0002

Gutter Depth at Curb: 2.2354 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 7.0000 ft

Curb opening height: 6.0000 in

Local Depression: 4.0000 in

Inlet Result Parameters

Perimeter: 7.0018 ft

Effective Perimeter: 5.6014 ft

Area: 5.8333 ft²

Effective Area: 4.6667 ft²

Depth at curb face (upstream of local depression): 0.3343 ft

Computed Width of Spread at Sag: 27.8569 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB#23

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0150 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 0.0010 ft

Width of Spread: 14.9040 ft

Gutter Result Parameters

Design Flow: 3.2400 cfs

Gutter Depression: 0.0000 in

Area of Flow: 1.6660 ft²

E_o (Gutter Flow to Total Flow): 0.0002

Gutter Depth at Curb: 2.6827 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Curb Opening

Length of Inlet: 3.5000 ft

Curb opening height: 6.0000 in

Local Depression: 2.0000 in

Inlet Result Parameters

Perimeter: 3.5018 ft

Effective Perimeter: 2.8014 ft

Area: 2.3333 ft²

Effective Area: 1.8667 ft²

Depth at curb face (upstream of local depression): 0.6323 ft

Computed Width of Spread at Sag: 42.1566 ft

Flow type: Weir Flow

Efficiency: 1.0000

APPENDIX F – MASTER PLAN OF DRAINAGE

Master Plan of Drainage

for

Dana Point Harbor

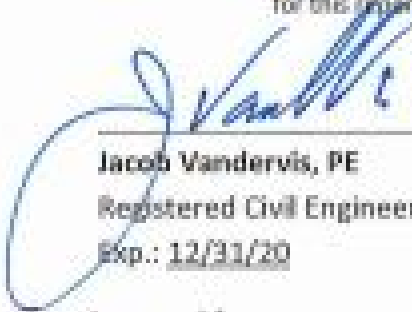
Commercial Core Retail & Dry Stack Lease Areas

Permit No. GRD19-0177

Dana Point, California

January, 2020

This Hydrology Study has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.



Jacob Vandervis, PE
Registered Civil Engineer No. C46301
Exp.: 12/31/20



Prepared for: _____

Prepared by: _____



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ABBREVIATIONS

AES: Advanced Engineer Software
BMP: Best Management Practices
CCA: Commercial Core Area
CCRA: Commercial Core Retail Area
CDP: Coastal Development Plan
DPH: Dana Point Harbor
DSA: Dry Stack Lease Area
DMA: Drainage Management Area
HGL: Hydraulic Grade Line
LDM: Local Drainage Manual
NRCS: National Resources Conservation Service
OCHM: Orange County Hydrology Manual
WQMP: Water Quality Management Plan
WQ: Water Quality

EXECUTIVE SUMMARY

The Dana Point Harbor Commercial Core Retail and Dry Stack Lease Area Master Plan of Drainage (MPD) provides an analysis of the existing storm drain systems and a conceptual storm drain design. The Commercial Core Retail and Dry Stack Lease Area combined are the Commercial Core Area (CCA) of the Dana Point Harbor. This MPD identified and analyzed the 5 storm drainage outlets to the Ocean. The hydrology and hydraulic analyses for both the existing and proposed condition were analyzed for each outlet.

This MPD is to provide an overall drainage design for the CCA, it serves as a basis for final design Hydrology & Hydraulic studies and as a guideline for the Water Quality Management Plans (WQMP). The hydrology analysis was prepared in conformance with the Orange County Hydrology Manual (OCHM), dated 1986 and its Addendum No. 1, dated 1996. The hydraulic analysis was proposed following the criteria and requirements set forth by the Orange County Local Drainage Manual (LDM), dated January 1996. The hydrology and hydraulic analyses were completed for the 10- and 100-year storm events. Sea tidal influence, future sea level rise, and the effects of high groundwater level were accounted for in the hydraulic analysis. The results obtained from the hydraulic models were used to assess the hydraulic capacity of the existing storm drain systems for the existing and proposed conditions, proposed storm drain systems, surface flooding analysis, and the water quality treatment device design. All proposed storm drain main lines are designed for the 10-year storm event following LDM guidelines.

The proposed drainage design for the areas draining to Outlets 1 and 3 changes the existing drainage boundary. The drainage areas to Outlets 1 and 3 were altered because of the following:

- The existing 18-inch storm drain system in the Dry Stack Lease Area does not have sufficient capacity (Outlet 1)
- The leasing boundary change associated with the Dry Stack Lease Area and Commercial Core Retail Area

For the areas draining to Outlets 2, 4, and 5, the proposed design follows existing drainage patterns. Drainage improvements in the Dry Stack Lease Area consist of diversion manholes and multiple detention basins to detain runoff that will slowly be released to the 18-inch storm drain system. The 10- and 100-year existing and proposed condition peak discharge and the flow difference is summarized in Tables 1 and 2. The Commercial Core Retail Area proposed drainage design divides the site in three areas that flow to the three existing outlets. Each

proposed storm drain line consists of curb side opening catch basins, grated inlets that convey runoff via storm drain laterals.

The hydraulic analysis used the sea water levels from NOAA as a downstream control. Seawater is expected to rise and flow into the existing storm drain system. The NOAA Mean High Water (MHW) sea level at La Jolla Station was used as the downstream control for the basis of the storm drain design.

The Preliminary Water Quality Management Plan design per this MPD follows the South Orange County Technical Guidance Document (TGD), dated September 2017, which complies with the San Diego Regional Water Quality Board requirements. This MPD proposes the use of Bioclean Modular Wetlands System (MWS), Jensen StormSafe or Bioclean Kraken Filters.

Table 1: Outlet 1 Summary Table

Outlet No.	Existing Q ₁₀ (cfs)	Existing Q ₁₀₀ (cfs)	Mitigated Q ₁₀ (cfs)	Mitigated Q ₁₀₀ (cfs)	Δ Q ₁₀ (cfs)	Δ Q ₁₀₀ (cfs)
1	48.46	76.15	9.76	29.42	-38.70	-46.73

Table 2: Outlet Summary Table

Outlet No.	Existing Q ₁₀ (cfs)	Existing Q ₁₀₀ (cfs)	Proposed Q ₁₀ (cfs)	Proposed Q ₁₀₀ (cfs)	Δ Q ₁₀ (cfs)	Δ Q ₁₀₀ (cfs)
2	4.75	7.29	4.25	6.63	-0.25	-0.66
3	356.23	575.46	374.28	602.02	+18.05	+26.56
4	9.06	13.84	8.86	13.53	-0.20	-0.31
5	4.98	7.61	6.05	9.20	+1.07	+1.59
6*	1.60	2.44	2.04	3.11	+0.44	+0.67
*Sheet flow directly into the Ocean						

SECTION 1 INTRODUCTION AND BACKGROUND

The Master Plan of Drainage (MPD) study provides a storm water runoff management program analysis and drainage design for the proposed Dana Point Harbor (DPH or Harbor) Revitalization Project for the Commercial Core Area (CCA) approved under Coastal Development Plan (CDP) 13-0018(1), which includes the Commercial Core Retail Area (CCRA) and the Dry Stack Lease Area (DSA). The analysis on this study incorporates hydrology and hydraulic design of the storm drain system for flood control and water quality treatment purposes. This MPD analyses the existing drainage patterns and provides preliminary proposed condition calculations for the CCA. It determines the existing storm drainage capacity, preliminary location of proposed inlets and storm drain systems. In addition, this Report outlines a program for future Water Quality Best Management Practices (BMPs) designed to meet the South Orange County regulations. The MPD will serve as a guideline for future studies to be prepared for final construction documents for the CCRA and DSA. The recommendations of this MPD will reduce potential hydrologic impacts to the appropriate levels as described in this document. This study was prepared following the requirements set forth by the Orange County Hydrology Manual (OCHM), dated 1986, and its 1996 Addendum and the Orange County Local Drainage Manual (LDM), dated January 1996.

DPH encompasses approximately 276.8 acres, owned by the County of Orange (County), and located in the southern portion of the City of Dana Point (City). The proposed CCA improvements within DPH constitute approximately 30 acres. DPH is bordered by the Pacific Ocean to the south, Dana Point Headlands and Old Cove Marine Preserve to the west, Doheny State Beach to the east and a variety of commercial, hotel, residential and public park uses to the north. The Interstate-5 freeway is located approximately two miles to the east and provides regional access to the Harbor. The City lies in the southwest portion of Orange County, in the State of California and it is part of the larger Southern California Region. It was incorporated on January 1st, 1989 and comprises of approximately 6.5 square miles. See Figure 1 Vicinity Map for project location.

The Dana Point Harbor Revitalization Plan has been in process since the late 1990's. The project goal is to improve the Harbor's boat slips, retail center, boater facilities and parking, and storm water quality treatment. The Dana Point Harbor is owned by the County of Orange and it is currently under a 66-year operating and maintenance lease agreement with the DPH Partners, LLC. and DPH Partners Drystack, LLC. which includes: Burnham Ward Properties, R.D. Olson Development and Bellwether Financial Group. Burnham Ward Properties will develop the Commercial Core Retail Area, R.D. Olson will develop the Hotel Area, and Bellwether Financial Group will develop the Marina portion and the Dry Stack Lease Area.

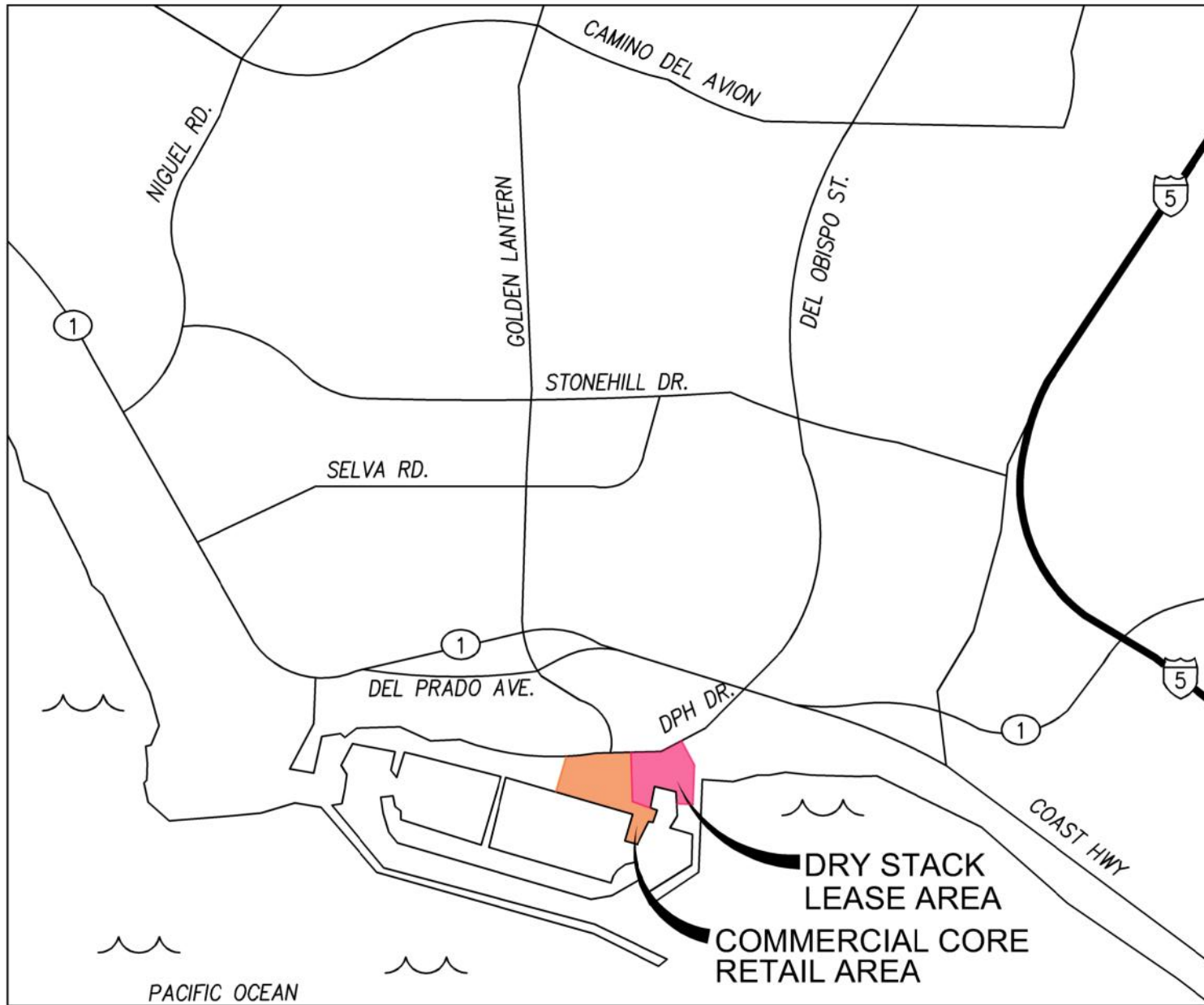


FIGURE 1 - VICINITY MAP

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

PREPARED BY:

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Since 1964

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R.D. OLSON DEVELOPMENT

BELLWETHER FINANCIAL GROUP

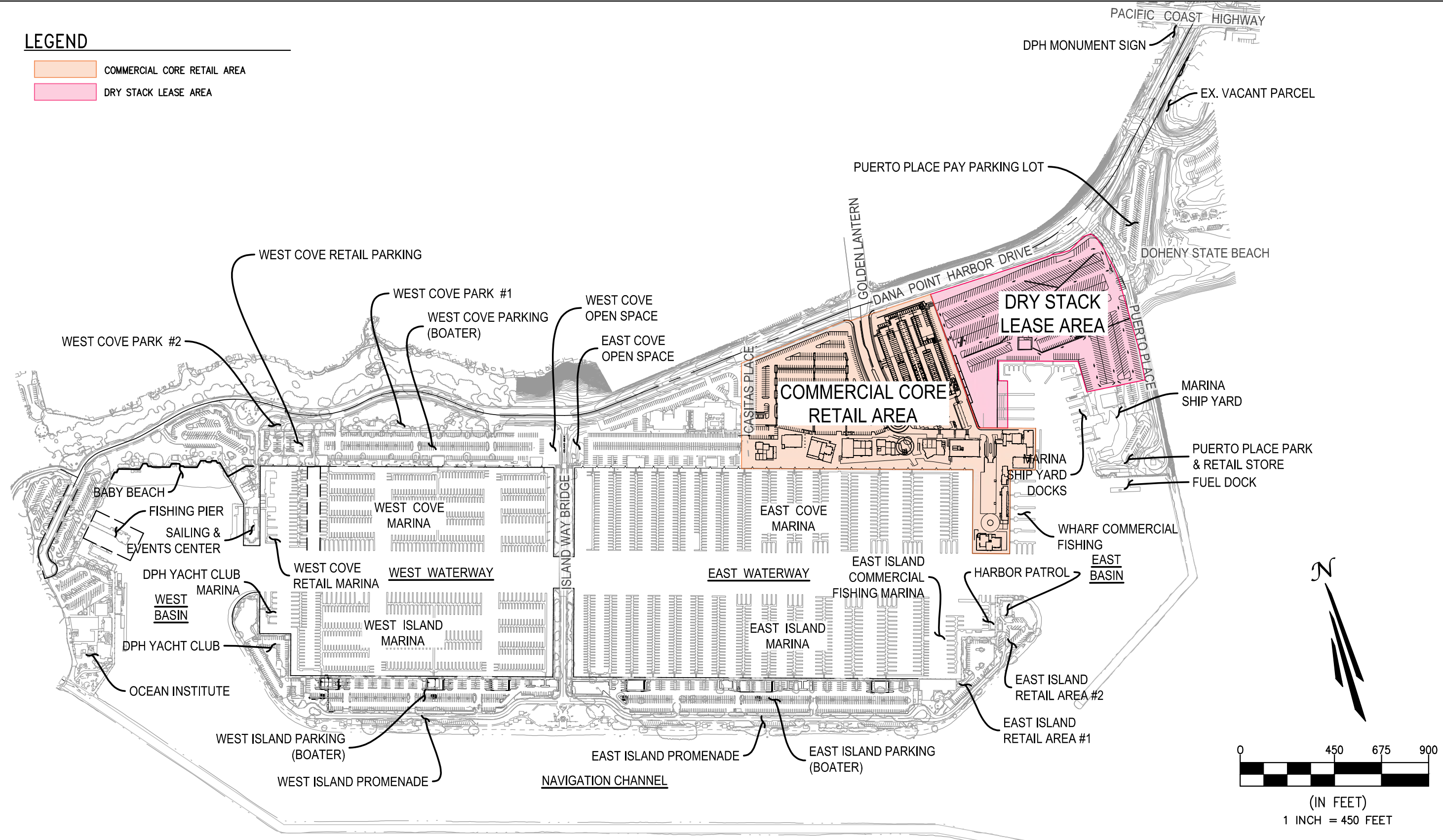
K:\Drawings\ME\ME03810 - Dana Point Harbor\ENG\Hydrology\Master\Figures\ME03810- Vicinity Map.dwg
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Figure 2 DPH Study Area provides an overview of DPH and the CCA. The CCRAA portion of the Harbor will include twelve commercial buildings, surface parking lots, and a 3-level parking structure. The Dry Stack Lease Area incorporates pavement improvements to the existing parking lot, removal of Embarcadero Place and improvements to the existing Boater Services Building. The CCA encompasses the northeast portion of DPH with Casitas Place to the west and Puerto Place to the east, the East Cove Marina and to the south and Dana Point Harbor Drive to the north.

The Environmental Impact Report (EIR), dated 2006, outlined multiple Planning Areas for the DPH Revitalization. The improvements discussed in this MPD are Planning Areas PA-1 and PA-2 of the EIR. PA -1 is the CCRA and PA-2 is the DSA. The proposed development will comply with all of the Project Design Features (PDF), Standard Conditions of Approval (SCA), and Mitigation Measures (MM) outlined in the EIR. Exhibit B of the EIR describes all the PDFs, MMs and SCAs and it is provided in *Appendix E*. This Report will comply with PDF 4.4-1, SCA 4.4-8, SCA 4.4-9, SCA 4.4-10, SCA 4.4-11, MM 4.1-1a, MM 4.3-13, MM 4.4-1, MM 4.4-2, MM 4.4-3, MM4.7-6, and MM 4.8-11.

LEGEND

- COMMERCIAL CORE RETAIL AREA
- DRY STACK LEASE AREA



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FIGURE 2 - DPH STUDY AREA
DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC



K:\Drawings\ME\ME03810 - Dana Point Harbor\ENG\Hydrology\Master\Figures\ME03810- Study Area Plan.dwg PLOTTED: 12/5/2019 1:21:55 PM BY Nick Flores

SECTION 2 PROJECT DESCRIPTION

Dana Point Harbor (DPH) was constructed between the late 1960's and early 1970's by the County of Orange and the United States Army Corps of Engineers. In the late 1990's the County began planning for the Revitalization of DPH, in 2006 the Environmental Impact Report (EIR) was approved, in November 18, 2014 the CDP was approved by the Coastal Commission and the City of Dana Point, in May 29, 2019 the Substantial Conformance to the 2014 CDP was approved and detailed planning has occurred since then. At this time, the CCRA of the DPH Revitalization Plan is under construction documents and design for Phase 2B which is the construction of a 3-level Parking Structure. See Section 2.3 below for the current Construction Phasing Plan for the CCRA. The initial construction phase for the DSA is entitled under the same EIR and CDP for the CCRA and is currently in the preliminary design phase. The ultimate redevelopment of the DSA will be subject to additional Coastal Commission and City of Dana Point Local Coastal Plan approval. As part of the DPH Revitalization project Bellwether Financial Group is managing the redevelopment of the DSA and Burnham Ward is redeveloping the CCRA. *Appendix M* provides the proposed improvement plans for the CCRA and DSA, Sections 2.1 and 2.2 below provide a detailed description of each site, and Figure 3 is the Proposed Commercial Core Area Site Plan.

2.1 Dry Stack Lease Area

The DSA is located on the eastern portion of DPH, between Puerto Place and the CCRA 3-level parking structure. It encompasses approximately 12 acres, consisting of asphalt paved surfaces for vehicle parking, boat storage, an access roadway (Embarcadero Place), a boat launch ramp, a boater services building, and several underground existing wet and dry utilities including a sewer lift station. The initial construction project (interim condition) proposed improvements include the removal of Embarcadero Place and reconfiguration of the existing parking areas. The ultimate proposed improvements will consist of one 6,000-square foot (sf) two-story Boater Service and Dry Storage Office Building, boat wash stations connected to the sewer public system, potential relocation of existing sewer lift station, a reconfigured day-use auto and trailer parking lot, and dry storage facility for long term land storage of boats. No boat maintenance operations other than exterior cleaning will occur within the DSA.

2.2 Commercial Core Retail Area

The CCRA is located on the eastern portion of DPH, between Casitas Place and the DSA, immediately north of the East Cove Marina boater boat slips. It encompasses approximately 20 acres. The existing site consist of surface parking lots, retail buildings, restaurants, a portion of dry boat storage, the Dana Wharf Area and the Catalina Express. The retail and restaurant buildings are surrounded by concrete walkways and some small landscape areas. The proposed

improvements include new retail and restaurant buildings along the waterfront with an ocean front boardwalk, multiple paved surface parking lots, a 3-level parking structure, newly landscaped areas, renovation to the existing Dana Wharf and its existing buildings, and the realignment of Golden Lantern Street. The proposed 3-level parking structure is located in an area where several existing surface parking lots are located.

2.3 Construction Phasing

The CCRA Construction Phasing is currently at Phase 2B. The DSA will be built independently and will not include phasing. Detailed description of each phase including storm drain installation and the DSA construction plan is detailed below. Figure 4 is the storm drain system construction phasing.

CCRA Construction Phases

Phase 1 and Phase 2A have been completed and consisted of:

- Phase 1: Public street improvements to Puerto Place and Casitas Place at Dana Point Harbor Drive, and improvements to Dana Point Harbor Drive.
- Phase 2A: Parking lot restriping within the Dry Stack Lease Area.

Phase 2B to 6 consist of:

- Phase 2B: Rough grading, precise grading and construction of the Parking Structure within the CCRA. Precise grading operations will include the partial realignment of Golden Lantern. For the rough grading portion of the work all stormwater will be kept on-site in proposed temporary desilting basins, then cleaned and pumped via a proposed temporary pump system that will discharge to the nearest storm drain inlet. Construction activities will follow the requirements under the rough grading Stormwater Pollution Prevention Plan (SWPPP).
During the precise grading activities and the construction of the parking structure portions of the ultimate storm drain system for the CCRA will be installed. However, the storm drain line that connects to the existing main Line C (as described in Sections 4, 5 and 6) will not be built due to conflicts with an existing Boater Services Building that must remain until the parking structure is completed. Temporary pumps will be placed to pump stormwater and discharge to the nearest storm drain inlet or manhole. This temporary condition is expected to last until the removal of the existing Boater Services Building, which is part of the initial construction activities for Phase 4A. A duration of 6 to 12 months is anticipated at this time.

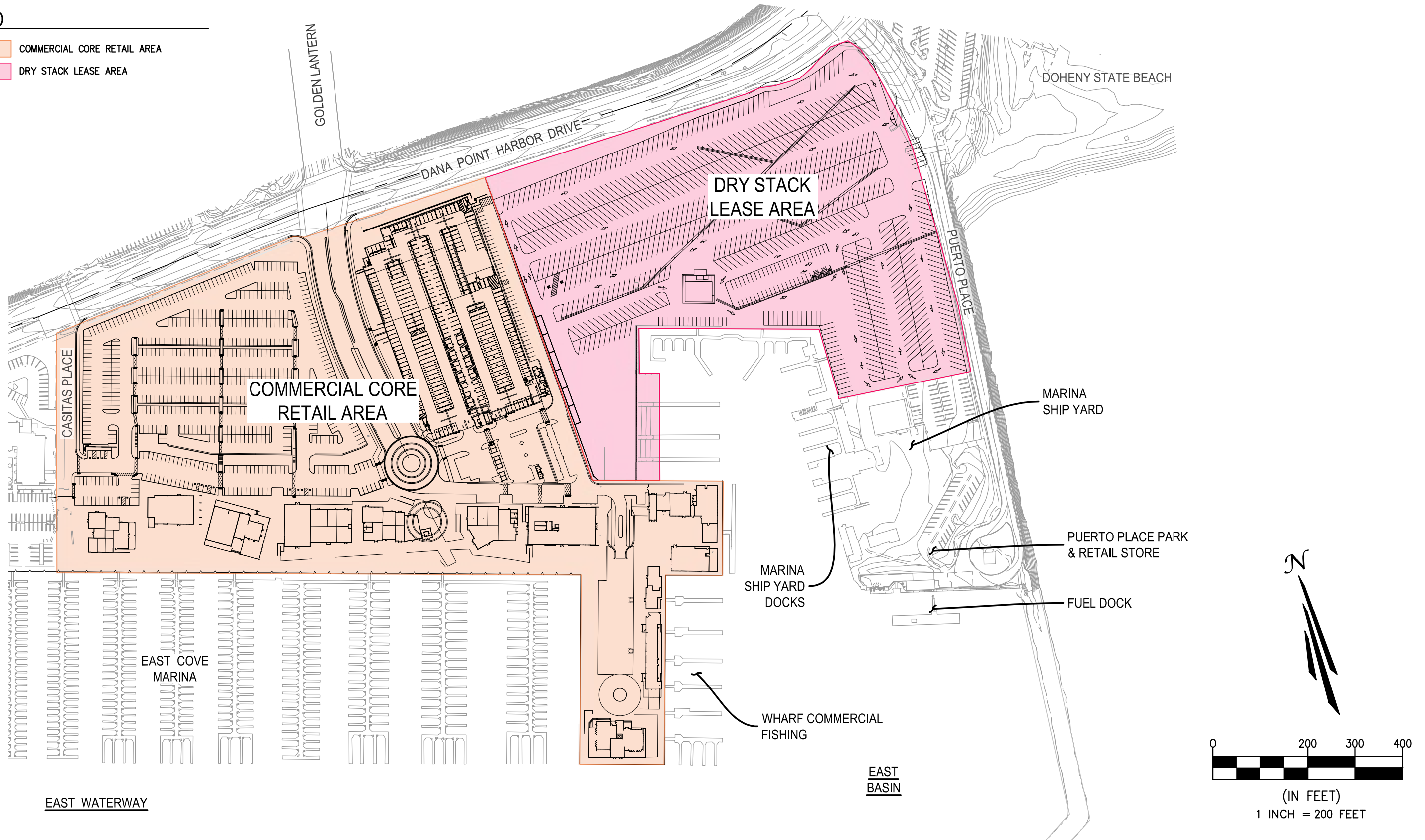
- Phase 3: Redevelopment and remodeling of the existing buildings at Dana Wharf, and completion of improvements to Golden Lantern. This phase includes ultimate build out of the storm drain system that will serve Dana Wharf within the CCRA.
- Phase 4A: Buildings 6 to 9, adjacent surface parking and waterfront boardwalk area immediately adjacent to buildings. This phase includes ultimate build out of the storm drain system that will serve the Phase 2B storm drain improvements, and the removal of the temporary storm drain pumps installed as part of Phase 2B. The storm drain system will connect to main Line C.
- Phase 4B: Buildings 10, 11 and 12 adjacent surface parking and waterfront boardwalk area immediately adjacent to buildings. This phase includes ultimate build out of the main components of the CCRA storm drain system.
- Phase 5: Demolition of remaining on-site buildings and construction of surface parking lot areas remaining. At this stage the complete storm drain system for the CCRA is completed.
- Phase 6: completion of the CCRA landscaping and signing improvements.

DSA Construction

The DSA is currently entitled under the CDP to reconfigure the existing Dry Storage, the Day Use Auto and Trailer parking lots, remove Embarcadero Place, and construct a new sewer lift station. The ultimate built out will include a proposed Dry Storage Building and a Boater Services Office Building, which are not part of the current entitlements and will be subject to a separate Coastal Development Permit. For this MPD the interim condition of the DSA is being utilized. In this interim condition, Embarcadero Place is removed, the existing parking lot is reconfigured and regraded, and the existing Boater Services Building remains. The proposed storm drain system as laid out and designed in this MPD is planned to accommodate the ultimate “built-out” condition.

LEGEND

- COMMERCIAL CORE RETAIL AREA
- DRY STACK LEASE AREA



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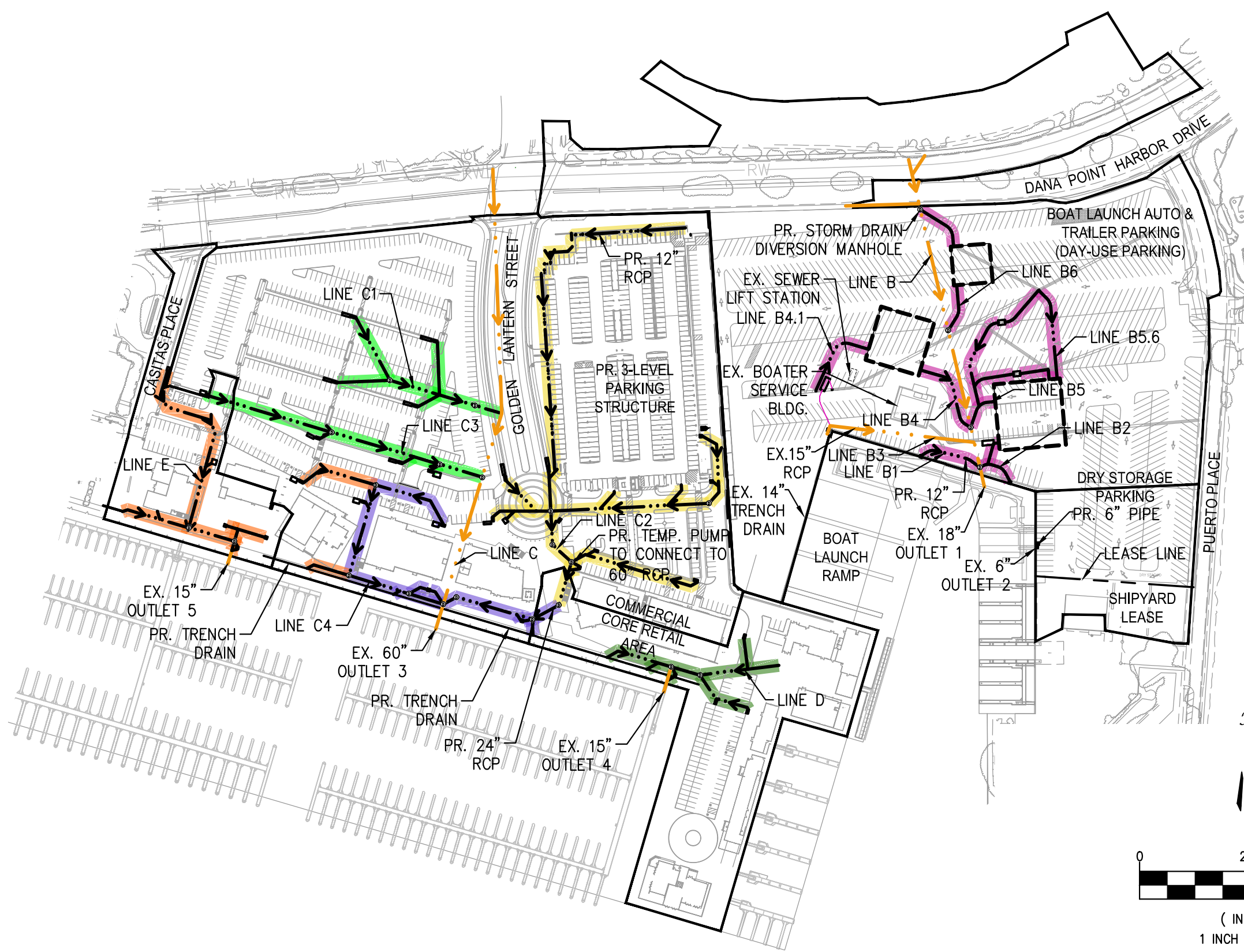
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FIGURE 3 - PROPOSED COMMERCIAL CORE AREA SITE PLAN
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LEGEND

- DRAINAGE AREA BOUNDARY
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- PHASE 2B
- PHASE 3
- PHASE 4A
- PHASE 4B
- PHASE 5
- PHASE DSA
- PROPOSED DETENTION BASIN
- PROPOSED CATCH BASIN/INLET
- PROPOSED MANHOLE JUNCTION STRUCTURE

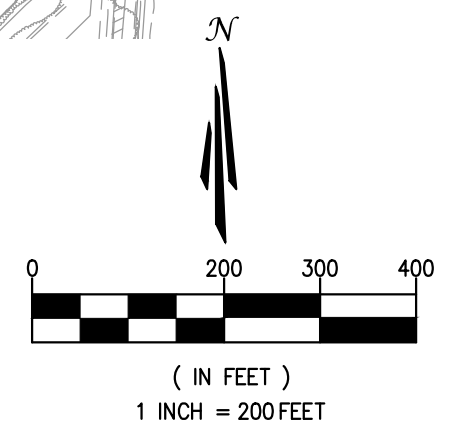


FIGURE 4 - STORM DRAIN CONSTRUCTION PHASING
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SECTION 3 HYDROLOGY DESIGN AND CRITERIA

3.1 Hydrology Criteria

The existing and proposed condition hydrology calculations were prepared in conformance with the Orange County Hydrology Manual (OCHM), dated 1986 and its Addendum No. 1, dated 1996. The hydrology analysis and small area hydrograph were prepared using the Advanced Engineer Software (AES), a computer software approved by the Orange County Flood Control District that follows the hydrology methodology and criteria from the OCHM. For this analysis drainage area delineations were prepared following existing topography and proposed contours for each analysis, flow paths, areas, and elevation were determined, as well as hydrology characteristics such as soil group and land use. The rational method for the existing and proposed conditions for the 10-year and 100-year storm were prepared for the CCRA and DSA. The Small Area Hydrograph analysis was prepared for the 10-year and 100-year storm events for the DSA for basin design and analysis purposes. Per the OCHM, the Antecedent Moisture Content (AMC) is II for the 10-year storm event, and III for the 100-year storm event. Sections 4 and 5 provide detailed descriptions for the Existing Condition and Proposed Condition Hydrology analyses.

3.1.1 Rational Method

The OCHM uses the rational method to calculate peak runoff discharge from a drainage area. It utilizes the equation $Q=CIA$, where Q is discharge, I is intensity, and A is area. The RATSCX module of AES was used to analyze and route runoff through each subarea using elevations, slopes, flow lengths, soil group, land use and area inputs. The rational method analysis was prepared using the high confidence rainfall values as determined by the OCHM. The AES results provide peak discharge and time of concentration. The area being analyzed includes elevation below mean sea level which result in negative numbers. Due to limitations of AES for modeling purposes all elevations were raise by 1,000 to input into the models. Time of concentration and peak flow rates for the 10- and 100-year storm events were obtained.

3.1.2 Small Area Hydrograph

The Small Area Hydrograph (SAH) was prepared to analyze the proposed underground detention basins for the DSA. The SAH analyzes the basins' ability to reduce peak flow runoff for flood control purposes. Per the OCHM the SAH applies to watersheds smaller than 640 acres. This analysis was prepared using the FLOODSCX module of AES, which utilizes the time of concentration obtained from the rational method, the rainfall depth, the total tributary area and the loss rates (F_m and \bar{Y}) to calculate the watershed hydrograph. The hydrograph is then routed through the proposed basin using the stage-storage-discharge table and the outflow discharge hydrograph is obtained. The small area hydrograph was run for the 10-year and 100-

year storm events to analyze the capacity of the proposed basins and the flow through the storm drain system. The basin calculations and design are describe further in Section 5.1.1 of this report.

3.2 Soil Group and Land Use

3.2.2 Land Use

The DPH Commercial Core land use types consist mainly of commercial areas. The off-site drainage area to Storm Drain Line C includes the following classifications: commercial, 5-7 dwelling Units/acre, 8-10 dwelling Units/acre, 11+ dwelling Units/acre, apartments, condominiums, and public park land use. The delineation and determination for the off-site area land use types follows the Dana Point Harbor general land use plan and aerial imagery. Figure 6 is the Land Use Map.

Shapefiles were obtained for the Soil Types from NRCS and created for the Land Use in ArcGIS. Hydrology Boundaries were imported into ArcGIS, and the areas were overlaid and intersected to develop the off-site hydrology.

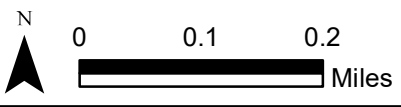
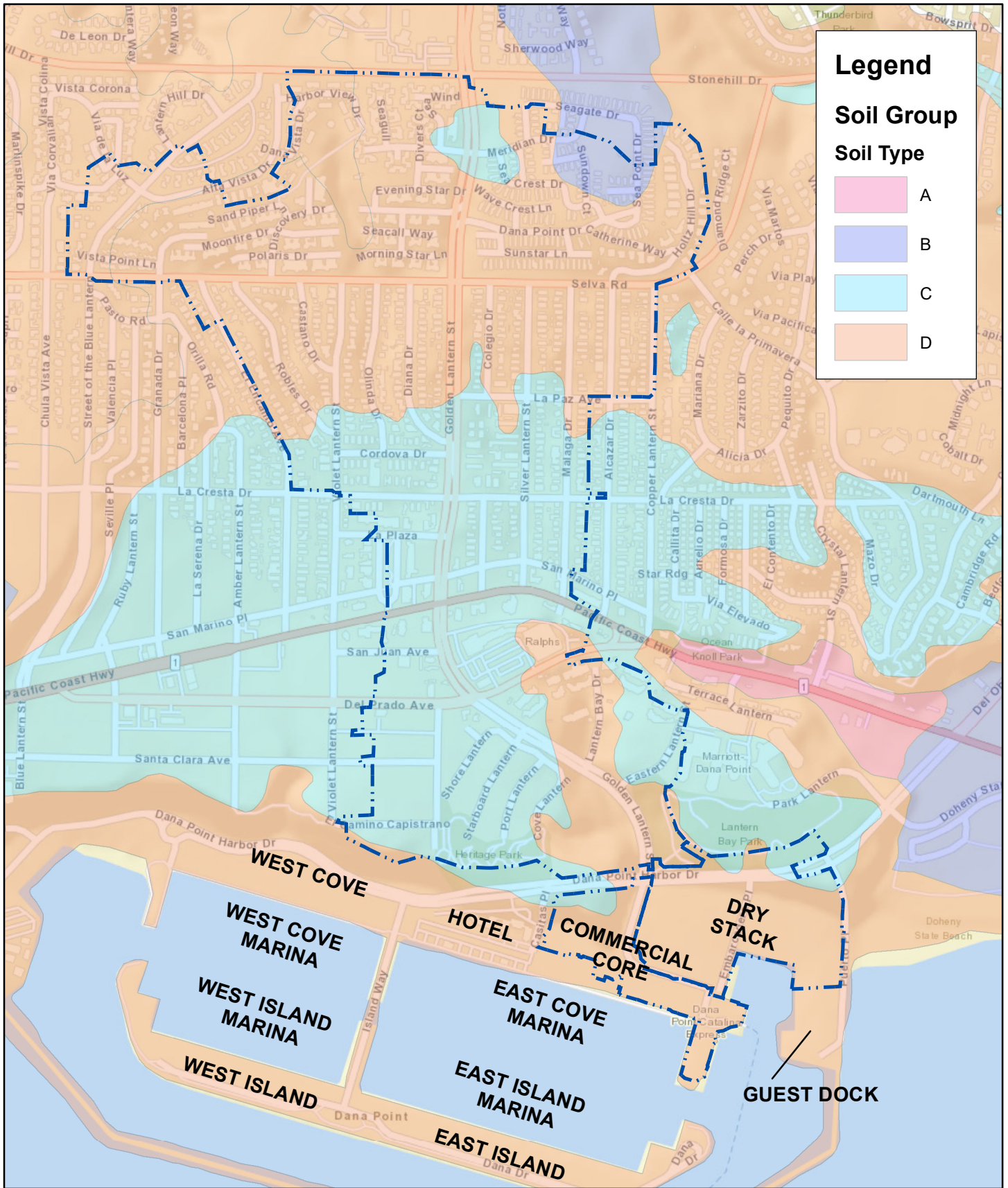
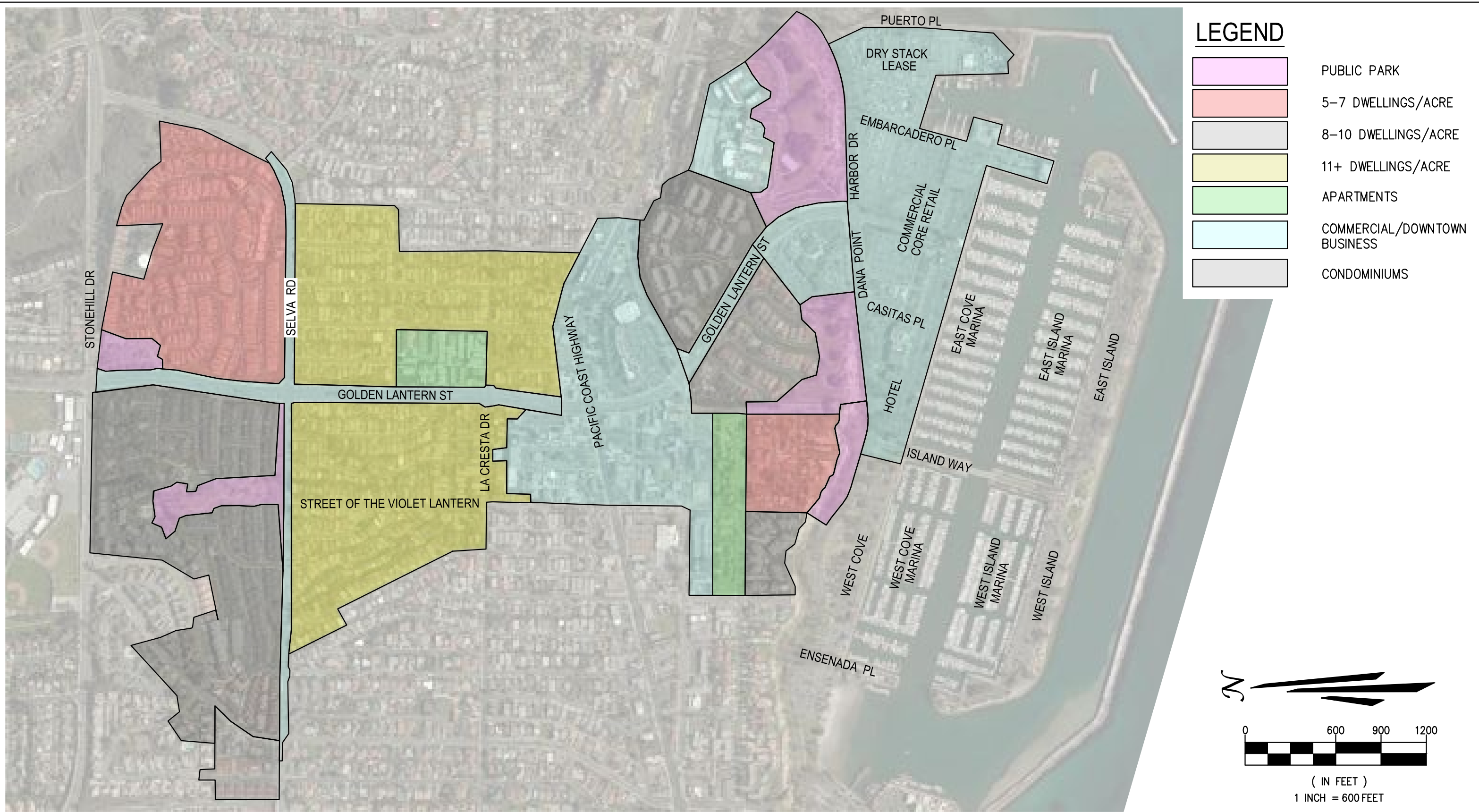
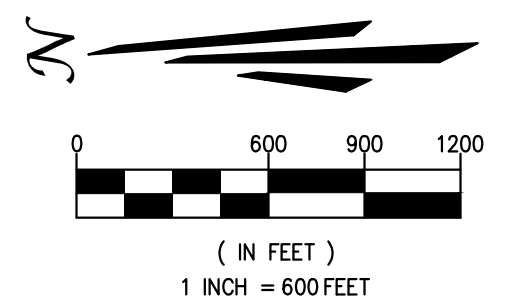


Figure 5 - Soil Group Map



LEGEND

- PUBLIC PARK
- 5-7 DWELLINGS/ACRE
- 8-10 DWELLINGS/ACRE
- 11+ DWELLINGS/ACRE
- APARTMENTS
- COMMERCIAL/DOWNTOWN BUSINESS
- CONDOMINIUMS



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FIGURE 6 - LAND USE MAP

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3.2.1 Soil Group

DPH is underlaid by artificial fills and marine deposits which overlay bedrock of the Capistrano Formation. The artificial fill materials consist of alternating layers of clayey sands, silty sands, sands, sandy clays, and sandy silts. The granular sands were found to be medium dense to dense and the fine-grained clay and silt materials were found to be predominantly firm to very firm. Marine deposit materials consist of wet, loose to medium dense, silty sands to sands. The Capistrano Formation bedrock consist of hard to very hard, fine to coarse-grained, massive sandstones with occasional beds of moderately hard to hard, gray to very dark gray claystones and siltstones.

The OCHM utilizes Hydrologic Soil Groups to develop the rational method calculations. Soils are classified as Hydrologic Soil Groups A, B, C and D. Soil group A is defined as a low runoff potential, group B has moderate infiltration rates, group C has slow infiltration rates, and group D has high runoff potential. The DPH Soil Groups were obtained from the National Resources Conservation Service (NRCS) online web soils tool. The majority of the on-site consists of groups C and D while the off-site consists of groups A, B, C, and D. Figure 5 is the Soils Group Map which includes the Soils Groups utilized for the project on-site and off-site drainage areas.

3.3 Regional Hydrology

DPH is located within the Dana Point Hydrologic Subarea of the San Juan Creek Hydrologic Unit, which is a part of the San Diego Basin. The Dana Point Harbor lies within the bounds of the Dana Point Coastal Streams Watershed, which drains to the Pacific Ocean. The almost fully developed watershed is 6 square miles and includes the cities of Dana Point, Laguna Beach Laguna Niguel and San Juan Capistrano. Included in the watershed are a number of coastal drains that discharge to the Pacific Ocean through DPH. Stormwater runoff from the site, sheet flows to different inlets that connect to underground storm drain lines that ultimately discharge to the Harbor through storm drain outlets located within the concrete stone revetment below the seawall.

The CCA includes the existing storm drain main Lines B and C which are 18- and 60-inch Reinforced Concrete Pipes (RCP), respectively. Line B bisects the DSA, while Line C bisects the CCRA. Both Line B and Line C receive off-site runoffs from the City of Dana Point. These lines discharge through Outlets 1 and 3 respectively. Line B receives a small portion of runoff from the bluffs north of the DSA and Line C receives stormwater runoff from a large off-site area consisting of residential and commercial developments within the City of Dana Point and north of Dana Point Harbor Drive. Section 4 provides more detail for these off-site drainage areas. Stormwater runoff from the proposed project areas discharges directly to the Ocean via several

County maintained and engineered storm drain systems or as stormwater runoff that sheet flows directly into the Ocean over the seawall.

SECTION 4 EXISTING CONDITION HYDROLOGY

The area being analyzed on this report consists of approximately 30 acres within the Dana Point Harbor. In the existing condition, some stormwater runoff sheet flows over the seawall, while the majority of the site's runoff is conveyed via curb opening catch basins and grated inlets into the existing County storm drain systems. There are five existing storm drain systems that service the study area: one 18-inch outlet under the seawall and one 6-inch outlet through the seawall at the southern edge of the DSA and three outlets (two 15-inch, and one 60-inch) under the seawall at the southern edge in the CCRA. These Outlets were built through the concrete stone revetment located under the existing seawall. The 6-inch outlet is a perforation found during a field visit that does not have documented as-builts, and its located 2.2-feet below the top of the seawall. Drainage areas to each outlet were delineated to obtain peak discharges for the 10-year and 100-year storm events. Hydrology maps of the existing condition that were utilized for this study are included on *Appendix A*, and the AES Rational Method Results are included in *Appendix C*. Figure 7 Existing Condition Drainage Areas highlights the drainage area tributary to each outlet and exhibits the existing storm drain. The sections below provide drainage area descriptions to each outlet and Table 1 is the Peak Flow Summary.

4.1 Dry Stack Lease Area Outlets

- **Outlet 1- Storm Drain Line B**

Outlet 1 is located southeast of Embarcadero Place and outlets to the ocean under the seawall through the concrete stone revetment. In the existing condition, approximately 20.1 acres are tributary to this outlet: 15.7acres on-site and 4.4acres off-site. Existing Storm Drain Line B an 18-inch RCP as shown in the Dana Point Harbor as-builts (*Appendix K*) connects and discharges through this outlet. The off-site drainage area to Outlet 1 consist of a portion of Dana Point Harbor Drive, Puerto Place, Heritage Park and the bluffs north of Dana Point Harbor Drive. The off-site subareas encompass approximately 4.37acres. The on-site drainage area consists of dry boater storage parking and a Boater Services Building that sheet flow to existing catch basins and a 14-inch wide trench drain. The 14-inch trench drain is located at the top of the boater launch ramp and receives runoff from the boater parking lot. The existing trench drain has capacity to capture the 10-year storm event flows, higher year storm event flows will by-pass the trench drain and sheet flow directly into the Ocean (*Appendix N* provides the analysis for the trench drain capacity). The 10- year and 100-year storm event peak discharge to this outlet are 48.46 cubic feet second (cfs) and 76.15cfs respectively.

- **Outlet 2**

Outlet 2 is located through the eastern seawall face in the DSA. In the existing condition, approximately 1.7 acres are tributary to this Outlet which connects to a 26-inch by 26-inch grated inlet. Stormwater discharges through a 6-inch PVC pipe perforation at the seawall approximately 2-feet below top of seawall. The off-site drainage area tributary to Outlet 2 consists of a portion of the adjacent Shipyard Lease Area. Stormwater from the off-site area sheet flows under an existing chain link fence into a V-Gutter, and ultimately is conveyed to the grated inlet. The on-site drainage area includes a portion of the existing dry boater storage parking. The 10-year and 100-year storm event peak discharge to this outlet are 4.75cfs and 7.29cfs respectively.

4.2 Commercial Core Retail Area Outlets

- **Outlet 3 –Storm Drain Line C**

Outlet 3 is located in the eastern portion of the East Cove Marina and outlets to the ocean under the seawall through the concrete stone revetment. Storm Drain Line C is an existing 60-inch RCP that connects to Outlet 3 as shown in the Dana Point Harbor as-built (Appendix K). In the existing condition, approximately 245 acres are tributary to this outlet. The majority of the tributary area (approximately 237 acres) is off-site with existing RCP storm drain lines that range from 33-inch to 60-inch. Appendix A provides the off-site existing condition hydrology map for Outlet 3. The total on-site drainage (Subarea H) has a tributary area of 7.75 acres, and consists of: paved parking lots, commercial buildings, walkways, restaurants, retail spaces and Golden Lantern Street. Stormwater runoff from these areas sheet flow through the parking lot, are collected via storm drain inlets, and connect to the existing 60-inch RCP via storm drain laterals. Stormwater runoff that is not collected through the existing inlets will sheet flow over the existing boardwalk into the Ocean. The 10-year and 100-year storm event peak discharges to this outlet are 356.23cfs and 575.46cfs respectively.

- **Outlet 4**

Outlet 4 is located below the south facing seawall for the East Cove Marina, immediately adjacent to the west seawall of Dana Wharf. In the existing condition, approximately 3.40 acres are tributary to this outlet via an existing 15-inch RCP storm drain line (see as-built in Appendix K). The drainage area consists of Dana Wharf parking lot, building areas, and the parking lot north of the Dana Wharf. Stormwater is collected via grated and curb opening catch basins. The 10-year and 100-year storm event peak discharge to this outlet are 9.06cfs and 13.84cfs respectively.

- **Outlet 5**

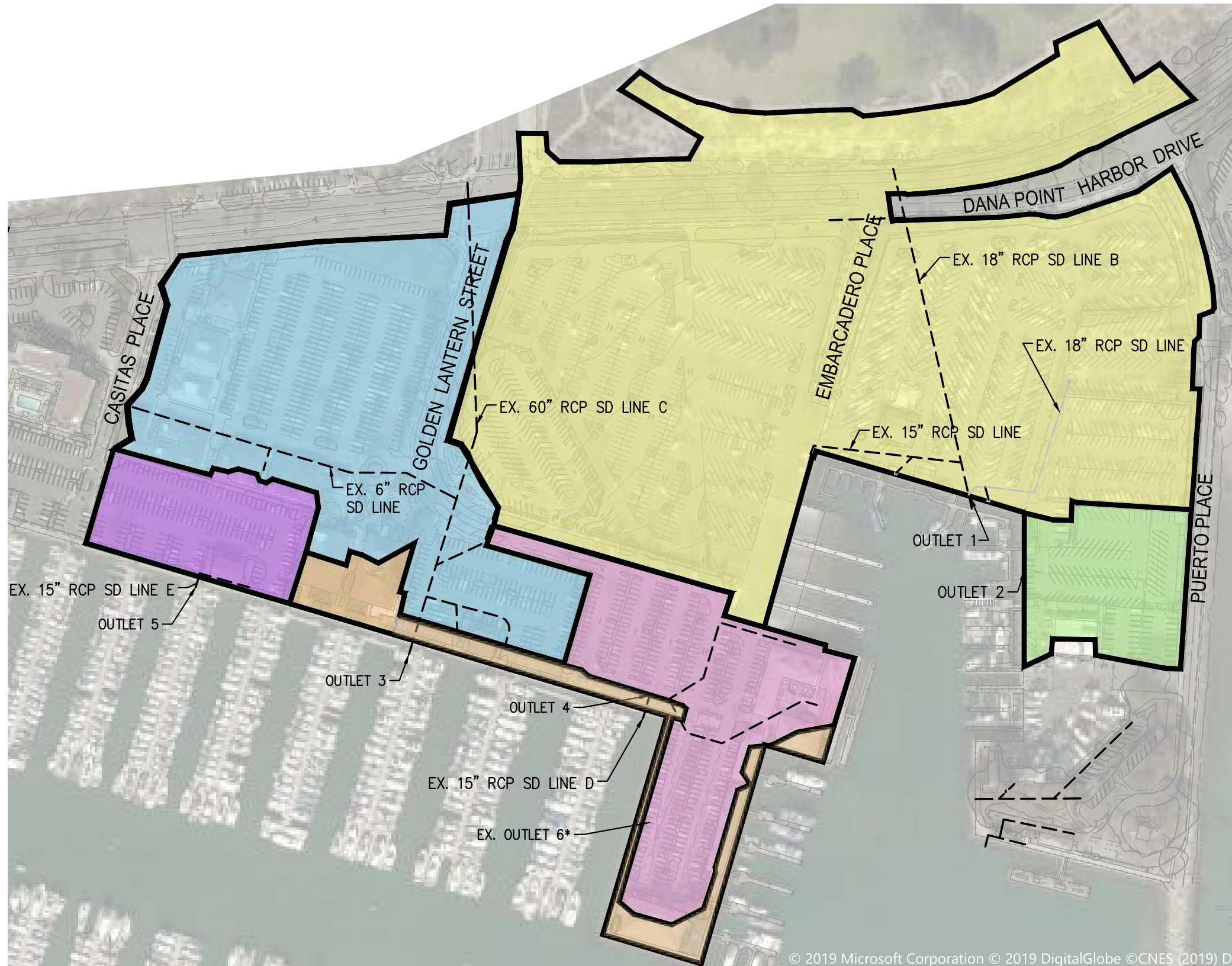
Outlet 5 is located in the center of the East Cove Marina, west of Outlet 3. In the existing condition, approximately 1.55 acres are tributary to this outlet via an existing 15-inch RCP storm drain system (see as-builts in *Appendix K*). The drainage area consists of the eastern portion of the East Marina parking lot and a boater services building. The 10-year and 100-year storm event peak discharge to this outlet are 4.98 cfs and 7.61 cfs respectively.

- **Outlet 6 - Direct Discharge to the Ocean**

Portions of DPH sheet flow directly to the Ocean over the seawall. These areas along the seawall include the boardwalk, patio eating area, and roof runoff from adjacent buildings along Dana Wharf. This drainage area includes approximately 0.44 acres and has 10-year and 100-year storm event peak discharge of 1.6 cfs and 2.44 cfs respectively.

Table 3: Existing Condition and Peak Flows Summary

Outlet	Area (AC)	10-year peak (cfs)	100 year peak (cfs)
1	20.1	48.46	76.15
2	1.7	4.75	7.29
3	252.75	356.23	575.46
4	3.4	9.06	13.84
5	1.55	4.98	7.61
6	0.44	1.6	2.44



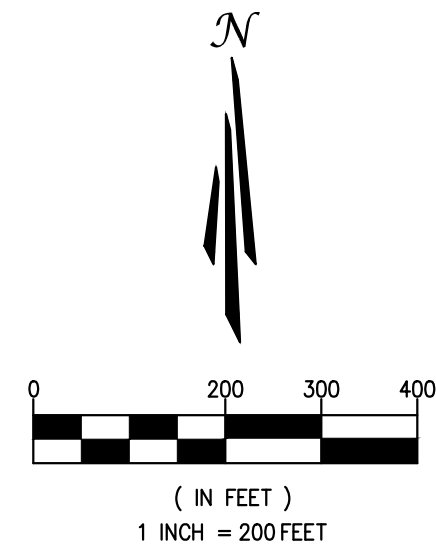
OUTLETS EXISTING CONDITIONS			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	20.1	48.46	76.15
2	1.7	4.75	7.29
3	252.75	356.23	575.46
4	3.4	9.06	13.84
5	1.55	4.98	7.61
6	0.44	1.6	2.44

LEGEND

- TRIBUTARY TO OUTLET 1
- TRIBUTARY TO OUTLET 2
- ONSITE TRIBUTARY TO OUTLET 3**
- TRIBUTARY TO OUTLET 4
- TRIBUTARY TO OUTLET 5
- TRIBUTARY TO OUTLET 6 *
- WATERSHED AREA BOUNDARY
- EXISTING STORM DRAIN LINE

NOTES

- * SHEET FLOW DIRECTLY TO HARBOR
- ** ONLY ON-SITE TRIBUTARY AREA TO OUTLET 3 SHOWN



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FIGURE 7 - EXISTING CONDITION DRAINAGE AREAS
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SECTION 5 PROPOSED CONDITION HYDROLOGY

The proposed condition hydrology analysis was prepared for Outlets 1, 2, 3, 4, 5 and 6 for the 10-year and 100-year storm events. The proposed drainage design follows existing condition drainage patterns except within the areas draining to Outlets 1 and 3. The area tributary to Outlet 3 is increasing and the area tributary to Outlet 1 is decreasing. This change occurs for two reasons:

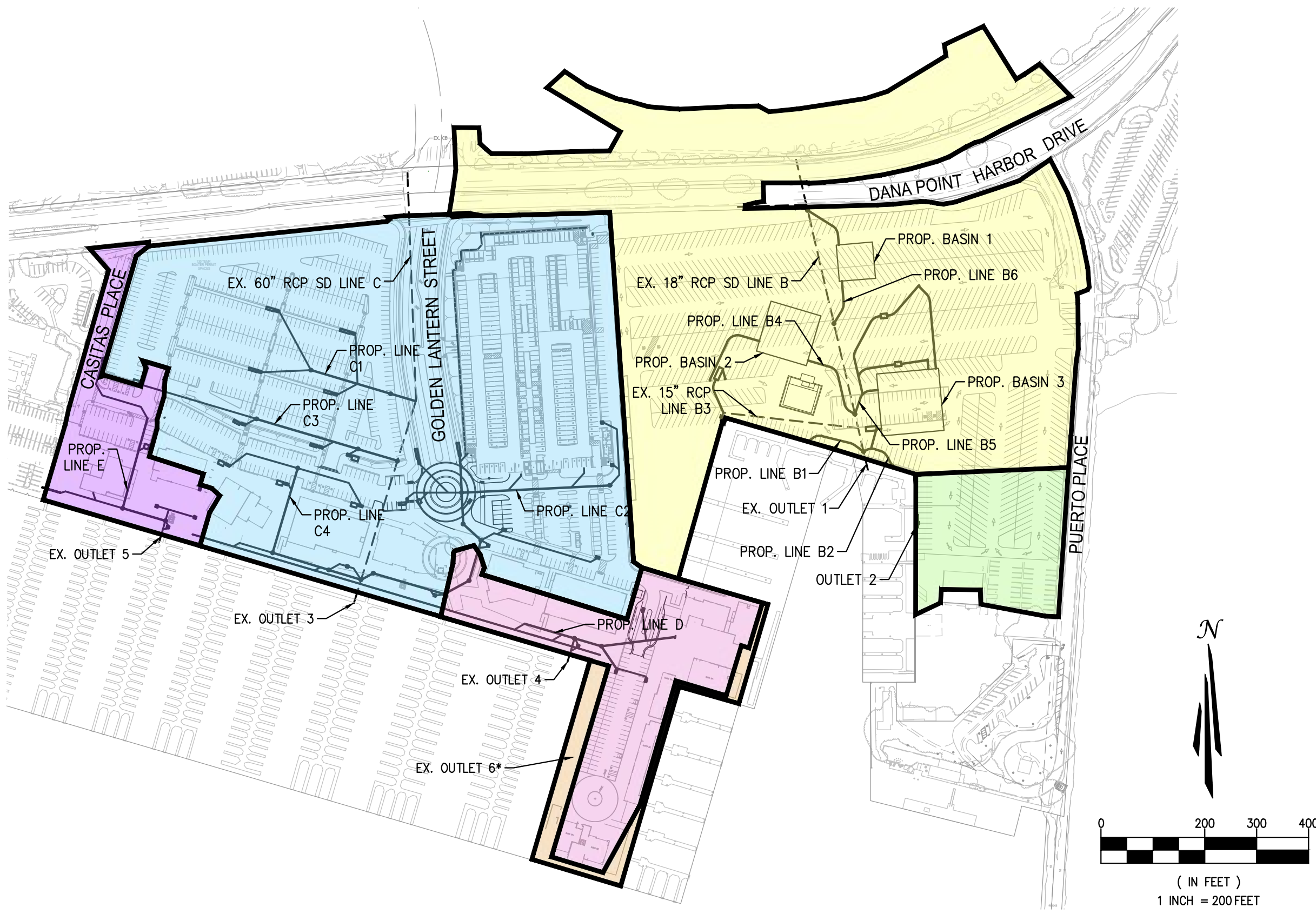
1. The existing 18-inch RCP storm drain Line B that is tributary to Outlet 1 (see Section 6 for detailed description) does not have sufficient capacity to convey the 10-year storm event flows.
2. The leasing boundary changes associated with the DSA and CCRA sites result in modifications to the existing parking lot area where the proposed 3-level parking structure will be constructed as part of the CCRA.

This change results in adding approximately 5 acres of drainage area to storm drain Line C. In the DSA, proposed detention basins are planned to reduce potential flooding and relieve storm drain flow through Line B (Section 5.1.1 provides Basin Design details). *Appendix B* provides the proposed condition hydrology maps, and *Appendix D* includes the AES RM and SAH Results for the 10- and 100-year storm events. Figure 8 includes a map with the overall drainage areas contributing to each of the existing Outlets in the proposed condition. The sections below provide drainage area descriptions for each Outlet and Table 8 lists a peak flow summary for the proposed condition.

5.1 Dry Stack Lease Area

- **Outlet 1 - Storm Drain Line B (18-inch RCP)**

Existing Outlet 1 will remain. Existing off-site drainage will continue to drain to Line B. In the proposed condition, three on-site detention basins will provide relief to Line B which is deficient in the existing condition (See Section 6.6). To better accommodate on-site stormwater runoff, a proposed diversion manhole will be constructed to divert off-site flows to Detention Basin 1, and Detentions Basin 2 and 3 are designed to receive on-site stormwater runoff. These three basins will detain runoff and slowly release it via a controlled outlets to Line B (Section 5.1.1 discusses the proposed detention basin analysis design). In the proposed condition, stormwater runoff from the proposed day-use, trailer and vehicle parking will sheet flows and be collected through several proposed 4-foot wide concrete gutters that will direct water to proposed inlets. These inlets will connect to proposed storm drain lines that ultimately will connect to Line B.



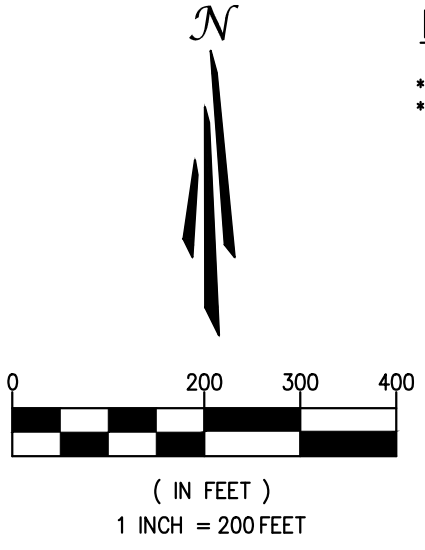
PROPOSED CONDITION DISCHARGE SUMMARY			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	15.01	9.76	29.42
2	1.66	4.25	6.63
3	259.40	374.28	602.02
4	3.00	8.86	13.53
5	1.80	6.05	9.20
6	0.58	2.04	3.11

LEGEND

- TRIBUTARY TO OUTLET 1
- TRIBUTARY TO OUTLET 2
- ONSITE TRIBUTARY TO OUTLET 3**
- TRIBUTARY TO OUTLET 4
- TRIBUTARY TO OUTLET 5
- TRIBUTARY TO OUTLET 6 *
- WATERSHED AREA BOUNDARY
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- PROPOSED BASIN
- PROP. PROPOSED
- EX. EXISTING

NOTES

- * SHEET FLOW DIRECTLY TO HARBOR
- ** ONLY ON-SITE TRIBUTARY AREA TO OUTLET 3 SHOWN



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FIGURE 8 - PROPOSED CONDITION DRAINAGE AREAS

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Some of these proposed inlets will also serve as diversion structures to direct stormwater runoff to water quality treatment systems as described in Section 7. The existing 14-inch trench drain will remain in place. The total tributary area to Line B is 15.0 acres and the 10-year and 100-year unmitigated peak discharge to this outlet is 38.14cfs and 58.93cfs.

- **Outlet 2 (6-inch PVC Outlet)**

Existing Outlet 2 will remain. In the proposed condition, approximately 1.69 acres are tributary to a proposed low point with a proposed storm drain grated inlet that will be sized to capture up to the 25-year storm event. The off-site drainage from the Shipyard Lease Area will continue to be directed via a concrete swale or gutter to the new proposed inlet. The 10-year and 100-year peak discharge to this Outlet are 4.75 cfs and 7.29 cfs.

5.1.1 Detention Basin Design

The DSA proposed underground Detention Basins were designed to detain stormwater runoff for the proposed condition 10-year storm event. These underground basins are proposed to be ADS StormTech Units SC-310 and SC-160LP. The DSA improvements do not include increasing the size of the existing 18-inch storm drain Line B and its outlet under the seawall. Line B is under capacity in the existing condition as discussed in this report. To reduce potential flooding within the DSA stormwater runoff will be hold using these proposed detention basins and slowly released to Line B. There are three proposed Detention Basins. Basin 1 received flows from the off-site areas, Basin 2 receives stormwater flows collected from the western portion of DSA, and Basin 3 receives stormwater flows collected from the eastern portion of DSA and street runoff from Puerto Place. The areas draining to Basins 2 and 3 were maximized considering the physical constraints due to the existing conditions, and it was found that additional flows needed to be detained. Basin 1 was included to the proposed condition improvements to provide better capacity for Line B, and reduce chances of surface flooding.

The Detention Basin analysis was prepared using the AES SAH which routes subareas hydrographs through basins and analyzes confluences. Ultimately it provides the peak discharges at storm drain Line B. This analysis was run for the 10-year and 100-year storm events. The flow diversion calculations for the proposed diversion manhole located upstream of Basin 1 were prepared using the flow-by pass analysis in AES. The flow is then routed through Basin 1. *Appendix D* provides a summary table of the calculations prepared to determine the discharge at each stage for the proposed diversion.

For Detention Basins 1, 2 and 3 a stage-storage-discharge was calculated using the area and depth to calculate volume and the orifice and weir equations to calculate flow discharge. The discharge will occur through an orifice located at a downstream manhole for each basin. Due to limitations of the AES software modeling, in order to account for the flow continuation and passage of the 100-year storm event analysis, a weir flow calculation was added to Basins 1 and 3. This allows the basin model to calculate the storage of water and the flow through of the peak 100-year discharge. However, during a 100-year storm event flow the basin will get full and water will back into the storm drain line, and possibly pond above surface as describe on Section 6.3 Table 2 summarizes the size and type of basin being used. Tables 3, 4 and 5 provide the stage-storage-discharge for Basins 1, 2 and 3 respectively, and Table 6 summarizes the 10-year and 100-year discharges for the SAH analyses.

Table 4: Proposed Detention Basin Summary

Basin	Type	Size (ftXft)	Area (ft ²)	Volume (ft ³)	Chamber Height (inch)
1	SC-310	70X70	4,900	10,245	16
2	SC-160LP	150X150	22,500	22,733	12
3	SC-160LP	120X120	14,400	14,549	12

Table 5: Stage-Storage-Discharge Detention Basin 1

Stage	Depth (ft)	Cumulative Storage (ac-ft)	Discharge* (cfs)
1	0	0.000	0.00
2	0.25	0.024	0.47
3	0.5	0.036	0.67
4	1	0.108	0.95
5	1.5	0.170	1.16
6	1.8	0.199	1.27
7	2	0.211	1.34
8	2.33	0.235	1.44
9	3.5	0.235	16.96**

*Discharge for 6-inch orifice.
 **Discharge for 6-inch orifice plus 4-foot weir.

Table 6: Stage-Storage-Discharge Detention Basin 2

Stage	Depth (ft)	Cumulative Storage (ac-ft)	Discharge* (cfs)
1	0	0.000	0.00
2	0.25	0.052	0.64
3	0.5	0.140	0.91
4	0.75	0.241	1.11
5	1	0.331	1.29
6	1.25	0.400	1.44
7	1.5	0.453	1.58
8	1.83	0.522	1.74
*Discharge for 7-inch orifice.			

Table 7: Stage-Storage-Discharge Detention Basin 3

Stage	Depth (ft)	Cumulative Storage (ac-ft)	Discharge* (cfs)
1	0	0.000	0.00
2	0.25	0.033	0.84
3	0.5	0.090	1.19
4	0.75	0.154	1.46
5	1	0.212	1.68
6	1.25	0.256	1.88
7	1.5	0.290	2.06
8	1.83	0.334	2.27
9	3.2	0.334	22.25**
*Discharge for an 8-inch orifice. **Discharge for an 8-inch orifice plus 4-foot weir.			

Table 8: Outlet 1 Proposed Condition Peak Flows Summary

10-Year Unmitigated Peak Discharge (cfs)	10-Year Mitigated Discharge Peak (cfs)	100-Year Unmitigated Peak Discharge (cfs)	100-Year Mitigated Peak Discharge (cfs)
38.14	9.76	58.93	29.42

5.2 Commercial Core Retail Area

The proposed drainage for the CCRA consist of three main watershed boundaries that drain to Outlets 3, 4 and 5 under the seawall and an small area that sheet flows over the seawall around the Dana Wharf.

- **Outlet 3 (60-inch RCP) – Storm Drain Lateral C1 to C4**

Existing Outlet 3 will remain located in the eastern portion of the East Cove Marina. In the proposed condition, four main laterals are being proposed that convey runoff to Line C and separate connections to Line C are proposed. Laterals C1 and C3 consist of surface pavement runoff from the northern parking areas between Casitas Place and Golden Lantern Street. Runoff from the parking lot will be collected at low points where stormwater will be treated via biofiltration and collected into the storm drain system. Lateral C2 receives runoff from Golden Lantern Street, the proposed 3-level parking structure, the surface paved parking area south of the parking structure, buildings 6 and 7 roofs, and building 8 with portions of the boardwalk south of building 8. Lateral C4 collects runoff for paved surfaced parking in front of building 11, building 9 and 10 roofs, and portions of the boardwalk south of building 9 and 10. The total on-site has a tributary area of 14.1 acres to the existing 60-inch storm drain system. A summary of the areas contributing and peak flows for each of the proposed laterals connecting to Line C is listed below on Table 7.

Table 9: Storm Drain Line C Proposed Condition Peak Flow Summary

Lateral Name	Area (AC)	10-Year Peak Discharge (cfs)	100-Year Peak Discharge (cfs)
Lateral C1	2.2	6.17	9.44
Lateral C2	7.6	18.63	28.85
Lateral C3	2.2	6.75	10.41
Lateral C4	2.1	5.84	9.03

As described in Section 4, a large off-site areas from the City of Dana Point contributes to Line C. In the proposed condition, the total area tributary to Line C is 259.4 acres (which includes an additional 6.65 acres) , and the 10-year and 100-year storm events peak discharge are 374.28cfs and 602.02cfs, respectively. There is an increase of 18.05cfs and 26.56cfs for the 10-year and 100-year storm events peak discharge, respectively. Approximately 5% increase in peak discharge for the 10-year, and 4.6% for the 100-year storm event. A discussion regarding the capacity and hydraulic design of Line C is provided in Section 6.

- **Outlet 4 – Storm Drain Line D (15-inch RCP)**

Existing Outlet 4 will remain located northeast of the East Cove Marina, immediately adjacent to the Dana Wharf and directly south of proposed Building 6. In the proposed condition, Outlet 4 receives runoff from the boardwalk south of Building 6 and 7 and the redeveloped Dana Wharf. Approximately 3.0 acres are tributary to a proposed storm drain system that discharges into the existing 15-inch outlet. The 10-year and 100-year peak discharge to this Outlet are 8.86cfs and 13.53cfs, respectively. This is a reduction from the existing peak flows at this outlet of 0.2cfs for the 10-year and 0.31cfs for the 100-year storm event.

- **Outlet 5 – Storm Drain Line E (15-inch RCP)**

Existing Outlet 5 will remain located center of the East Cove Marina and southwest of the CCRA. In the proposed condition, Outlet 5 receives runoff from Casitas Place, Building 12, southern portion of Building 11 roof, and the boardwalk south of Buildings 11 and 12. Approximately 1.8 acres are tributary to a proposed storm drain system that discharges into the existing 15-inch RCP outlet. The 10-year and 100-year peak discharge to this outlet are 6.05cfs and 9.26cfs, respectively. This is a small increase from the existing condition peak flows at this outlet of 0.25cfs for the 10-year and 1.65cfs for the 100-year storm events.

- **Outlet 6 – Direct Discharge to the Ocean**

It is anticipated that several small areas surrounding the buildings along Dana Wharf will directly discharge stormwater runoff into the harbor via flow over the existing seawall. This area (Drainage Area Outlet 6) consists of 0.58acres with 10year peak flows of 2.04cfs and 3.11cfs for the 100 year storm event.

Table 10: Proposed Condition Peak Flows Summary

Outlet	Area (AC)	10 Year peak (cfs)	100 Year Peak (cfs)
1	15.01	9.76	29.42
2	1.66	4.25	6.63
3	259.4	374.28	602.02
4	3.0	8.86	13.53
5	1.8	6.05	9.20
6*	0.58	2.04	3.11

*Sheet flow directly into the Ocean.

SECTION 6 HYDRAULIC DESIGN

6.1 Hydraulic Criteria and Methodology

This MPD analyzed the hydraulic capacity of the existing storm drain systems for both the existing and proposed conditions, the new proposed storm drain system, surface flooding capacity, and the water quality (low-flow) storm drain system. The DPH proposed storm drain facilities include on-site storm drains systems, curb-side and grated inlets, Bioclean Modular Wetland Units (MWS), Jensen StormSafe Filters, underground detention basins, and diversion structures. The MPD provides preliminary hydraulic calculations for the proposed storm drain system main lines, analyses site drainage design, and sets a basis for future storm drain design for each construction phase of the Dana Point Harbor Revitalization Project. The construction phasing is detailed in Section 6 of this report. The MPD hydraulic calculations follow the criteria and requirements set forth by the Orange County Local Drainage Manual (LDM), dated January 1996. Per Chapter 1 of the LDM protection levels for proposed development follow the criteria below:

- Structures: provide 100-year storm event protection for all habitable structures.
- General Criteria: storm drains with tributary areas of less than 640 acres are to be designed for a minimum of a 10-year storm event below top of curb, using a combination of street and storm drain flow. In sump conditions, catch basins and the connecting storm drain should be design for a 25-year storm event.
- Hydraulic Grade Line (HGL) – Freeboard: a design HGL of at least 0.5-feet below the street gutter flow line shall be provided within catch basins where the entire system is being design. For preliminary studies the HGL of the storm drain mainline shall be at least 2-feet below the street gutter flow line. This MPD does not include inlet design. Future studies to be provided at each phase of construction, shall include catch basin sizing following this criteria.

All proposed storm drain main lines for the DPH CCA should be design for the 10-year storm event. The CCA is in a flow by condition, since flows will pond up to the top of curb and sheet flow through walkways and into the Ocean. The proposed inlets should be sized using the 25-year storm event discharge. The CCA is not in a sump condition, due to being immediately adjacent to the Ocean with sufficient clearance from the top of the wall to the sea water level.

The Water Surface Pressure Gradient (WSPGW), a software developed by the Los Angeles County Flood Control District and approved by the County of Orange was utilized to calculate the HGL for the existing and proposed storm drain lines. WSPG uses the Bernoulli equation to calculate the HGL for each storm drain line utilizing the flow and the boundary conditions.

DPH is located immediately adjacent to the Ocean, all existing storm drain outlets were built under the seawall through the concrete stone revetment (excluding Outlet 2). The Outlet inverts are below mean sea level, with the exception of Outlet 2 which is approximately 2.2-feet below the top of the seawall. Thus, all storm drain systems are controlled downstream by the seawater elevation, which varies due to tidal influence. Section 6.2 describes the sea level conditions at DPH. Seawater is expected to backflow into the storm drain system, as it does in the existing condition, and it is considered in the hydraulic calculations by setting the downstream surface water elevation at the appropriate elevation for each analysis prepared:

- Mean High Water (MHW) 10-year storm event: this analysis is used as the basis for storm drain line design.
- Mean Higher-High Water (MHHW) plus 2-feet 10-year storm event: this analysis is the considered the worst condition analysis. It includes the Sea Level Rise Condition
- Mean High Water (MHW) 100-year storm event.

These analyses were prepared for the CCRA storm drain Lines C, C1, C2, C3, C4, D and E and for the DSA storm drain Lines B, B1, B2, B3, B4, B4.1, B5, B5.1, and B6. Section 6.6 describes the results of this analysis.

6.1.1 Future Hydraulic Analysis

Future Hydrology and Hydraulic Basis of Design Reports for each construction phase of the DPH CCA Revitalization project, shall follow the MPD hydraulic design criteria and overall drainage plan, and will include the following additional analyses:

- Design of storm drain inlet based on the 25-year storm event.
- Surface flooding analysis for the 100-year storm event MHHW downstream condition.
- Protection of all structures from the anticipated 100-year storm event flows by setting finished floor pads above the flooding elevation and providing adequate flow pathways between proposed buildings.
- Design by-pass structures to divert low-flows for water quality treatment and stormwater conveyance through the storm drain main lines.

6.2 Sea Level Rise

DPH storm water runoff discharges are influenced by the sea water levels. Tidal changes occur throughout the day, with the moon cycles and due to tectonic forces. The majority of the project areas' storm drain outlets are located below the mean sea water level (estimated to be

+2.5-feet for DPH) causing the storm drain system to incur in sea water intrusion which limits the hydraulic capacity of the storm drain lines. In order to determine sea water levels the NOAA Tides/Water Levels for La Jolla Monitoring Station were obtained (see *Appendix G*). The datum change between La Jolla Monitoring Station and NAVD88 is -0.19-feet. Per NOAA the following are the calculated tidal water levels averages to be used for design:

- Mean Sea Level (MSL) is at $2.73' - 0.19' = 2.54$ -feet.
- Mean High Water (MHW) is at $4.6' - 0.19' = 4.41$ -feet.
- Mean Higher-High Water (MHHW) is at $5.32' - 0.19' = 5.13'$.

The United States Army Corps of Engineers and California State Agencies have issued general guidance provisions to incorporate sea level rise into the design of federal or state agency coastal projects. Per the Dana Point Harbor Revitalization Preliminary Shoreline Management Plan, prepared by Project Dimensions and dated March 2014 (*Appendix O*) Ocean water levels in South Orange County are influenced by the global climatic oscillations. The sea level rise for southern California areas locate south of Cape Mendocino, are projected to rise 2- to 12-inches by 2030, 5- to 24-inches by 2050 and 17- to 66-inches by 2100. Per the State of California Sea-Level Rise Guidance probabilistic projections for the height of sea level rise depend on the greenhouse gas emission projections. Up to 2050 using different emission scenarios there are minor result differences, and after 2050 different emission scenarios result in significant sea level rise. For projects with a life span to 2050 under a high-emission scenario the State recommends the use of low projection sea level rise at 1.1-feet, medium risk projection at 1.9-feet, and extreme risk projection at 2.7-feet.

For this MPD and for future Hydrology and Hydraulic Basis of Design Analysis for the DPH CCA the downstream condition using the MHHW plus 2-feet to account for sea level rise will be analyzed. This would set the sea level for MHHW at 7.13-feet. This is a conservative approach analysis considering that there is a level of uncertainty in sea level rise projections. It is important to note that the existing DPH was built approximately 50-years ago, and planning for Revitalization has been under way for the last 20-years. Thus, it is expected and anticipated that throughout the life-span of the project (anticipated to be the entire 66-year D&M Lease Term) some future improvements will occur to DPH as additional analysis of sea rise impacts are undertaken.

6.3 100-Year Flood Analysis

Currently the proposed building finish floor elevations for new buildings within the CCRA (Buildings 6-12) are set at 12.5-feet elevation. This elevation is 3-feet above the top of the existing seawall which is at 9.5-feet on average (based on TAIT Field Surveys). For this MPD an exhibit is provided in *Appendix P* that delineates the areas in which 100-year ponding may

occur, anticipates flowpaths and corridors through the buildings, and sheet flows over the existing seawall are outlined. This analysis is based on an assumed level for the 100-year storm event flows with a MHHW level (5.13-feet), plus 2-feet (sea level rise projection) of 7.13-feet.

It should be noted that County Maintenance Staff have not recorded any flooding issues at DPH throughout its current life span. The Laguna Beach Audubon rain gage data was obtained from the Orange County website. This rain gage is the closest to DPH with records since 1928. The highest rain event recorded was in December 6, 1997 with a total rain depth of 5.5-inches, which per the OCHM is considered a 100-year storm event. The NOAA tidal records for the La Jolla station for the same date, measured the highest sea level at 5.07-feet and the day after at 5.62-feet. No damages to structures or flooding issues were recorded during that storm event or that year. The rain season of 1997- 1998 was an El Nino season with some of the highest ever recorded rainfall.

6.4 Groundwater Influences

Per the Seismic Hazard Zone Report for the Dana Point Quadrangle, dated 2001, the historical high groundwater elevation at DPH is located 5-feet below ground surface (bgs). Per the Geotechnical Findings and Preliminary Geotechnical Design Considerations and Recommendations Dana Point Harbor Revitalization, prepared by GMU Geotechnical Inc., dated December 2018, the existing groundwater at the CCA was found between approximately 3- to 15-feet bgs. In addition, at the Harbor groundwater elevations fluctuate with tidal variations. *Appendix I* provides a figure that depicts anticipated groundwater level across the CCA based on recent geotechnical borings for DPH. During final design of the proposed storm drain system design considerations shall be considered for any infrastructure that will be located within groundwater (which shall include the use of water tight joints and concrete pipe).

6.6 Hydraulic Results

6.6.1 Dry Stack Lease Area

- **Storm Drain Line B**

Storm Drain Line B is an existing 18-inch RCP that begins north of Dana Point Harbor Drive and extends into DPH. It crosses the street east of Embarcadero place and runs under the paved surface parking areas. Two laterals (15-inch and 18-inch) connect to Line B at the southern end. This connection was observed during a recent TAIT field visit and record documents on these lines are not available. Line B discharges to the Ocean through Outlet 1 (at approximately elevation -4.3). In the existing condition,

this storm drain line is under capacity based on the calculated existing 10-year stormwater runoff flow.

In the proposed condition, the existing connections at the southern end will remain. Two new laterals will connect to this line under the surface parking areas. Immediately south of Dana Point Harbor Drive a new diversion storm drain manhole is proposed to divert flow to a proposed underground detention basin. Flows from this Detention Basin will be slowly released back to Line B. The WSPG analysis was prepared for the existing and proposed conditions and the results are provided in *Appendix F*, the storm drain profiles including the HGL show that with the proposed diversion and the three proposed detention basins, Line B will not be under pressure and the HGL will be within the existing 18-inch storm drain pipe. Additional proposed laterals B1, B2, B3, B4, B4,1, B5, B5,1 and B6 were analyzed to determine the HGL at these proposed lateral connections. All proposed storm drain lines were found to have sufficient capacity. For the 100-year MHW analysis it is noted that the HGL is above the storm drain pipe at some locations and the resulting ponding of stormwater will result in stormwater runoff overflowing the existing seawall directly into the Ocean.

- **Storm Drain Line A**

Storm drain Line A is a new proposed short storm drain lateral line that will connect at a proposed grated inlet to the existing storm drain for Outlet 1. Flows will be collected via a grated inlet and will discharge to the Ocean via an existing 6-inch perforation through the seawall. Future studies, will analyze the feasibility to use a pump system to serve a low flow treatment configuration. All overflows exceeding the required treatment volume and the capacity of the 6-inch outlet pipe will pond and flow over the proposed grated inlet and into the Ocean following the existing condition drainage patterns.

6.6.2 Commercial Core Area

- **Storm Drain Line C**

Storm drain Line C consists of the existing 60-inch RCP line that crosses the Harbor at the Commercial Retail Area (CCRA) and discharges at Outlet 3. The 10-year and 100-year storm event discharge for the existing and proposed condition were analyzed and presented herein. The sizes and slopes of the existing Line C used on this study were determined based on as-built plans and field verifications where possible (using the opening at the existing storm drain manholes and catch basins within the Harbor were dip to obtained existing invert information). There are four main laterals that are

proposed to connect to the existing Line C. These laterals vary in size from 12-inch to 44-inch RCP (pipe material was assumed for these laterals and all proposed storm drain laterals). The existing invert elevation of the main Line C is at 7.2 below sea level (-7.2). Since the MHW was used as a downstream control for the 10-year storm event, pressure flow is prevalent in the existing line. The proposed storm drain laterals were design to connect to Line C at different elevations to allow 3-feet to 4-feet between the 10-year Hydraulic Gradient Line (HGL) and the proposed ground surface elevation. There are a few locations at the upstream end of Lateral C-2 and along the boardwalk for Laterals C-2 and C-4 where only a 2-foot minimum separation could be obtained between the proposed surface elevation and the 10-year HGL. *Appendix H* includes the storm drain profiles plotted with the HGL profile obtained from WSPGW. The 100-year storm event discharge with analyzed with the MHHW as the downstream control. The results of this study indicates that flooding will occur during a 100-year storm event. As a result, the grading design for the CCRA will incorporate where necessary provisions for swales and stormwater conveyance around the proposed buildings to protect buildings from a 100-year storm event. The runoff conveyance systems around the building will allow surface discharge to the Harbor over the seawall.

- **Storm Drain Line D**

Storm drain Line D is a proposed 15-inch RCP line extension to the existing 15-inch RCP line that discharges runoff from the Dana Wharf Area to the Harbor at Outlet 4. The existing outlet is located south of proposed Building 6. The anticipated invert elevation based on as-built plans for this outlet is at 3-feet. Elevations of the Dana Wharf area range from 7- to 10-feet and the downstream water surface elevation for the hydraulic calculations was set at MHW. The 10-year HGL in the proposed condition remains 2.5-feet to 4-feet below the proposed ground surface. The 100-year HGL exceeds the ground surface elevation by a maximum of 12-inches.

- **Storm Drain Line E**

Storm drain Line E is a proposed 15-inch RCP extension to the existing 15-inch RCP line that outlets at the southwest of the CCRA at Outlet 5. The anticipated invert elevation based on as-built plans for this outlet is at 4-feet. The 10-year HGL in the proposed condition will remain under the proposed ground surface elevation with an HGL that range from 3-feet to 4-feet bgs. The 100-year HGL for this line will also remain under the proposed finished ground elevation with bout 2-feet of freeboard.

SECTION 7 WATER QUALITY DESIGN

The DPH Revitalization project will incorporate Water Quality Management Practices following the guidelines set forth in the South Orange County Technical Guidance Document (TGD), dated September 2017, which complies with the San Diego Regional Water Quality Board requirements. All Water Quality (WQ) design and analysis provided in this MPD is preliminary and will serve as a guideline for final storm drain design and preparation of the Water Quality Management Plan.

Per Section 2.3.5.1 TGD priority projects are categorically exempted from hydromodification requirements where the project discharges to: “Existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean”. All DPH stormwater runoff discharges directly to the Pacific Ocean. Thus this project is exempt from Hydromodification. Figure 9 is a copy of the Dana Point Exemption Map taken from the TGD.

7.1 Receiving Waters and Pollutants of Concern

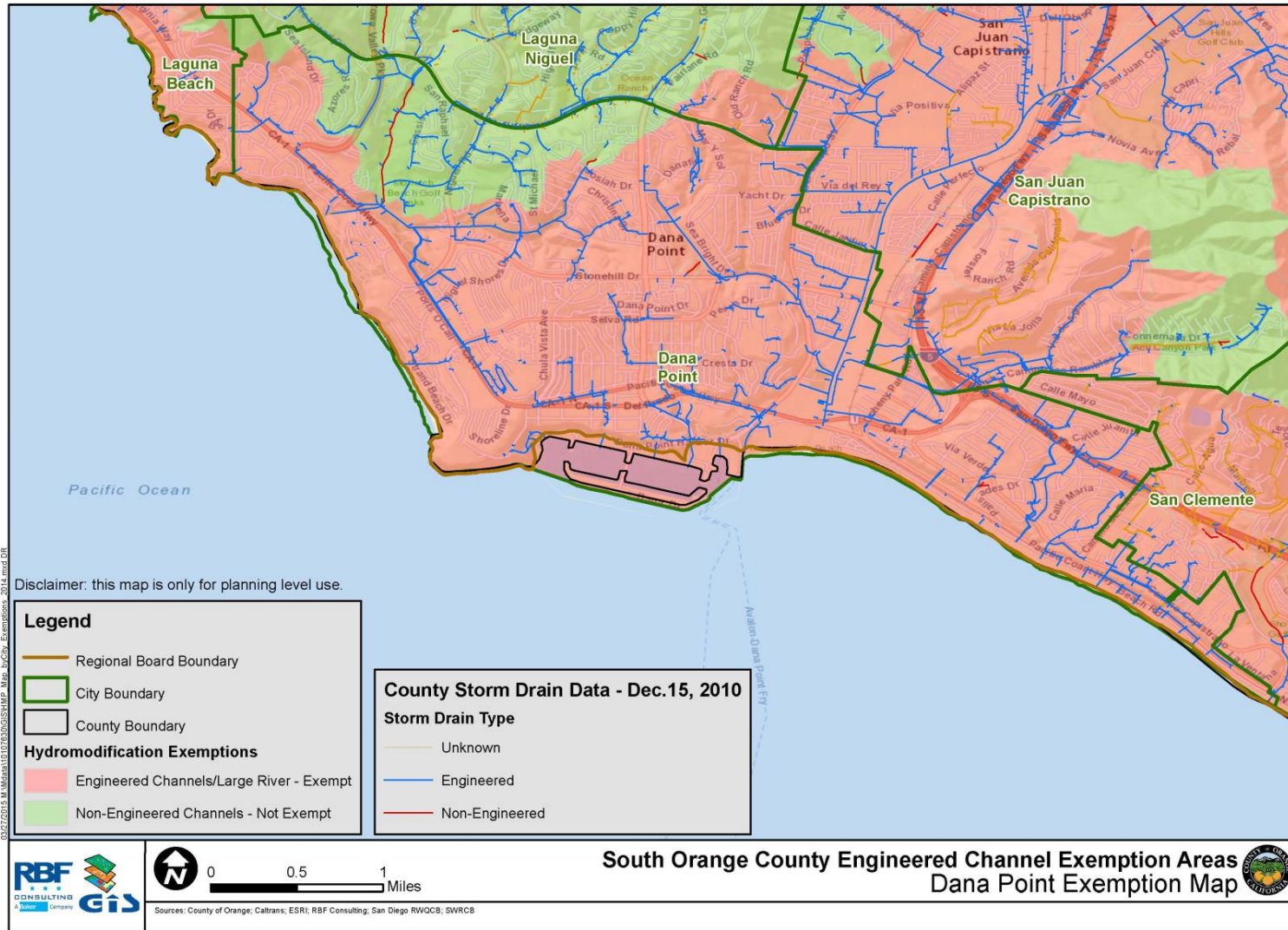
The receiving water body for the project is the Pacific Ocean Shoreline, Dana Point Harbor. Per The California State Water Board website the 2014/2016 303d listed impairments are: Indicator Bacteria, Dissolved Oxygen, Toxicity and Zinc.

Per Table 2-4 Anticipated and Potential Pollutants Generated by Land Use Type of the TGD the following are the Pollutants of Concern for DPH:

- Suspended Solid/ Sediments.
- Nutrients.
- Heavy Metals.
- Pathogens (Bacteria/ Virus).
- Pesticides, Oil & Grease.
- Toxic Organic Compounds.
- Trash & Debris.

Within the CCRA the portion adjacent to the seawall along the boardwalk and in landscape/seating areas, the only anticipated pollutants are Trash & Debris, sediments, Bacteria & Viruses and Pesticides. Heavy Metals and Oil & Grease will not be anticipated in these areas since these areas will be separated from the automobile and boat related parking areas of the project. Only the parking structure, surface parking lots and the DSA are expected to generate all of the pollutants as listed above.

Figure F-2: Dana Point Exemption Map



TAKEN FROM SOUTH ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT

FIGURE 9 - DANA POINT
HYDROMODIFICATION EXEMPTION MAP

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM I WARD
PROPERTIES

R.D. OLSON
DEVELOPMENT



BELLWETHER
FINANCIAL GROUP

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7.2 Low Impact BMP Selection and Design

In accordance with Section 2.5 of the TGD Low Impact Development (LID) Best Management Practices (BMP's) must be selected and size to maximized volume retention and pollutant retention according to a specific hierarchy. Below is a description for selection criteria and analyses of BMP's for the DPH project proposed for this MPD. Final analysis, design and a WQMP shall be completed for the CCRA and the DSA separately.

1. Capture and retain the DCV (Design Captured Volume from a 24-hr 85th percentile storm event) and drawdown within 48hr or less following the end of the precipitation. In order to capture and retain runoff, infiltration rates of the existing soil and the depth of groundwater will need to be considered. Infiltration for the project has been determined unfeasible by GMU Geotechnical Engineering due to the following reasons:
 - Percolation testing results indicated existing soil infiltration rates vary from 0.10 to 0.32in/hr. Based on this the percolation field testing does not meet the minimum requirements of 0.6in/hr (unfactored) to fully infiltrate the DCV volume.
 - Groundwater depths as described on Section 6.4 of this MPD ranges from 3-feet 10-feet bgs for the vast majority of the project area.
 - The site Hydrologic Soil Group is classified as D, which tends to yield very low percolation rates.

Based on the above presented information, it is not feasible to comply with the retention requirements since infiltration is not adequate for DPH.

2. Harvest and Use feasibility shall be analyzed (Section 4.2.3 of TGD), and implement Harvest and Use BMP (Section 4.3 of the TGD).

Based on the current Site Plans for the redevelopment of DPH and the CCA, there will not be enough landscaped areas to utilize a Harvest and Use BMP. In addition, South Coast Water District has installed existing a recycled water line on Dana Point Harbor Drive and is requiring the use of recycled water possible for proposed landscape areas within the CCA. Therefore, Harvest and Use for the CCA was determined to be a non-feasible BMP.

3. Select and Size Biotreatment Systems.

The use of biofiltration basins may not be feasible due to of the proximity to the ocean. Biofiltration basins are designed to utilize a discharge point located approximately 3.75-feet or more below the top of the basin with a basin ponding depth of anywhere from 6-inches to 18-inches. The finished surface in the vicinity of the seawall are approximately

10-feet (the area between the buildings and the seawall is the lowest finished surface for stormwater capture). The basin outlet would need to be located at an approximate elevation of 5 to 5.5-feet and the MHW for the project is at 4.41-feet. In a preliminary analysis, it was noted that the HGL in storm drain Lines B and C would be too high to provide sufficient clearance between the receiving pipe HGL and the biofiltration systems. Therefore, based on the anticipated water surface and HGL within the proposed CCA storm drain systems, the use of biofiltration basins was found to be infeasible and it is not recommended for this project.

4. Maximize volume and pollutant retention through the incorporation of all of the applicable Hydrologic Sources of Control (HSC) and use biofiltration BMPs. The project has identified the proposed use of Bioclean Modular Wetlands System, Jensen StormSafe or Bioclean Kraken Filter, which are proprietary devices with high pollutant removal efficiency for the CCA proposed Water Quality Treatment BMPs. Technical information and performance information for these proposed BMP's is provided in *Appendix J* of this MPD. Per Appendix J of the TGD, flow through systems such as MWS have been deemed acceptable if sized to treat 150% of the flow-based calculated treatment flows. These systems will be all designed following the procedure outlined on Appendix E.3.5.4: Worksheet for Using the Flow-Based Compact Biofiltration with Supplemental Retention Method for Sizing Compact Biofiltration BMPs - Worksheet 9: Flow-Based Compact Biofiltration with Supplemental Retention Method. Preliminary calculations are provided in *Appendix J* and the Proposed Storm Drain Plan on *Appendix H* includes a plan layout of the proposed BMPs.

Biofiltration in the form of MWS has been selected as the main BMP to meet the WQ requirements and target the pollutants of concern for the project where feasible. StormSafe or Kraken Filters will be utilized for areas where MWS are not feasible due to sites constraints as described below:

- When the HGL elevation of the proposed storm drain system is above the bottom of the MWS units. Under this condition, flows could by-pass the unit and untreated water would discharge to the Harbor.
- At locations adjacent to the Harbor biofiltration BMP's could have seawater backing into the storm drain systems which could affect the plants health and limit the type of plans that can be utilized in the MWS units.
- There are some locations where it is physically not possible to connect the MWS to the existing storm drain system due to existing invert elevations.

Drainage Management Areas (DMAs) at locations near the seawall specifically the boardwalk, the buildings along the southern border of the CCRA, the Dana Wharf, the parking structure, areas along the DSA seawall, and the proposed parking lot shall use filter systems such as Jensen StormSafe or Bioclean Kraken Filter due to high groundwater conditions and the stormdrain systems' HGL. These devices will be designed to treat the required water quality flows to the maximum extent possible. Where determined to be feasible in final design proposed filter systems may be replaced with MWS.

Table 9 includes a summary of each DMA and the proposed BMP for each area for both the CCRA and the DSA.

7.3 Commercial Core Retail Area

The Drainage Management Areas within the Commercial Core Retail Area encompasses 18.97 acres. It was divided into 38 DMA's for this study (Figure shows the Proposed DMA Areas for the CCRA). Within the CCRA, 8.5 acres will be treated with MWS biofiltration while the remaining 10.47 acres are proposed to be treated with StormSafe or Kraken filters. Where possible the roof drains for the proposed buildings will be treated with MWS that will be placed partially above ground to increase biofiltration WQ treatment, see detailed description below.

DMA F consist of 0.56 acres in the Dana Wharf area. Due to the existing conditions of this area and proximity to the Harbor it is unfeasible to collect runoff and provide treatment prior to discharge over the seawall. This small DMA will not be treated and will remain as it is in the existing condition.

Table 11: Commercial Core DMA Summary and BMP's sizing

Area ID	Time of Concentration (min)	Design Intensity 80% Capture Efficiency (in/hr)	Area (ac)	Imperviousness	Runoff Coefficient	Q (cfs)	Q _{design} =1.5Q (cfs)	Proprietary Device
OUTFALL 1								
B-1, 2, 3	7.05	0.23	2.79	0.9	0.83	0.53	0.794	MWS-L-8-24
B-12	6.4	0.24	1.06	0.9	0.83	0.21	0.315	MWS-L-8-12
B-7, 8, 10	8.87	0.2	1.54	0.9	0.83	0.25	0.381	MWS-L-8-12
B-13, 14	8.72	0.2	2.02	0.9	0.83	0.33	0.500	MWS-L-8-20
B-15	9.7	0.21	1.27	0.9	0.83	0.22	0.330	Storm Safe
B-16	6.26	0.24	0.42	0.9	0.83	0.08	0.125	Storm Safe
B-17	7.13	0.23	0.97	0.9	0.83	0.18	0.276	Storm Safe
OUTFALL 2								
D-1, 2	5	0.25	1.69	0.9	0.83	0.35	0.523	Storm Safe
OUTFALL 3								
LINE C1								
C1.1	7.43	0.25	0.53	0.9	0.825	0.11	0.164	MWS-L-4-15
C1.2	7.48	0.25	0.52	0.9	0.825	0.11	0.161	MWS-L-4-15
C1.3	7.31	0.25	0.66	0.9	0.825	0.14	0.204	MWS-L-4-19
C1.4	7.03	0.25	0.45	0.9	0.825	0.09	0.139	MWS-L-4-15
LINE C2								
C2.1	7.34	0.25	0.44	0.9	0.825	0.09	0.136	StormSafe Filter
C2.2	5.00	0.26	0.11	0.9	0.825	0.02	0.035	StormSafe Filter
C2.3	5.00	0.26	1.39	0.9	0.825	0.30	0.447	StormSafe Filter
C2.4	9.03	0.24	1.56	0.9	0.825	0.31	0.463	StormSafe Filter
C2.5	6.76	0.25	0.52	0.9	0.825	0.11	0.161	MWS 4-19-3h
C2.6	5.00	0.26	0.29	0.9	0.825	0.06	0.093	MWS 4-13-2.5h
C2.7	5.00	0.26	0.35	0.9	0.825	0.08	0.113	MWS 6-8-2.5h
C2.8	6.91	0.25	0.62	0.9	0.825	0.13	0.192	MWS 4-19-3H
C2.9	5.00	0.26	0.23	0.9	0.825	0.05	0.074	StormSafe Filter
C2.10A	6.21	0.25	1.11	0.9	0.825	0.23	0.343	StormSafe Filter
C2.10B	5.00	0.26	0.57	0.9	0.825	0.12	0.183	StormSafe Filter

Table 11: Commercial Core DMA Summary and BMP's sizing

Area ID	Time of Concentration (min)	Design Intensity 80% Capture Efficiency (in/hr)	Area (ac)	Imperviousness	Runoff Coefficient	Q (cfs)	Q _{design} =1.5Q (cfs)	Proprietary Device
C2.11	5.00	0.26	0.41	0.9	0.825	0.09	0.132	StormSafe Filter
LINE C3								
C3.1	6.03	0.25	0.67	0.9	0.825	0.14	0.207	MWS-L-8-10-4H
C3.2	6.06	0.25	0.36	0.9	0.825	0.07	0.111	MWS-L-4-13
C3.3	5.48	0.26	0.37	0.9	0.825	0.08	0.119	MWS-L-4-13
C3.4	5.00	0.26	0.85	0.9	0.825	0.18	0.273	MWS-L-8-12
LINE C4								
C4.1	7.14	0.25	0.48	0.9	0.825	0.10	0.149	MWS-L-8-12-2.5
C4.2	6.23	0.25	0.49	0.9	0.825	0.10	0.152	MWS-L-8-12-2.5
C4.3	5.00	0.26	0.50	0.9	0.825	0.11	0.161	MWS-L-8-12-2.5
C4.4	5.00	0.26	0.31	0.9	0.825	0.07	0.100	StormSafe Filter
C4.5	5.00	0.26	0.36	0.9	0.825	0.08	0.116	StormSafe Filter
OUTFALL 4								
D-1	5.38	0.26	0.61	0.9	0.825	0.13	0.196	StormSafe Filter
D-2	5.00	0.26	0.27	0.9	0.825	0.06	0.087	StormSafe Filter
D-3	8.35	0.24	0.86	0.9	0.825	0.17	0.255	StormSafe Filter
D-4	8.59	0.24	0.43	0.9	0.825	0.09	0.128	StormSafe Filter
D-5	5.00	0.26	0.41	0.9	0.825	0.09	0.132	StormSafe Filter
D-6	5.00	0.26	0.44	0.9	0.825	0.09	0.142	StormSafe Filter
OUTFALL 5								
E-1	5.00	0.26	0.26	0.9	0.825	0.06	0.084	MWS-L-4-6
E-2	5.82	0.26	0.57	0.9	0.825	0.12	0.183	MWS-L-8-8
E-3	5.47	0.26	0.34	0.9	0.825	0.07	0.109	StormSafe Filter
E-4	5.00	0.26	0.22	0.9	0.825	0.05	0.071	StormSafe Filter
E-5	5.00	0.26	0.41	0.9	0.825	0.09	0.132	StormSafe Filter
DIRECT SHEET FLOW INTO OCEAN								
F								None Proposed

Alternate Option

It should be noted that most of the DMA areas in the boardwalk and adjacent to the Harbor meet the minimum 2.5ft elevation difference between the existing ground surface and the HGL of the proposed storm drain system, which might allow for biofiltration to be incorporated if feasible. These DMAs C4.4, C4.5, C2.11, C2.9, C2.10B, C2.10A, C2.11, D-3, D-4, D-6, D-5, E4 and E-5 are proposed to use StormSafe filters at this stage of the design. As more detail studies are prepared during final design, additional determination of the feasibility of using MWS or biofiltration systems will be conducted.

However, one primary concern with the use of biofiltration is the possibility of seawater intrusion into the biofiltration media due to the close proximity to the ocean. This intrusion would affect the health of the plants and possibly causing on-going maintenance of the systems or reduce the possibility of biofiltration of the pollutants within the stormwater runoff.

For the parking structure it has been determined that it is unfeasible to use biofiltration. This determination is based on the elevation at which the storm drain exits the building (approximately 5-feet to 6-feet below finished floor of the lower level (Elev. 7.0 to 8.0)) to does not allow sufficient depth to incorporate the use of a biofiltration systems. Similarly, areas C2.1 and C2.2 are the most upstream areas for Lateral C-2 and there is not adequate cover to incorporate biofiltration BMP's.

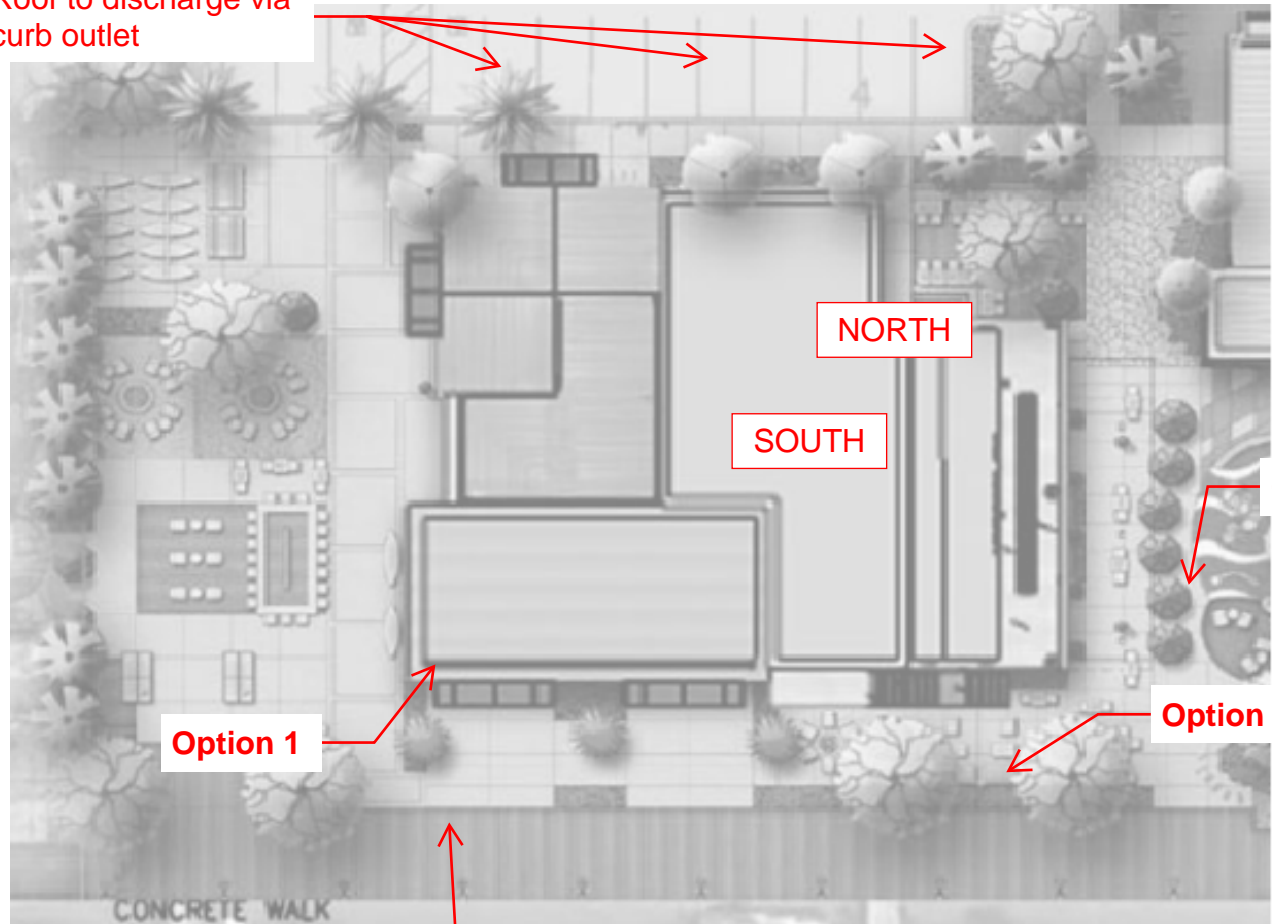
Proposed Building Roof Drains Typical Water Quality Design Approach

Roof drains will be treated with biofiltration BMPs where possible. This MPD does not include separation of stormwater runoff WQ treatment for the building's roof. However, during final design additional studies shall incorporate separate treatment design and analysis. In this Master Plan Study, half of each building's roof is assumed to discharge via curb outlets to the paved parking area where treatment will occur at MWS units that are proposed in the parking areas. The southern portions of the building's roof will be treated separately and final design studies will include this analysis. The different BMP options considered for this study are listed below.

- Option 1: Biofiltration at each roof drain location with MWS at grade or partially raised.
- Option 2: Roof drains to discharge at grade and treatment to occur at MWS units adjacent to the boardwalk.

See Figure 10 for a graphical representation of the options described above.

Roof to discharge via curb outlet



Option 1

Option 2

NORTH

SOUTH

Option 1

Typical proposed trench location along pedestrian boardwalk

NOTES:

1. SOUTH SECTION TO DISCHARGE TO WATERSIDE BMP.
2. NORTH SIDE TO DISCHARGE THROUGH CURB OPENINGS IN PARKING LOT.
3. OPTIONAL SOLUTION TO INSTALL ROOF DRAIN FILTERS NOT SHOWN BUT MAY BE CONSIDERED IN FINAL DESIGN FOR ROOF STORMWATER RUNOFF TREATMENT BMP'S.

FIGURE 10 - TYPICAL BMP'S OPTIONS FOR PROPOSED CCRA BUILDINGS ROOF DRAINS

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7.4 Dry Stack Lease Area

The Dry Stack Lease Area encompasses 12 acres. It was divided into 8 DMA's for this study. 7.41 acres will be treated with MWS biofiltration while the remaining 4.35 acres are proposed to be treated with StormSafe or Kraken filters. DMA D1 and D2 of the DSA consist of 2.66 acres that currently drain to a grated inlet that discharges through a perforation on the seawall only about 2.3-feet below the top of wall. Due to the existing conditions of this area and proximity to the Harbor it is unfeasible to collect runoff and provide treatment prior to discharge. A new grated inlet is proposed at this location to connect to the existing perforation. This new inlet shall include filtration inserts to provide WQ treatment to the maximum extent possible. During final design the feasibility of a pump to provide a more advanced WQ treatment will be analyzed.

7.5 Proprietary Devices - Structural BMPs

7.5.1 Modular Wetlands Systems

Modular Wetland Systems is a proprietary biofiltration BMP's that uses horizontal flow allowing for a smaller footprint. This BMP includes a pretreatment chamber that includes separation and pre-filter cartridges. In this chamber sediments and hydrocarbons are removed from runoff before entering the bio-filtration chamber, reducing maintenance and improving performance. The MWS system meets the TAPE testing criteria as required for proprietary systems as outlined in the TGD Appendix J.

7.5.2 Stormsafe

The StormSafe Filter is proprietary media filtration BMP that has been tested and utilized in Harbor storm water programs. It has demonstrated significant effectiveness in reducing bacteria in storm water. This system also removes other pollutants of concern typical of media filtration type BMPs's. This specific media filtration BMP was selected due to its ability to remove nutrients and bacteria.

7.5.3 Kraken Filters

The Kraken Filter is a WQ treatment BMP system that utilizes an advanced membrane filtration that provides a high level of removals for total suspended solids (TSS), phosphorus, nutrients, metals, trash, and hydrocarbons. The Kraken (membrane) Filter cartridge provides high flow rates, while the system can operate at a low loading rate to ensure maximum performance, minimum maintenance, and minimal clogging.

SECTION 8 Conclusion, Final Remarks and Future Studies

The Dana Point Harbor Revitalization Plan proposes the redevelopment of certain areas within the existing Harbor. This study investigates the Commercial Core Area (CCA) which includes the Commercial Core Retail Area (CCRA) and the Dry Stack Lease Area (DSA) and provides analyses for this Master Plan of Drainage for the CCA. The analysis in this study includes hydrology and hydraulic design of the storm drain systems for flood control and water quality treatment purposes. This MPD analyzes the existing drainage patterns and provides calculations for a proposed condition for the CCA. The existing and proposed condition 10-year and 100-year storm events was analyzed for the ultimate condition, and a preliminary plan for storm drain construction was developed and presented herein to incorporate different construction phases. A 100-year flood analysis was also completed and drainage patterns were delineated to ensure all proposed building structure to be protected for the 100-year storm event in a Mean High-High Water condition following County of Orange requirements and guidelines. A preliminary Water Quality Treatment Program was developed, and a path for future studies was discussed in this report. *Appendix J* provides a Conceptual Master Quality Management Plan that contains locations, types, and typical sections of the proposed BMPs.

8.1 Future Studies

This Section summarizes studies that may be included with final design for each phase of construction as applicable.

1. Prepare the proposed condition 25-year storm event hydrology analysis to size proposed drainage inlet openings.
2. Analyze 100-year MHHW at the proposed storm drain main line, and surface flooding analysis for this condition.
3. Develop details to provide structure protection from the 100-year flood by setting finished floor pads above the flooding elevation and provide methods to convey flow around buildings of proposed stormwater.
4. Finalize design of proposed stormwater by-pass structures to divert low-flows for water quality treatment and stormwater conveyance through the proposed storm drain main lines.
5. Determine final sizes and location of proprietary BMPs.
6. Prepare Final Project WQMP for the Commercial Core Retail Area and Dry Stack Lease Area (considering Phasing as necessary).

TECHNICAL APPENDIX

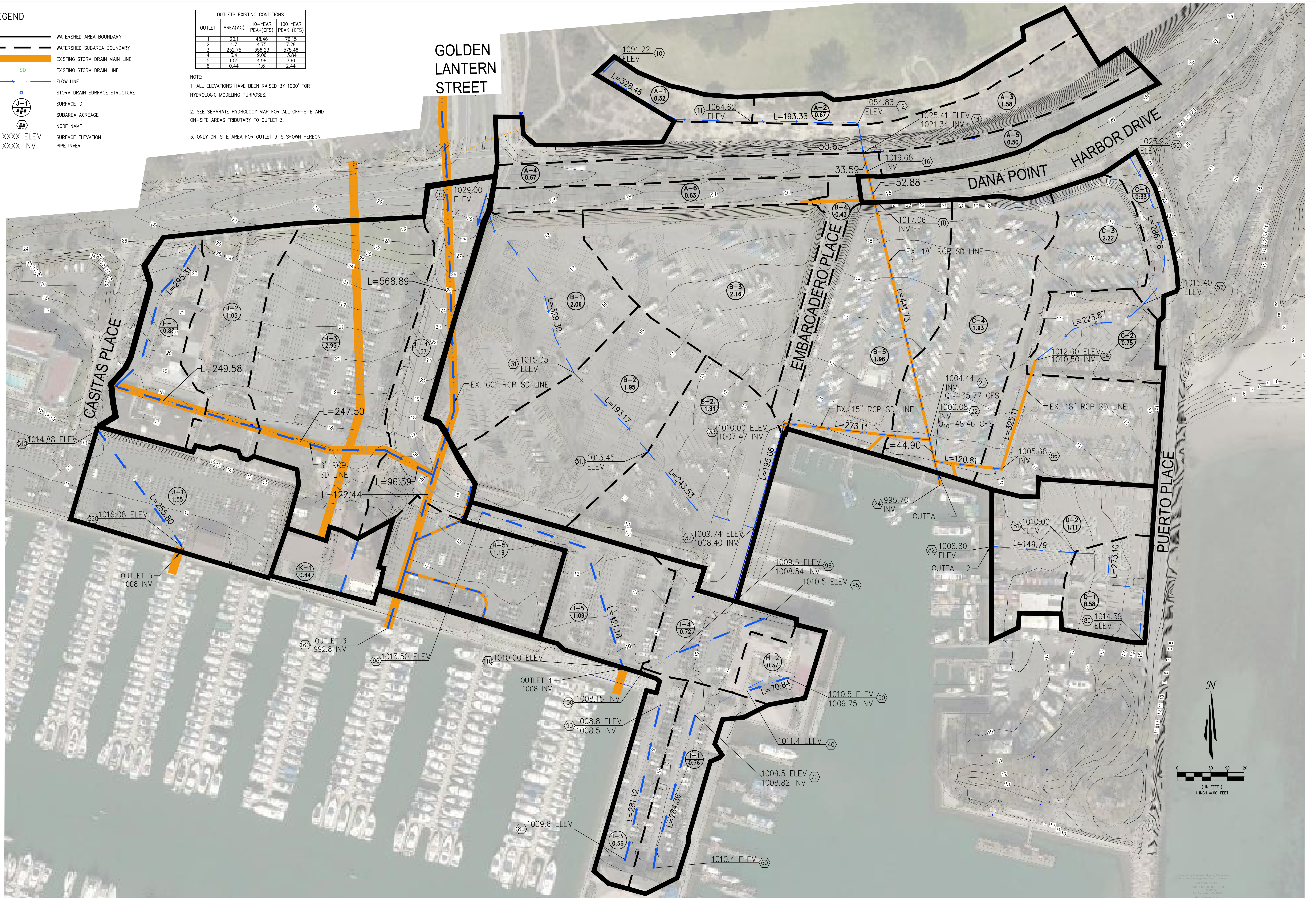
Appendix A – Existing Condition Hydrology Map

LEGEND

- WATERSHED AREA BOUNDARY
- WATERSHED SUBAREA BOUNDARY
- EXISTING STORM DRAIN MAIN LINE
- EXISTING STORM DRAIN LINE
- FLOW LINE
- STORM DRAIN SURFACE STRUCTURE
- SURFACE ID
- SUBAREA ACREAGE
- NODE NAME
- XXXX ELEV
- XXXX INV

OUTLETS EXISTING CONDITIONS			
OUTLET	AREA(AC)	10-YEAR PEAK(CFS)	100 YEAR PEAK (CFS)
1	20.1	48.46	76.15
2	1.7	4.75	7.93
3	252.75	356.73	575.46
4	3.4	9.05	13.84
5	1.55	4.36	7.51
6	0.44	1.6	2.44

- NOTE:
1. ALL ELEVATIONS HAVE BEEN RAISED BY 1000' FOR HYDROLOGIC MODELING PURPOSES.
 2. SEE SEPARATE HYDROLOGY MAP FOR ALL OFF-SITE AND ON-SITE AREAS TRIBUTARY TO OUTLET 3.
 3. ONLY ON-SITE AREA FOR OUTLET 3 IS SHOWN HEREON.



NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
6					
5					
4					
3					
2					
1					

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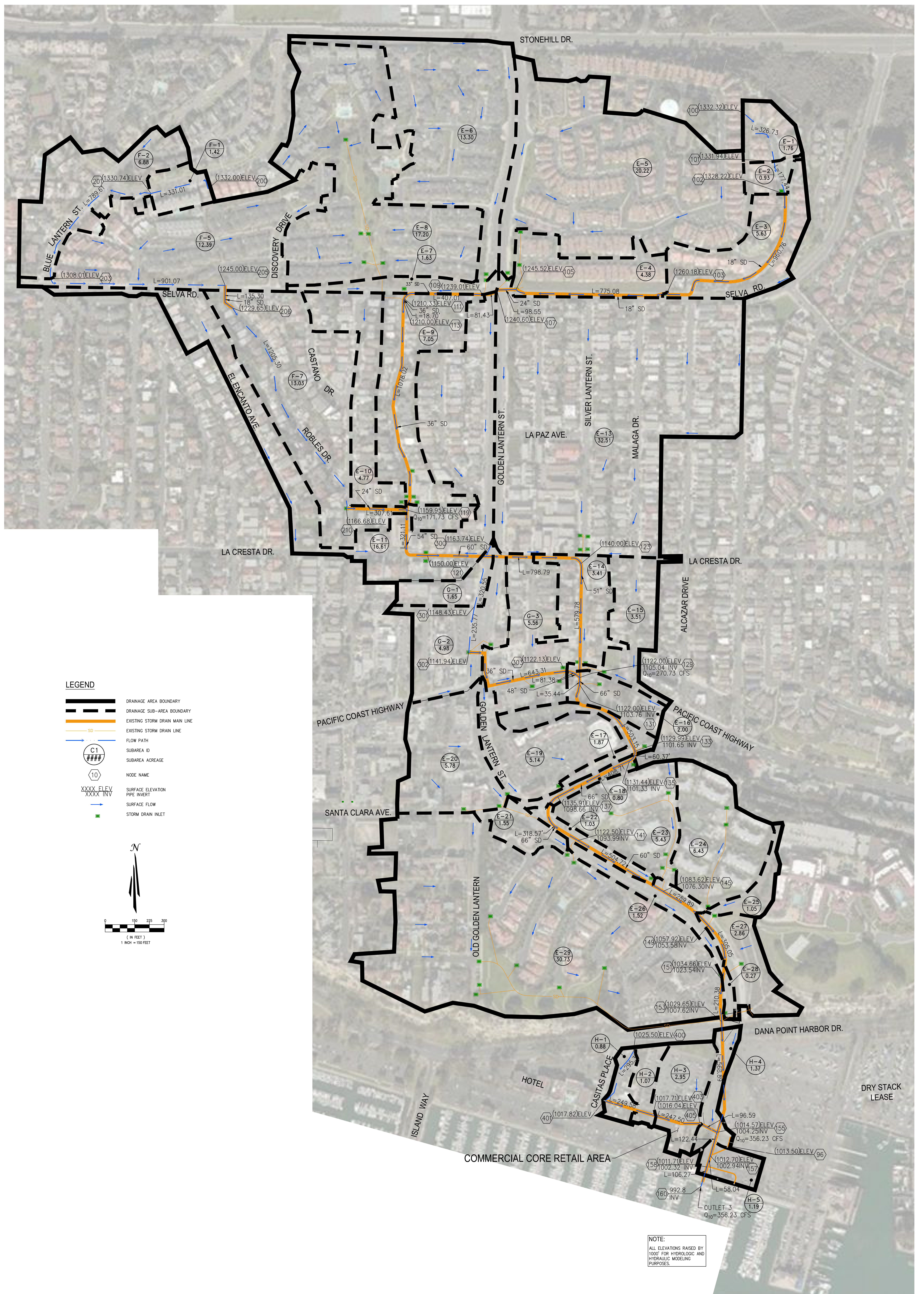
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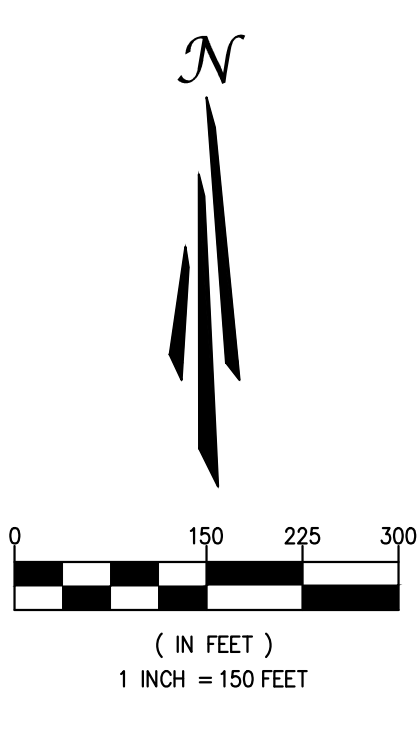
ON-SITE EXISTING CONDITION HYDROLOGY MAP
(OUTLETS 1, 2, 3, 4, & 5)

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

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- LEGEND**
- DRAINAGE AREA BOUNDARY
 - DRAINAGE SUB-AREA BOUNDARY
 - EXISTING STORM DRAIN MAIN LINE
 - EXISTING STORM DRAIN LINE
 - FLOW PATH
 - SUBAREA ID
 - SUBAREA ACREAGE
 - NODE NAME
 - SURFACE ELEVATION
 - PIPE INVERT
 - SURFACE FLOW
 - STORM DRAIN INLET



NOTE:
ALL ELEVATIONS RAISED BY
1000' FOR HYDROLOGIC AND
HYDRAULIC MODELING
PURPOSES.

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7					
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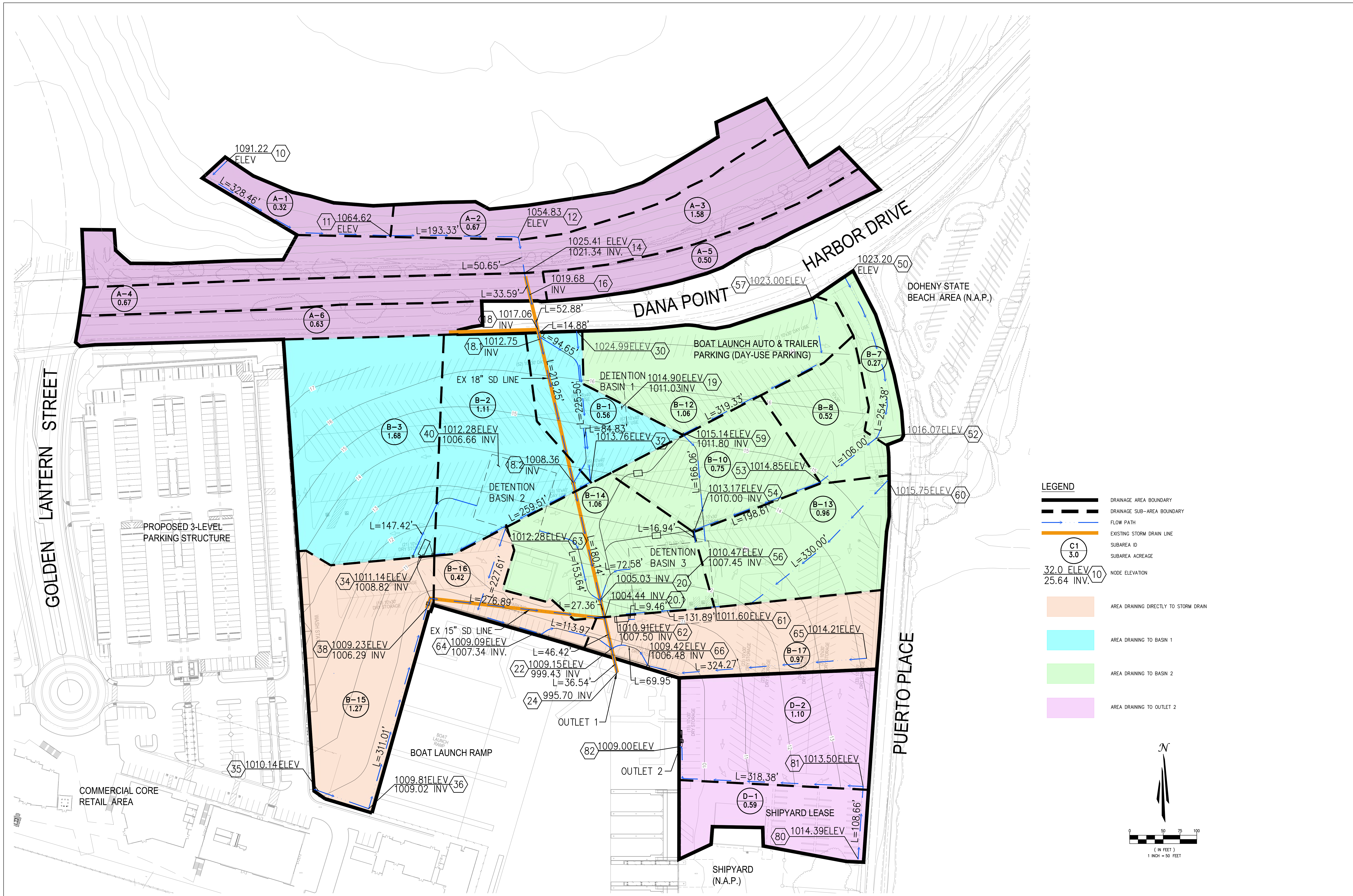
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OUTLET 3 EXISTING CONDITION HYDROLOGY MAP
 (ON-SITE AND OFF-SITE AREAS)

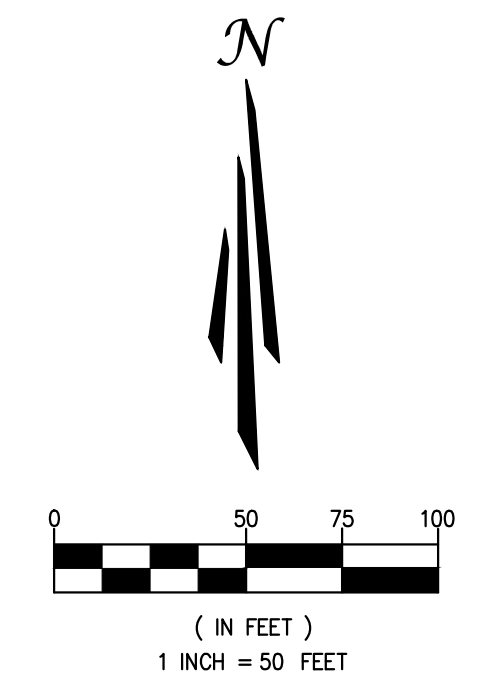
COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

Appendix B – Proposed Condition Hydrology Map



LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN LINE
- SUBAREA ID
- SUBAREA ACREAGE
- NODE ELEVATION
- AREA DRAINING DIRECTLY TO STORM DRAIN
- AREA DRAINING TO BASIN 1
- AREA DRAINING TO BASIN 2
- AREA DRAINING TO OUTLET 2



7					
6					
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4					
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1					
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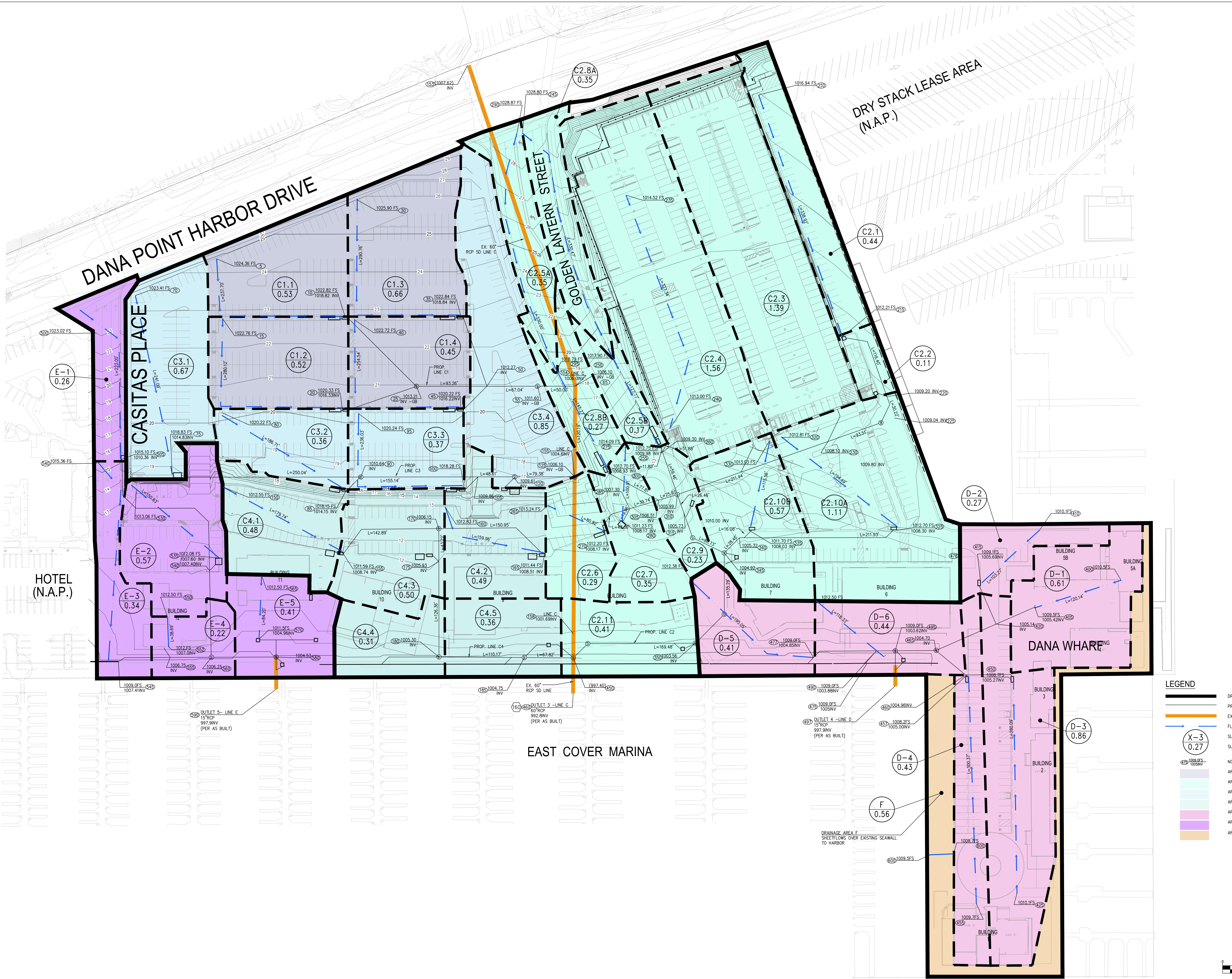
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DRY STACK LEASE AREA
PROPOSED CONDITION HYDROLOGY MAP
(OUTLETS 1 & 2)

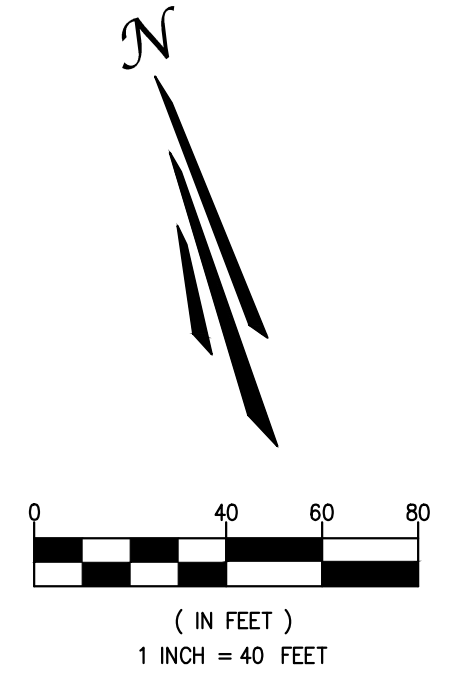
COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHT 1 OF 1

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- LEGEND**
- DRAINAGE AREA BOUNDARY
 - PROPOSED STORM DRAIN LINE
 - EXISTING STORM DRAIN LINE
 - FLOWPATH
 - SUBAREA ID
SUBAREA ACREAGE
 - NODE ELEVATION
 - AREA DRAINING TO LATERAL C1
 - AREA DRAINING TO LATERAL C2
 - AREA DRAINING TO LATERAL C3
 - AREA DRAINING TO LATERAL C4
 - AREA DRAINING TO LINE E
 - AREA DRAINING TO OUTLET 6 (SHEET FLOW)



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COMMERCIAL CORE RETAIL AREA
 PROPOSED CONDITION HYDROLOGY MAP
 (ON-SITE AREAS ONLY)

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHEET 1 OF 1

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Appendix C – Existing Condition Hydrology Results

DRY STACK LEASE AREA

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

Tait & Associates, Inc

10 year- Existing Condition Outlet #1

***** DESCRIPTION OF STUDY *****

- * DANA POINT HARBOR DRY STACK LEASE AREA *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTFALL 1 *
* 10-YEAR STORM EVENT EM *

FILE NAME: DRM10EX1.DAT
TIME/DATE OF STUDY: 08:13 08/16/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

Table with columns: NO., HALF-CROWN TO STREET-CROSSFALL, CURB GUTTER-GEOMETRIES, MANNING FACTOR. Rows 1 and 2.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.46
ELEVATION DATA: UPSTREAM(FEET) = 1091.22 DOWNSTREAM(FEET) = 1064.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.812
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.934
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"OPEN BRUSH" C 0.11 0.25 1.000 84 8.81
NATURAL POOR COVER
"OPEN BRUSH" D 0.21 0.20 1.000 88 8.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.78
TOTAL AREA(ACRES) = 0.32 PEAK FLOW RATE(CFS) = 0.78

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1064.62 DOWNSTREAM(FEET) = 1054.83
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.33 CHANNEL SLOPE = 0.0506
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.843
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"OPEN BRUSH" C 0.50 0.25 1.000 84
NATURAL POOR COVER
"OPEN BRUSH" D 0.17 0.20 1.000 88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.57
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.47
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 0.50
Tc(MIN.) = 9.31
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 1.57
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.33

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 7.22
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 521.79 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1054.83 DOWNSTREAM(FEET) = 1025.41
CHANNEL LENGTH THRU SUBAREA(FEET) = 50.65 CHANNEL SLOPE = 0.5808
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 1.00
CHANNEL FLOW THRU SUBAREA(CFS) = 2.33
FLOW VELOCITY(FEET/SEC.) = 3.17 FLOW DEPTH(FEET) = 0.61
TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 9.58
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 572.44 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 16.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1021.34 DOWNSTREAM(FEET) = 1019.68
FLOW LENGTH(FEET) = 33.59 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.12
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.33
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 9.64
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.00 = 606.03 FEET.

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.06	0.20	0.100	75
PUBLIC PARK	D	0.03	0.20	0.850	75
NATURAL POOR COVER					

"OPEN BRUSH" C 0.96 0.25 1.000 84
NATURAL POOR COVER
"OPEN BRUSH" D 0.53 0.20 1.000 88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.64
EFFECTIVE AREA(ACRES) = 2.57 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 2.6 PEAK FLOW RATE(CFS) = 5.92

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.03	0.25	0.100	69
COMMERCIAL	D	0.64	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 1.67
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 7.59

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.45	0.25	0.100	69
COMMERCIAL	D	0.05	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.24
EFFECTIVE AREA(ACRES) = 3.74 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 8.83

FLOW PROCESS FROM NODE 16.00 TO NODE 18.00 IS CODE = 41

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1019.68  DOWNSTREAM(FEET) = 1017.06
FLOW LENGTH(FEET) = 52.88  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.83
PIPE TRAVEL TIME(MIN.) = 0.07  Tc(MIN.) = 9.72
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.00 = 658.91 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 9.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  D  0.63  0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63  SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 4.37  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23  AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 4.4  PEAK FLOW RATE(CFS) = 10.35

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 20.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1017.06  DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 441.73  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.02
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.35
PIPE TRAVEL TIME(MIN.) = 0.74  Tc(MIN.) = 10.45
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1100.64 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.45
RAINFALL INTENSITY(INCH/HR) = 2.66
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.62
EFFECTIVE STREAM AREA(ACRES) = 4.37
TOTAL STREAM AREA(ACRES) = 4.37
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.35

*****
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.30
ELEVATION DATA: UPSTREAM(FEET) = 1029.00  DOWNSTREAM(FEET) = 1015.35

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.840
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.714
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS  Tc
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL  D  2.06  0.20  0.100  75  5.84
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 6.85
TOTAL AREA(ACRES) = 2.06  PEAK FLOW RATE(CFS) = 6.85

*****
FLOW PROCESS FROM NODE 31.00 TO NODE 31.10 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1015.35  DOWNSTREAM(FEET) = 1013.45
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.17  CHANNEL SLOPE = 0.0098
CHANNEL BASE(FEET) = 40.00  "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.017  MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.231
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  D  1.95  0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

```

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.00
AVERAGE FLOW DEPTH(FEET) = 0.12 TRAVEL TIME(MIN.) = 1.61
Tc(MIN.) = 7.45
SUBAREA AREA(ACRES) = 1.95 SUBAREA RUNOFF(CFS) = 5.64
EFFECTIVE AREA(ACRES) = 4.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 11.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.13 FLOW VELOCITY(FEET/SEC.) = 2.21
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 31.10 = 522.47 FEET.

FLOW PROCESS FROM NODE 31.10 TO NODE 32.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1013.45 DOWNSTREAM(FEET) = 1009.74
CHANNEL LENGTH THRU SUBAREA(FEET) = 243.53 CHANNEL SLOPE = 0.0152
CHANNEL BASE(FEET) = 40.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.017 MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.907

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.91 0.20 0.100 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.07
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.69
AVERAGE FLOW DEPTH(FEET) = 0.13 TRAVEL TIME(MIN.) = 1.51
Tc(MIN.) = 8.96

SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 4.96
EFFECTIVE AREA(ACRES) = 5.92 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.9 PEAK FLOW RATE(CFS) = 15.38

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.13 FLOW VELOCITY(FEET/SEC.) = 2.77
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 766.00 FEET.

FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.40 DOWNSTREAM(FEET) = 1007.47

CHANNEL LENGTH THRU SUBAREA(FEET) = 195.06 CHANNEL SLOPE = 0.0048
CHANNEL BASE(FEET) = 1.17 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.014 MAXIMUM DEPTH(FEET) = 5.00
CHANNEL FLOW THRU SUBAREA(CFS) = 15.38
FLOW VELOCITY(FEET/SEC.) = 4.54 FLOW DEPTH(FEET) = 2.90
TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 9.67
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 961.06 FEET.

FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 9.67
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.781
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 2.16 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.16 SUBAREA RUNOFF(CFS) = 5.37
EFFECTIVE AREA(ACRES) = 8.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 20.08

FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 9.67
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.781
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.43 SUBAREA RUNOFF(CFS) = 1.07
EFFECTIVE AREA(ACRES) = 8.51 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.5 PEAK FLOW RATE(CFS) = 21.15

FLOW PROCESS FROM NODE 33.00 TO NODE 20.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.47 DOWNSTREAM(FEET) = 1004.44
 FLOW LENGTH(FEET) = 273.11 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.23
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.15
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 9.94
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 1234.17 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.94
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.739
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.96	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.96 SUBAREA RUNOFF(CFS) = 4.80
 EFFECTIVE AREA(ACRES) = 10.47 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 25.62

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.94
 RAINFALL INTENSITY(INCH/HR) = 2.74
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 10.47
 TOTAL STREAM AREA(ACRES) = 10.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.62

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.35	10.45	2.660	0.23(0.14)	0.62	4.4	10.00
2	25.62	9.94	2.739	0.20(0.02)	0.10	10.5	30.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.77	9.94	2.739	0.22(0.05)	0.25	14.6	30.00
2	35.23	10.45	2.660	0.22(0.06)	0.25	14.8	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 35.77 Tc(MIN.) = 9.94
 EFFECTIVE AREA(ACRES) = 14.62 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.25
 TOTAL AREA(ACRES) = 14.8
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 1234.17 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1004.40 DOWNSTREAM(FEET) = 1000.08
 FLOW LENGTH(FEET) = 44.90 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.24
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 35.77
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 9.97
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 22.00 = 1279.07 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.97
 RAINFALL INTENSITY(INCH/HR) = 2.73
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22
 AREA-AVERAGED Ap = 0.25
 EFFECTIVE STREAM AREA(ACRES) = 14.62
 TOTAL STREAM AREA(ACRES) = 14.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.77

FLOW PROCESS FROM NODE 50.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 286.76
ELEVATION DATA: UPSTREAM(FEET) = 1023.20 DOWNSTREAM(FEET) = 1015.40

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.011
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.653
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.12	0.25	0.100	69	6.01
COMMERCIAL	D	0.21	0.20	0.100	75	6.01

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 1.08
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.08

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1015.40 DOWNSTREAM(FEET) = 1012.60
CHANNEL LENGTH THRU SUBAREA(FEET) = 223.87 CHANNEL SLOPE = 0.0125
CHANNEL BASE(FEET) = 30.00 "Z" FACTOR = 15.000
MANNING'S FACTOR = 0.017 MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.931
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.75	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.06
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.33
AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 2.81
 T_c (MIN.) = 8.83
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 1.97
EFFECTIVE AREA(ACRES) = 1.08 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.21 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 2.83

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.06 FLOW VELOCITY(FEET/SEC.) = 1.43
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 510.63 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 56.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1005.68
FLOW LENGTH(FEET) = 325.11 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.60
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.83
PIPE TRAVEL TIME(MIN.) = 0.97 T_c (MIN.) = 9.79
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 835.74 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.68 DOWNSTREAM(FEET) = 1000.08
FLOW LENGTH(FEET) = 120.81 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.42
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.83
PIPE TRAVEL TIME(MIN.) = 0.24 T_c (MIN.) = 10.03
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 22.00 = 956.55 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE T_c (MIN.) = 10.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.724
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.25	0.25	0.100	69
COMMERCIAL	D	1.97	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 5.40
EFFECTIVE AREA(ACRES) = 3.30 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.21 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 3.3 PEAK FLOW RATE(CFS) = 8.03

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 10.03
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.724
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL C 0.06 0.25 0.100 69
 COMMERCIAL D 1.87 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.93 SUBAREA RUNOFF(CFS) = 4.70
 EFFECTIVE AREA(ACRES) = 5.23 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 12.72

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.03
 RAINFALL INTENSITY(INCH/HR) = 2.72
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 5.23
 TOTAL STREAM AREA(ACRES) = 5.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.72

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.77	9.97	2.733	0.22(0.05)	0.25	14.6	30.00
1	35.23	10.49	2.655	0.22(0.06)	0.25	14.8	10.00
2	12.72	10.03	2.724	0.20(0.02)	0.10	5.2	50.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.46	9.97	2.733	0.22(0.05)	0.21	19.8	30.00

2	48.43	10.03	2.724	0.22(0.05)	0.21	19.9	50.00
3	47.63	10.49	2.655	0.22(0.05)	0.21	20.1	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 48.46 Tc(MIN.) = 9.97
 EFFECTIVE AREA(ACRES) = 19.82 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.21
 TOTAL AREA(ACRES) = 20.1
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 22.00 = 1279.07 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1000.08 DOWNSTREAM(FEET) = 995.70
 FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.42
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 48.46
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 10.00
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 24.00 = 1317.07 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 20.1 TC(MIN.) = 10.00
 EFFECTIVE AREA(ACRES) = 19.82 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.208
 PEAK FLOW RATE(CFS) = 48.46

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	48.46	10.00	2.729	0.22(0.05)	0.21	19.8	30.00
2	48.43	10.06	2.720	0.22(0.05)	0.21	19.9	50.00
3	47.63	10.52	2.651	0.22(0.05)	0.21	20.1	10.00

 END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

Tait & Associates, Inc
10 year- Existing condition Outlet #2

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR DRY STACK LEASE AREA *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTFALL 2 *
* 10-YEAR STORM EVENT EM *

FILE NAME: DRM10EX2.DAT
TIME/DATE OF STUDY: 08:58 08/02/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	10.0	1.0	0.001/0.001/0.005	0.08	0.10	0.0100	0.010	0.0080

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 273.10
ELEVATION DATA: UPSTREAM(FEET) = 1014.39 DOWNSTREAM(FEET) = 1010.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.549
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.478
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.58	0.20	0.100	75	6.55

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 1.81
TOTAL AREA(ACRES) = 0.58 PEAK FLOW RATE(CFS) = 1.81

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 1010.00
DOWNSTREAM NODE ELEVATION(FEET) = 1008.80
CHANNEL LENGTH THRU SUBAREA(FEET) = 149.79
"V" GUTTER WIDTH(FEET) = 3.00 GUTTER HIKE(FEET) = 0.125
PAVEMENT LIP(FEET) = 0.031 MANNING'S N = 0.140
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 0.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.142
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
COMMERCIAL	D	1.11	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.36
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.97
AVERAGE FLOW DEPTH(FEET) = 0.26 FLOOD WIDTH(FEET) = 24.08
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 1.27 T_c (MIN.) = 7.82
SUBAREA AREA(ACRES) = 1.11 SUBAREA RUNOFF(CFS) = 3.12
EFFECTIVE AREA(ACRES) = 1.69 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 4.75

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.28 FLOOD WIDTH(FEET) = 28.65
FLOW VELOCITY(FEET/SEC.) = 2.06 DEPTH*VELOCITY(FT*FT/SEC) = 0.58
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 422.89 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.7 TC(MIN.) = 7.82
EFFECTIVE AREA(ACRES) = 1.69 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.100
PEAK FLOW RATE(CFS) = 4.75

=====

END OF RATIONAL METHOD ANALYSIS



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Analysis prepared by:

Tait & Associates, Inc

100 year- Existing Condition Outlet #1

FILE NAME: DRM10EX1.DAT
TIME/DATE OF STUDY: 11:17 10/17/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

-----*TIME-OF-CONCENTRATION MODEL*-----

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	10.0	1.0	0.001/0.001/0.005	0.08	0.10	0.0100	0.010	0.0080

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.46
ELEVATION DATA: UPSTREAM(FEET) = 1091.22 DOWNSTREAM(FEET) = 1064.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.812
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.472
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"OPEN BRUSH" C 0.11 0.25 1.000 84 8.81
NATURAL POOR COVER
"OPEN BRUSH" D 0.21 0.20 1.000 88 8.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.23
TOTAL AREA(ACRES) = 0.32 PEAK FLOW RATE(CFS) = 1.23

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1064.62 DOWNSTREAM(FEET) = 1054.83
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.33 CHANNEL SLOPE = 0.0506
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.346
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"OPEN BRUSH" C 0.50 0.25 1.000 84
NATURAL POOR COVER
"OPEN BRUSH" D 0.17 0.20 1.000 88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.16
AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 0.45
Tc(MIN.) = 9.26
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 2.48
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48 FLOW VELOCITY(FEET/SEC.) = 8.03
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 521.79 FEET.

 FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1054.83 DOWNSTREAM(FEET) = 1025.41
 CHANNEL LENGTH THRU SUBAREA(FEET) = 50.65 CHANNEL SLOPE = 0.5808
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 1.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 3.67
 FLOW VELOCITY(FEET/SEC.) = 3.54 FLOW DEPTH(FEET) = 0.72
 TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 9.50
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 572.44 FEET.

 FLOW PROCESS FROM NODE 14.00 TO NODE 16.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1021.34 DOWNSTREAM(FEET) = 1019.68
 FLOW LENGTH(FEET) = 33.59 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.27
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.67
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 9.56
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.00 = 606.03 FEET.

 FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.06	0.20	0.100	75
PUBLIC PARK	D	0.03	0.20	0.850	75
NATURAL POOR COVER "OPEN BRUSH"	C	0.96	0.25	1.000	84
NATURAL POOR COVER "OPEN BRUSH"	D	0.53	0.20	1.000	88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
 SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 5.75
 EFFECTIVE AREA(ACRES) = 2.57 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.98
 TOTAL AREA(ACRES) = 2.6 PEAK FLOW RATE(CFS) = 9.35

 FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.03	0.25	0.100	69
COMMERCIAL	D	0.64	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 2.56
 EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.18
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80
 TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 11.91

 FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.45	0.25	0.100	69
COMMERCIAL	D	0.05	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.91
 EFFECTIVE AREA(ACRES) = 3.74 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.70
 TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 13.82

 FLOW PROCESS FROM NODE 16.00 TO NODE 18.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 1019.68  DOWNSTREAM(FEET) = 1017.06
FLOW LENGTH(FEET) = 52.88  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.24
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.82
PIPE TRAVEL TIME(MIN.) = 0.07  Tc(MIN.) = 9.63
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.00 = 658.91 FEET.

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FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 9.63
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.251
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  D  0.63  0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63  SUBAREA RUNOFF(CFS) = 2.40
EFFECTIVE AREA(ACRES) = 4.37  AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23  AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 4.4  PEAK FLOW RATE(CFS) = 16.16

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FLOW PROCESS FROM NODE 18.00 TO NODE 20.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1017.06  DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 441.73  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.85
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.16
PIPE TRAVEL TIME(MIN.) = 0.68  Tc(MIN.) = 10.31
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1100.64 FEET.

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*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

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TIME OF CONCENTRATION(MIN.) = 10.31
RAINFALL INTENSITY(INCH/HR) = 4.09
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.62
EFFECTIVE STREAM AREA(ACRES) = 4.37
TOTAL STREAM AREA(ACRES) = 4.37
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.16

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*****
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.30
ELEVATION DATA: UPSTREAM(FEET) = 1029.00  DOWNSTREAM(FEET) = 1015.35

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.840
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.661
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS  Tc
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL  D  2.06  0.20  0.100  75  5.84
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 10.46
TOTAL AREA(ACRES) = 2.06  PEAK FLOW RATE(CFS) = 10.46

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*****
FLOW PROCESS FROM NODE 31.00 TO NODE 31.10 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1015.35  DOWNSTREAM(FEET) = 1013.45
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.17  CHANNEL SLOPE = 0.0098
CHANNEL BASE(FEET) = 40.00  "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.017  MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.026
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL  D  1.95  0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.39
AVERAGE FLOW DEPTH(FEET) = 0.15  TRAVEL TIME(MIN.) = 1.35

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Tc(MIN.) = 7.19
SUBAREA AREA(ACRES) = 1.95 SUBAREA RUNOFF(CFS) = 8.79
EFFECTIVE AREA(ACRES) = 4.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 18.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.17 FLOW VELOCITY(FEET/SEC.) = 2.54
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 31.10 = 522.47 FEET.

FLOW PROCESS FROM NODE 31.10 TO NODE 32.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1013.45 DOWNSTREAM(FEET) = 1009.74
CHANNEL LENGTH THRU SUBAREA(FEET) = 243.53 CHANNEL SLOPE = 0.0152
CHANNEL BASE(FEET) = 40.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.017 MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.579

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.91 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.98
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.20
AVERAGE FLOW DEPTH(FEET) = 0.16 TRAVEL TIME(MIN.) = 1.27
Tc(MIN.) = 8.46
SUBAREA AREA(ACRES) = 1.91 SUBAREA RUNOFF(CFS) = 7.84
EFFECTIVE AREA(ACRES) = 5.92 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.9 PEAK FLOW RATE(CFS) = 24.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.18 FLOW VELOCITY(FEET/SEC.) = 3.26
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 766.00 FEET.

FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.40 DOWNSTREAM(FEET) = 1007.47
CHANNEL LENGTH THRU SUBAREA(FEET) = 195.06 CHANNEL SLOPE = 0.0048
CHANNEL BASE(FEET) = 1.17 "Z" FACTOR = 0.000
MANNING'S FACTOR = 0.014 MAXIMUM DEPTH(FEET) = 5.00

CHANNEL FLOW THRU SUBAREA(CFS) = 24.29
FLOW VELOCITY(FEET/SEC.) = 4.72 FLOW DEPTH(FEET) = 4.40
TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 9.14
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 961.06 FEET.

FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.378
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 2.16 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.16 SUBAREA RUNOFF(CFS) = 8.47
EFFECTIVE AREA(ACRES) = 8.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 31.69

FLOW PROCESS FROM NODE 33.00 TO NODE 33.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.378
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.43 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.43 SUBAREA RUNOFF(CFS) = 1.69
EFFECTIVE AREA(ACRES) = 8.51 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 8.5 PEAK FLOW RATE(CFS) = 33.38

FLOW PROCESS FROM NODE 33.00 TO NODE 20.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.47 DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 273.11 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 27.20
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 33.38
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 9.31
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 1234.17 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 9.31
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.333
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL D 1.96 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.96 SUBAREA RUNOFF(CFS) = 7.61
 EFFECTIVE AREA(ACRES) = 10.47 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 40.64

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.31
 RAINFALL INTENSITY(INCH/HR) = 4.33
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 10.47
 TOTAL STREAM AREA(ACRES) = 10.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 40.64

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.16	10.31	4.088	0.23(0.14)	0.62	4.4	10.00
2	40.64	9.31	4.333	0.20(0.02)	0.10	10.5	30.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	56.14	9.31	4.333	0.22(0.05)	0.24	14.4	30.00
2	54.49	10.31	4.088	0.22(0.06)	0.25	14.8	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 56.14 Tc(MIN.) = 9.31
 EFFECTIVE AREA(ACRES) = 14.42 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.24
 TOTAL AREA(ACRES) = 14.8
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 1234.17 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1004.40 DOWNSTREAM(FEET) = 1000.08
 FLOW LENGTH(FEET) = 44.90 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 31.77
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 56.14
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 9.34
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 22.00 = 1279.07 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.34
 RAINFALL INTENSITY(INCH/HR) = 4.33
 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22
 AREA-AVERAGED Ap = 0.24
 EFFECTIVE STREAM AREA(ACRES) = 14.42
 TOTAL STREAM AREA(ACRES) = 14.84
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 56.14

 FLOW PROCESS FROM NODE 50.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 286.76
ELEVATION DATA: UPSTREAM(FEET) = 1023.20 DOWNSTREAM(FEET) = 1015.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.011
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.568
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL C 0.12 0.25 0.100 69 6.01
COMMERCIAL D 0.21 0.20 0.100 75 6.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.65
TOTAL AREA(ACRES) = 0.33 PEAK FLOW RATE(CFS) = 1.65

FLOW PROCESS FROM NODE 52.00 TO NODE 54.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1015.40 DOWNSTREAM(FEET) = 1012.60
CHANNEL LENGTH THRU SUBAREA(FEET) = 223.87 CHANNEL SLOPE = 0.0125
CHANNEL BASE(FEET) = 30.00 "Z" FACTOR = 15.000
MANNING'S FACTOR = 0.017 MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.599
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.75 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.19
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.57
AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 2.38
Tc(MIN.) = 8.39
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 3.09
EFFECTIVE AREA(ACRES) = 1.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 4.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.08 FLOW VELOCITY(FEET/SEC.) = 1.76
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 510.63 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 56.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1005.68
FLOW LENGTH(FEET) = 325.11 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.33
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.45
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 9.25
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 835.74 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.68 DOWNSTREAM(FEET) = 1000.08
FLOW LENGTH(FEET) = 120.81 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.58
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.45
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 9.46
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 22.00 = 956.55 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.46
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.294
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.25 0.25 0.100 69
COMMERCIAL D 1.97 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.22 SUBAREA RUNOFF(CFS) = 8.54
EFFECTIVE AREA(ACRES) = 3.30 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.3 PEAK FLOW RATE(CFS) = 12.69

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc(MIN.) = 9.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.294
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL C 0.06 0.25 0.100 69
 COMMERCIAL D 1.87 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.93 SUBAREA RUNOFF(CFS) = 7.42
 EFFECTIVE AREA(ACRES) = 5.23 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 20.12

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.46
 RAINFALL INTENSITY(INCH/HR) = 4.29
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 5.23
 TOTAL STREAM AREA(ACRES) = 5.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.12

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	56.14	9.34	4.326	0.22(0.05)	0.24	14.4	30.00
1	54.49	10.33	4.083	0.22(0.06)	0.25	14.8	10.00
2	20.12	9.46	4.294	0.20(0.02)	0.10	5.2	50.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	76.15	9.34	4.326	0.22(0.04)	0.20	19.6	30.00
2	76.06	9.46	4.294	0.22(0.04)	0.20	19.7	50.00
3	73.61	10.33	4.083	0.22(0.05)	0.21	20.1	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 76.15 Tc(MIN.) = 9.34
 EFFECTIVE AREA(ACRES) = 19.58 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.20
 TOTAL AREA(ACRES) = 20.1
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 22.00 = 1279.07 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1000.08 DOWNSTREAM(FEET) = 995.70
 FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 43.09
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 76.15
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.35
 LONGEST FLOWPATH FROM NODE 30.00 TO NODE 24.00 = 1317.07 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 20.1 TC(MIN.) = 9.35
 EFFECTIVE AREA(ACRES) = 19.58 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.204
 PEAK FLOW RATE(CFS) = 76.15

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	76.15	9.35	4.322	0.22(0.04)	0.20	19.6	30.00
2	76.06	9.47	4.290	0.22(0.04)	0.20	19.7	50.00
3	73.61	10.35	4.079	0.22(0.05)	0.21	20.1	10.00

END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:
Tait & Associates, Inc
100 year- Existing Condition Outlet #2

FILE NAME: OUT2100E.DAT
TIME/DATE OF STUDY: 12:31 10/17/2019
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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150
2 10.0 1.0 0.001/0.001/0.005 0.08 0.10 0.0100 0.010 0.0080

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 273.10
ELEVATION DATA: UPSTREAM(FEET) = 1014.39 DOWNSTREAM(FEET) = 1010.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.549
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.301
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.58 0.20 0.100 75 6.55
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.76
TOTAL AREA(ACRES) = 0.58 PEAK FLOW RATE(CFS) = 2.76

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 1010.00
DOWNSTREAM NODE ELEVATION(FEET) = 1008.80
CHANNEL LENGTH THRU SUBAREA(FEET) = 149.79
"V" GUTTER WIDTH(FEET) = 3.00 GUTTER HIKE(FEET) = 0.125
PAVEMENT LIP(FEET) = 0.031 MANNING'S N = .0140
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 0.50
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.815
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.11 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.14
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.09
AVERAGE FLOW DEPTH(FEET) = 0.29 FLOOD WIDTH(FEET) = 29.72
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 7.75
SUBAREA AREA(ACRES) = 1.11 SUBAREA RUNOFF(CFS) = 4.79
EFFECTIVE AREA(ACRES) = 1.69 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 7.29

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.32 FLOOD WIDTH(FEET) = 34.82
FLOW VELOCITY(FEET/SEC.) = 2.22 DEPTH*VELOCITY(FT*FT/SEC) = 0.70
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 422.89 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.7 TC(MIN.) = 7.75
EFFECTIVE AREA(ACRES) = 1.69 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 7.29

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END OF RATIONAL METHOD ANALYSIS

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COMMERCIAL CORE RETAIL AREA

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:
Tait & Associates, Inc
10 year- Existing Condition Outlet #3

***** DESCRIPTION OF STUDY *****

* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTFALL 3 *
* 10-YEAR STORM EVENT DM *

FILE NAME: DRM10EX3.DAT
TIME/DATE OF STUDY: 09:31 08/07/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- CROWN TO STREET-CROSSFALL WIDTH (FT)	CROSSFALL (FT)	IN- / OUT- / SIDE / SIDE / WAY	PARK- HEIGHT (FT)	GUTTER- GEOMETRIES: CURB WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0313	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
- 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 326.73
ELEVATION DATA: UPSTREAM(FEET) = 1332.32 DOWNSTREAM(FEET) = 1331.94

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.223
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.21	0.30	0.500	56	15.22
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	1.55	0.20	0.500	75	15.22

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 3.23
TOTAL AREA(ACRES) = 1.76 PEAK FLOW RATE(CFS) = 3.23

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1331.94 DOWNSTREAM ELEVATION(FEET) = 1328.22
STREET LENGTH(FEET) = 177.44 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.05
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 8.56
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75

STREET FLOW TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 16.31
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.062
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	0.93	0.20	0.500	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 1.64
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.74

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 9.15
 FLOW VELOCITY(FEET/SEC.) = 2.84 DEPTH*VELOCITY(FT*FT/SEC.) = 0.81
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 504.17 FEET.

 FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1328.22 DOWNSTREAM(FEET) = 1260.18
 FLOW LENGTH(FEET) = 960.76 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.35
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.74
 PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 17.72
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1464.93 FEET.

 FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.72
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	5.09	0.20	0.500	75
COMMERCIAL	D	0.54	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
 SUBAREA AREA(ACRES) = 5.63 SUBAREA RUNOFF(CFS) = 9.49

EFFECTIVE AREA(ACRES) = 8.32 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 14.00

 FLOW PROCESS FROM NODE 103.00 TO NODE 105.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1260.18 DOWNSTREAM(FEET) = 1245.52
 FLOW LENGTH(FEET) = 775.08 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.92
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.00
 PIPE TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 19.35
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2240.01 FEET.

 FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 19.35
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.869
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	3.73	0.20	0.500	75
COMMERCIAL	D	0.65	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
 SUBAREA AREA(ACRES) = 4.38 SUBAREA RUNOFF(CFS) = 7.02
 EFFECTIVE AREA(ACRES) = 12.70 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 12.7 PEAK FLOW RATE(CFS) = 20.30

 FLOW PROCESS FROM NODE 105.00 TO NODE 107.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1245.52 DOWNSTREAM(FEET) = 1240.60
 FLOW LENGTH(FEET) = 98.55 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.63

GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.30
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 19.46
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 2338.56 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.20 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 1.16 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 12.06 0.20 0.500 75
COMMERCIAL C 0.60 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
PUBLIC PARK C 0.70 0.25 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.481
SUBAREA AREA(ACRES) = 19.69 SUBAREA RUNOFF(CFS) = 31.07
EFFECTIVE AREA(ACRES) = 32.39 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 51.30

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 0.53 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 0.81
EFFECTIVE AREA(ACRES) = 32.92 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 32.9 PEAK FLOW RATE(CFS) = 52.11

FLOW PROCESS FROM NODE 107.00 TO NODE 109.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1240.60 DOWNSTREAM(FEET) = 1239.01
FLOW LENGTH(FEET) = 81.43 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.59
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 52.11
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 19.55
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 2419.99 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.859
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.52 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
CONDOMINIUMS C 1.00 0.25 0.350 69
CONDOMINIUMS D 10.74 0.20 0.350 75
PUBLIC PARK D 0.07 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.325
SUBAREA AREA(ACRES) = 13.30 SUBAREA RUNOFF(CFS) = 21.45
EFFECTIVE AREA(ACRES) = 46.22 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 73.43

FLOW PROCESS FROM NODE 109.00 TO NODE 111.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1239.07 DOWNSTREAM(FEET) = 1210.33
FLOW LENGTH(FEET) = 407.01 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.99
GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.43
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 19.84

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.

FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.84

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.843

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.69	0.20	0.100	75
CONDOMINIUMS	D	0.09	0.20	0.350	75
PUBLIC PARK	D	0.85	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505

SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 2.56

EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44

TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 75.32

FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00

FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.45

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 75.32

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 19.86

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.

FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.86

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.842

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	13.30	0.20	0.350	75
PUBLIC PARK	D	3.90	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 27.07

EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44

TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 102.34

FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95

FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 23.3 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 21.17

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 102.34

PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 20.71

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.51	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	5.27	0.20	0.200	75
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196

SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 11.15

EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42

TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 110.93

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.27	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	3.23	0.20	0.200	75
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
SUBAREA AREA(ACRES) = 4.77 SUBAREA RUNOFF(CFS) = 7.54
EFFECTIVE AREA(ACRES) = 76.87 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 76.9 PEAK FLOW RATE(CFS) = 118.47

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.71
RAINFALL INTENSITY(INCH/HR) = 1.80
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.41
EFFECTIVE STREAM AREA(ACRES) = 76.87
TOTAL STREAM AREA(ACRES) = 76.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 118.47

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
ELEVATION DATA: UPSTREAM(FEET) = 1332.00 DOWNSTREAM(FEET) = 1330.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.172
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
CONDOMINIUMS	D	1.42	0.20	0.350	75	11.17

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 3.18

TOTAL AREA(ACRES) = 1.42 PEAK FLOW RATE(CFS) = 3.18

FLOW PROCESS FROM NODE 201.00 TO NODE 203.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 1330.74 DOWNSTREAM ELEVATION(FEET) = 1308.01
STREET LENGTH(FEET) = 789.61 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 15.33
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.52
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.92
STREET FLOW TRAVEL TIME(MIN.) = 2.91 Tc(MIN.) = 14.08
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.91	0.20	0.400	75
CONDOMINIUMS	D	4.97	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
SUBAREA AREA(ACRES) = 6.88 SUBAREA RUNOFF(CFS) = 13.44
EFFECTIVE AREA(ACRES) = 8.30 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 16.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 18.84
FLOW VELOCITY(FEET/SEC.) = 5.05 DEPTH*VELOCITY(FT*FT/SEC.) = 2.45
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1120.62 FEET.

FLOW PROCESS FROM NODE 203.00 TO NODE 205.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1308.01 DOWNSTREAM ELEVATION(FEET) = 1245.00
STREET LENGTH(FEET) = 901.07 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.87
AVERAGE FLOW VELOCITY(FEET/SEC.) = 8.15
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.07
STREET FLOW TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 15.92
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.090

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.07	0.20	0.400	75
COMMERCIAL	D	0.73	0.20	0.100	75
CONDOMINIUMS	D	11.58	0.20	0.350	75
PUBLIC PARK	D	0.01	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 12.39 SUBAREA RUNOFF(CFS) = 22.56
EFFECTIVE AREA(ACRES) = 20.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 20.7 PEAK FLOW RATE(CFS) = 37.64

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.37
FLOW VELOCITY(FEET/SEC.) = 8.81 DEPTH*VELOCITY(FT*FT/SEC.) = 4.80
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 2021.69 FEET.

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1245.00 DOWNSTREAM(FEET) = 1229.65
FLOW LENGTH(FEET) = 135.30 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.64
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 16.03
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2156.99 FEET.

FLOW PROCESS FROM NODE 206.00 TO NODE 210.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1229.65 DOWNSTREAM ELEVATION(FEET) = 1166.68
STREET LENGTH(FEET) = 1205.30 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.52
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 19.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.08
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.56
STREET FLOW TRAVEL TIME(MIN.) = 2.84 Tc(MIN.) = 18.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.897

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.38	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	9.23	0.20	0.200	75
COMMERCIAL	D	0.42	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.197
SUBAREA AREA(ACRES) = 13.03 SUBAREA RUNOFF(CFS) = 21.75
EFFECTIVE AREA(ACRES) = 33.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29

TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 55.78
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12
 FLOW VELOCITY(FEET/SEC.) = 7.33 DEPTH*VELOCITY(FT*FT/SEC.) = 3.82
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 3362.29 FEET.

 FLOW PROCESS FROM NODE 210.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1166.68 DOWNSTREAM(FEET) = 1159.95
 FLOW LENGTH(FEET) = 307.60 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.76
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 55.78
 PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 19.15
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 119.00 = 3669.89 FEET.

 FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.15
 RAINFALL INTENSITY(INCH/HR) = 1.88
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.29
 EFFECTIVE STREAM AREA(ACRES) = 33.72
 TOTAL STREAM AREA(ACRES) = 33.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.78

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	118.47	20.71	1.798	0.21(0.09)	0.41	76.9	100.00
2	55.78	19.15	1.880	0.20(0.06)	0.29	33.7	200.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	170.61	19.15	1.880	0.21(0.08)	0.37	104.8	200.00
2	171.73	20.71	1.798	0.21(0.08)	0.37	110.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 171.73 Tc(MIN.) = 20.71
 EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 110.6
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

 FLOW PROCESS FROM NODE 119.00 TO NODE 121.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1159.95 DOWNSTREAM(FEET) = 1150.00
 FLOW LENGTH(FEET) = 321.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 27.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.88
 GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 171.73
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 20.97
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 121.00 = 4244.83 FEET.

 FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.97
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.785
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	6.04	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	8.06	0.20	0.200	75
COMMERCIAL	C	0.97	0.25	0.100	69
COMMERCIAL	D	1.54	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.185
 SUBAREA AREA(ACRES) = 16.61 SUBAREA RUNOFF(CFS) = 26.08
 EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 196.08

FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1150.00 DOWNSTREAM(FEET) = 1140.00
FLOW LENGTH(FEET) = 798.79 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.28
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 196.08
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 21.84
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 5043.62 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.84
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 6.79 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 17.92 0.20 0.200 75
APARTMENTS C 4.46 0.25 0.200 69
APARTMENTS D 0.69 0.20 0.200 75
COMMERCIAL C 0.78 0.25 0.100 69
COMMERCIAL D 1.88 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.192
SUBAREA AREA(ACRES) = 32.52 SUBAREA RUNOFF(CFS) = 49.82
EFFECTIVE AREA(ACRES) = 159.72 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 159.7 PEAK FLOW RATE(CFS) = 241.18

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	243.02	20.28	1.820	0.21(0.07)	0.31	153.9	200.00
2	241.18	21.84	1.744	0.21(0.07)	0.31	159.7	100.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 243.02 Tc(MIN.) = 20.28
AREA-AVERAGED Fm(INCH/HR) = 0.07 AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.31 EFFECTIVE AREA(ACRES) = 153.93

FLOW PROCESS FROM NODE 123.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1140.00 DOWNSTREAM(FEET) = 1122.00
FLOW LENGTH(FEET) = 579.78 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.38
GIVEN PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 243.02
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 20.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.85 0.25 0.200 69
COMMERCIAL C 0.56 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.184
SUBAREA AREA(ACRES) = 3.41 SUBAREA RUNOFF(CFS) = 5.38
EFFECTIVE AREA(ACRES) = 157.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 163.1 PEAK FLOW RATE(CFS) = 245.37

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.54 0.25 0.200 69
COMMERCIAL C 0.97 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.172

SUBAREA AREA(ACRES) = 3.51 SUBAREA RUNOFF(CFS) = 5.54
 EFFECTIVE AREA(ACRES) = 160.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 166.6 PEAK FLOW RATE(CFS) = 250.91

 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 20.71
 RAINFALL INTENSITY(INCH/HR) = 1.80
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.31
 EFFECTIVE STREAM AREA(ACRES) = 160.85
 TOTAL STREAM AREA(ACRES) = 166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 250.91

 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 320.55
 ELEVATION DATA: UPSTREAM(FEET) = 1163.74 DOWNSTREAM(FEET) = 1148.43

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.616
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.798
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.29	0.25	0.200	69	5.99
COMMERCIAL	C	1.36	0.25	0.100	69	5.62

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.118
 SUBAREA RUNOFF(CFS) = 5.60
 TOTAL AREA(ACRES) = 1.65 PEAK FLOW RATE(CFS) = 5.60

 FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 3 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 1148.43 DOWNSTREAM ELEVATION(FEET) = 1141.94
 STREET LENGTH(FEET) = 235.77 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.31
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.39
 HALFSTREET FLOOD WIDTH(FEET) = 13.04
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.05
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.56
 STREET FLOW TRAVEL TIME(MIN.) = 0.97 T_c (MIN.) = 6.59
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.467

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.47	0.25	0.200	69
COMMERCIAL	C	4.51	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
 SUBAREA AREA(ACRES) = 4.98 SUBAREA RUNOFF(CFS) = 15.42
 EFFECTIVE AREA(ACRES) = 6.63 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 20.52

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.68
 FLOW VELOCITY(FEET/SEC.) = 4.49 DEPTH*VELOCITY(FT*FT/SEC.) = 1.93
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 556.32 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1141.94 DOWNSTREAM(FEET) = 1122.00
 FLOW LENGTH(FEET) = 643.31 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.02
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 20.52
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 7.48
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1199.63 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 7.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.224
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.51 0.25 0.200 69
COMMERCIAL C 3.05 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
SUBAREA AREA(ACRES) = 5.56 SUBAREA RUNOFF(CFS) = 15.95
EFFECTIVE AREA(ACRES) = 12.19 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 12.2 PEAK FLOW RATE(CFS) = 35.02

FLOW PROCESS FROM NODE 303.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1122.13 DOWNSTREAM(FEET) = 1122.00
FLOW LENGTH(FEET) = 81.38 MANNING'S N = 0.13
DEPTH OF FLOW IN 48.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.60
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.02
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 7.77
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 129.00 = 1281.01 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.77
RAINFALL INTENSITY(INCH/HR) = 3.15
AREA-AVERAGED Fm(INCH/HR) = 0.03

AREA-AVERAGED Fp(INCH/HR) = 0.25
AREA-AVERAGED Ap = 0.13
EFFECTIVE STREAM AREA(ACRES) = 12.19
TOTAL STREAM AREA(ACRES) = 12.19
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.02

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	250.91	20.71	1.798	0.21(0.06)	0.31	160.9	200.00
1	248.85	22.27	1.725	0.21(0.07)	0.31	166.6	100.00
2	35.02	7.77	3.153	0.25(0.03)	0.13	12.2	300.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	202.76	7.77	3.153	0.21(0.06)	0.28	72.5	300.00
2	270.73	20.71	1.798	0.21(0.06)	0.29	173.0	200.00
3	267.84	22.27	1.725	0.21(0.06)	0.30	178.8	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 270.73 Tc(MIN.) = 20.71
EFFECTIVE AREA(ACRES) = 173.04 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 178.8
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 131.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1122.00 DOWNSTREAM(FEET) = 1121.90
FLOW LENGTH(FEET) = 35.44 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.40
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 270.73
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 20.77
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 131.00 = 5658.84 FEET.

FLOW PROCESS FROM NODE 131.00 TO NODE 131.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 20.77
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.795
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         1.86   0.25  0.100  69
COMMERCIAL           D         0.14   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.00   SUBAREA RUNOFF(CFS) = 3.19
EFFECTIVE AREA(ACRES) = 175.04   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 180.8   PEAK FLOW RATE(CFS) = 273.08

*****
FLOW PROCESS FROM NODE 131.00 TO NODE 133.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1103.76 DOWNSTREAM(FEET) = 1101.65
FLOW LENGTH(FEET) = 503.15 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.49
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 273.08
PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 21.49
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 133.00 = 6161.99 FEET.

*****
FLOW PROCESS FROM NODE 133.00 TO NODE 133.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 21.49
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.760
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         1.00   0.25  0.100  69
COMMERCIAL           D         0.87   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.87   SUBAREA RUNOFF(CFS) = 2.92
EFFECTIVE AREA(ACRES) = 176.91   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 182.7   PEAK FLOW RATE(CFS) = 273.08
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1101.65 DOWNSTREAM(FEET) = 1101.33
FLOW LENGTH(FEET) = 60.37 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.49
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 273.08
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.58
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 6222.36 FEET.

*****
FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 21.58
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.756
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C         0.36   0.25  0.100  69
COMMERCIAL           D         0.44   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80   SUBAREA RUNOFF(CFS) = 1.25
EFFECTIVE AREA(ACRES) = 177.71   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 183.5   PEAK FLOW RATE(CFS) = 273.08
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 135.00 TO NODE 137.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1101.33 DOWNSTREAM(FEET) = 1098.66
FLOW LENGTH(FEET) = 408.71 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.49
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 273.08

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PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 22.18
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 137.00 = 6631.07 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.18
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.729
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.06	0.25	0.100	69
COMMERCIAL	D	1.08	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.14 SUBAREA RUNOFF(CFS) = 7.89
EFFECTIVE AREA(ACRES) = 182.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 188.6 PEAK FLOW RATE(CFS) = 274.62

FLOW PROCESS FROM NODE 137.00 TO NODE 141.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1098.66 DOWNSTREAM(FEET) = 1093.99
FLOW LENGTH(FEET) = 318.57 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 41.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.63
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 274.62
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 22.48
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 141.00 = 6949.64 FEET.

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.716
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.78	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 5.78 SUBAREA RUNOFF(CFS) = 8.80
EFFECTIVE AREA(ACRES) = 188.63 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 194.4 PEAK FLOW RATE(CFS) = 281.22

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.716
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	0.87	0.25	0.400	69
COMMERCIAL	C	0.68	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.268
SUBAREA AREA(ACRES) = 1.55 SUBAREA RUNOFF(CFS) = 2.30
EFFECTIVE AREA(ACRES) = 190.18 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 196.0 PEAK FLOW RATE(CFS) = 283.52

FLOW PROCESS FROM NODE 141.00 TO NODE 145.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1093.99 DOWNSTREAM(FEET) = 1076.30
FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.75
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 283.52
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 22.82
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.82
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.701
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	0.87	0.25	0.400	69
COMMERCIAL	C	0.68	0.25	0.100	69

COMMERCIAL C 0.71 0.25 0.100 69
COMMERCIAL D 0.32 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03 SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 191.21 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0 PEAK FLOW RATE(CFS) = 283.52
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.82
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.701
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	1.02	0.25	0.350	69
CONDOMINIUMS	D	4.41	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43 SUBAREA RUNOFF(CFS) = 7.95
EFFECTIVE AREA(ACRES) = 196.64 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4 PEAK FLOW RATE(CFS) = 290.52

FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1076.30 DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 27.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.69
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 290.52
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 22.96
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.96

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	C	4.75	0.25	0.350	69
CONDOMINIUMS	D	1.68	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43 SUBAREA RUNOFF(CFS) = 9.33
EFFECTIVE AREA(ACRES) = 203.07 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9 PEAK FLOW RATE(CFS) = 298.77

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 22.96
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.40	0.25	0.100	69
PUBLIC PARK	C	0.62	0.25	0.850	69
PUBLIC PARK	D	0.03	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 1.47
EFFECTIVE AREA(ACRES) = 204.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9 PEAK FLOW RATE(CFS) = 300.24

FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1053.58 DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 25.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 36.97
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 300.24
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 23.10
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.10
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.689
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.41	0.25	0.100	69
COMMERCIAL	D	1.11	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 2.28
EFFECTIVE AREA(ACRES) = 205.64 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 211.4 PEAK FLOW RATE(CFS) = 301.45

FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1023.54 DOWNSTREAM(FEET) = 1007.62
FLOW LENGTH(FEET) = 210.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.58
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 301.45
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 23.20
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	75
PUBLIC PARK	D	2.01	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627
SUBAREA AREA(ACRES) = 2.86 SUBAREA RUNOFF(CFS) = 4.01
EFFECTIVE AREA(ACRES) = 208.50 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 214.3 PEAK FLOW RATE(CFS) = 304.66

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.40
EFFECTIVE AREA(ACRES) = 208.77 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 214.6 PEAK FLOW RATE(CFS) = 305.07

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 23.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	5.30	0.25	0.500	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	0.58	0.20	0.500	75
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	9.75	0.25	0.400	69
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.01	0.20	0.400	75
APARTMENTS	C	2.16	0.25	0.200	69
COMMERCIAL	C	2.28	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375
SUBAREA AREA(ACRES) = 21.08 SUBAREA RUNOFF(CFS) = 30.22
EFFECTIVE AREA(ACRES) = 229.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 235.6 PEAK FLOW RATE(CFS) = 335.28

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 23.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           D      4.68   0.20  0.100  75
PUBLIC PARK          C      4.30   0.25  0.850  69
PUBLIC PARK          D      0.67   0.20  0.850  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 9.65   SUBAREA RUNOFF(CFS) = 13.62
EFFECTIVE AREA(ACRES) = 239.50  AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 245.3   PEAK FLOW RATE(CFS) = 348.90

*****
FLOW PROCESS FROM NODE 153.00 TO NODE 155.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1007.62  DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 568.89  MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.77
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 348.90
PIPE TRAVEL TIME(MIN.) = 0.53  Tc(MIN.) = 23.74
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 23.74
RAINFALL INTENSITY(INCH/HR) = 1.66
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.30
EFFECTIVE STREAM AREA(ACRES) = 239.50
TOTAL STREAM AREA(ACRES) = 245.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 348.90

*****
FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.31
ELEVATION DATA: UPSTREAM(FEET) = 1025.50  DOWNSTREAM(FEET) = 1017.82

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.137
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.610
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
    LAND USE         GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL           C      0.15   0.25  0.100  69  6.14
COMMERCIAL           D      0.73   0.20  0.100  75  6.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.84
TOTAL AREA(ACRES) = 0.88  PEAK FLOW RATE(CFS) = 2.84

*****
FLOW PROCESS FROM NODE 401.00 TO NODE 403.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1017.82  DOWNSTREAM(FEET) = 1017.71
FLOW LENGTH(FEET) = 249.58  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.48
ESTIMATED PIPE DIAMETER(INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.84
PIPE TRAVEL TIME(MIN.) = 2.81  Tc(MIN.) = 8.94
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 544.89 FEET.

*****
FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 8.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.909
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
    LAND USE         GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C      0.27   0.25  0.100  69
COMMERCIAL           D      0.80   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.07  SUBAREA RUNOFF(CFS) = 2.78

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EFFECTIVE AREA(ACRES) = 1.95 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 5.07

FLOW PROCESS FROM NODE 403.00 TO NODE 405.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1017.71 DOWNSTREAM(FEET) = 1016.04
 FLOW LENGTH(FEET) = 247.50 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.88
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.07
 PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 9.79
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 405.00 = 792.39 FEET.

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.79
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.763
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.50	0.25	0.100	69
COMMERCIAL	D	2.45	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 2.95 SUBAREA RUNOFF(CFS) = 7.28
 EFFECTIVE AREA(ACRES) = 4.90 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 4.9 PEAK FLOW RATE(CFS) = 12.09

FLOW PROCESS FROM NODE 405.00 TO NODE 155.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1016.04 DOWNSTREAM(FEET) = 1014.57
 FLOW LENGTH(FEET) = 96.59 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.93
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 12.09

PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 9.99
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 155.00 = 888.98 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.99
 RAINFALL INTENSITY(INCH/HR) = 2.73
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 4.90
 TOTAL STREAM AREA(ACRES) = 4.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.09

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	322.60	11.13	2.566	0.23(0.07)	0.30	139.0	300.00
1	348.90	23.74	1.663	0.22(0.07)	0.30	239.5	200.00
1	343.47	25.32	1.602	0.22(0.07)	0.30	245.3	100.00
2	12.09	9.99	2.730	0.21(0.02)	0.10	4.9	400.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	320.65	9.99	2.730	0.23(0.07)	0.29	129.7	400.00
2	333.96	11.13	2.566	0.23(0.07)	0.29	143.9	300.00
3	356.23	23.74	1.663	0.22(0.07)	0.30	244.4	200.00
4	350.53	25.32	1.602	0.22(0.07)	0.30	250.2	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 356.23 Tc(MIN.) = 23.74
 EFFECTIVE AREA(ACRES) = 244.40 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
 TOTAL AREA(ACRES) = 250.2
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 157.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.25 DOWNSTREAM(FEET) = 1002.94
FLOW LENGTH(FEET) = 122.44 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.14
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 356.23
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 23.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 157.00 = 8951.01 FEET.

FLOW PROCESS FROM NODE 157.00 TO NODE 157.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.85
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.658
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.37 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.37 SUBAREA RUNOFF(CFS) = 2.02
EFFECTIVE AREA(ACRES) = 245.77 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 251.6 PEAK FLOW RATE(CFS) = 356.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 157.00 TO NODE 158.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1002.94 DOWNSTREAM(FEET) = 1002.32
FLOW LENGTH(FEET) = 58.04 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.14
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 356.23
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 23.90
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9009.05 FEET.

FLOW PROCESS FROM NODE 158.00 TO NODE 158.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.656
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.19 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 1.75
EFFECTIVE AREA(ACRES) = 246.96 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 252.7 PEAK FLOW RATE(CFS) = 356.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 158.00 TO NODE 160.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1002.32 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 106.27 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 29.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.31
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 356.23
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 23.95
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 160.00 = 9115.32 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 252.7 TC(MIN.) = 23.95
EFFECTIVE AREA(ACRES) = 246.96 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.295
PEAK FLOW RATE(CFS) = 356.23

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	320.65	10.22	2.694	0.23(0.06)	0.29	132.2	400.00
2	333.96	11.36	2.537	0.23(0.06)	0.29	146.5	300.00
3	356.23	23.95	1.654	0.22(0.06)	0.29	247.0	200.00
4	350.53	25.54	1.595	0.22(0.07)	0.30	252.7	100.00

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:
Tait & Associates, Inc
10- year Existing Condition Outlet #4

FILE NAME: DRM10EX4.DAT
TIME/DATE OF STUDY: 06:37 10/21/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROSSFALL (FT)	IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 40.00 TO NODE 50.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 71.00
ELEVATION DATA: UPSTREAM(FEET) = 1011.40 DOWNSTREAM(FEET) = 1010.05

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.29 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.05
TOTAL AREA(ACRES) = 0.29 PEAK FLOW RATE(CFS) = 1.05

FLOW PROCESS FROM NODE 50.00 TO NODE 70.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.75 DOWNSTREAM(FEET) = 1008.82
FLOW LENGTH(FEET) = 185.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.05
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 6.61
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 70.00 = 256.00 FEET.

FLOW PROCESS FROM NODE 70.00 TO NODE 70.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.61
RAINFALL INTENSITY(INCH/HR) = 3.46
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.29
TOTAL STREAM AREA(ACRES) = 0.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.05

FLOW PROCESS FROM NODE 60.00 TO NODE 70.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 284.40
ELEVATION DATA: UPSTREAM(FEET) = 1010.40 DOWNSTREAM(FEET) = 1009.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.213

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.76	0.20	0.100	75	9.21

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 1.94

TOTAL AREA(ACRES) = 0.76 PEAK FLOW RATE(CFS) = 1.94

FLOW PROCESS FROM NODE 70.00 TO NODE 70.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.21
RAINFALL INTENSITY(INCH/HR) = 2.86
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.76
TOTAL STREAM AREA(ACRES) = 0.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.94

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.05	6.61	3.461	0.20(0.02)	0.10	0.3	40.00
2	1.94	9.21	2.860	0.20(0.02)	0.10	0.8	60.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.74	6.61	3.461	0.20(0.02)	0.10	0.8	40.00

2 2.81 9.21 2.860 0.20(0.02) 0.10 1.0 60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.81 T_c (MIN.) = 9.21
EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 70.00 = 284.40 FEET.

FLOW PROCESS FROM NODE 70.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.82 DOWNSTREAM(FEET) = 1008.50
FLOW LENGTH(FEET) = 63.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.93
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.81
PIPE TRAVEL TIME(MIN.) = 0.54 T_c (MIN.) = 9.76
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 347.40 FEET.

FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.76
RAINFALL INTENSITY(INCH/HR) = 2.77
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.05
TOTAL STREAM AREA(ACRES) = 1.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.81

FLOW PROCESS FROM NODE 80.00 TO NODE 90.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 282.00
ELEVATION DATA: UPSTREAM(FEET) = 1009.60 DOWNSTREAM(FEET) = 1008.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM $T_c(MIN.) = 8.805$
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.935
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.56	0.20	0.100	75	8.81

 SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(INCH/HR) = 0.20$
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
 SUBAREA RUNOFF(CFS) = 1.47
 TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 1.47

 FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.81
 RAINFALL INTENSITY(INCH/HR) = 2.94
 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 0.56
 TOTAL STREAM AREA(ACRES) = 0.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.47

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	2.74	7.15	3.307	0.20(0.02)	0.10	0.8	40.00
1	2.81	9.76	2.768	0.20(0.02)	0.10	1.0	60.00
2	1.47	8.81	2.935	0.20(0.02)	0.10	0.6	80.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.09	7.15	3.307	0.20(0.02)	0.10	1.3	40.00
2	4.26	8.81	2.935	0.20(0.02)	0.10	1.5	80.00
3	4.20	9.76	2.768	0.20(0.02)	0.10	1.6	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.26 $T_c(MIN.) = 8.81$
 EFFECTIVE AREA(ACRES) = 1.53 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$ AREA-AVERAGED $A_p = 0.10$

TOTAL AREA(ACRES) = 1.6
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 347.40 FEET.

FLOW PROCESS FROM NODE 90.00 TO NODE 100.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
 ELEVATION DATA: UPSTREAM(FEET) = 1008.50 DOWNSTREAM(FEET) = 1008.15
 FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.26
 PIPE TRAVEL TIME(MIN.) = 0.61 $T_c(MIN.) = 9.41$
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 100.00 = 417.40 FEET.

FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.41
 RAINFALL INTENSITY(INCH/HR) = 2.82
 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 1.53
 TOTAL STREAM AREA(ACRES) = 1.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.26

FLOW PROCESS FROM NODE 95.00 TO NODE 98.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 165.00
 ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1009.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM $T_c(MIN.) = 6.507$
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.491
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
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COMMERCIAL D 0.72 0.20 0.100 75 6.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.25
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 2.25

 FLOW PROCESS FROM NODE 98.00 TO NODE 100.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.54 DOWNSTREAM(FEET) = 1008.15
 FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.89
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.25
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 7.21
 LONGEST FLOWPATH FROM NODE 95.00 TO NODE 100.00 = 245.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.21
 RAINFALL INTENSITY(INCH/HR) = 3.29
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.72
 TOTAL STREAM AREA(ACRES) = 0.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.25

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.09	7.76	3.156	0.20(0.02)	0.10	1.3	40.00
1	4.26	9.41	2.825	0.20(0.02)	0.10	1.5	80.00
1	4.20	10.37	2.673	0.20(0.02)	0.10	1.6	60.00
2	2.25	7.21	3.291	0.20(0.02)	0.10	0.7	95.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.21	7.21	3.291	0.20(0.02)	0.10	1.9	95.00
2	6.24	7.76	3.156	0.20(0.02)	0.10	2.0	40.00
3	6.18	9.41	2.825	0.20(0.02)	0.10	2.3	80.00
4	6.02	10.37	2.673	0.20(0.02)	0.10	2.3	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.24 Tc(MIN.) = 7.76
 EFFECTIVE AREA(ACRES) = 2.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.3
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 100.00 = 417.40 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 110.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.15 DOWNSTREAM(FEET) = 1008.00
 FLOW LENGTH(FEET) = 30.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.24
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 8.02
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 110.00 = 447.40 FEET.

 FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.02
 RAINFALL INTENSITY(INCH/HR) = 3.10
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.01
 TOTAL STREAM AREA(ACRES) = 2.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.24

 FLOW PROCESS FROM NODE 96.00 TO NODE 110.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 420.00
 ELEVATION DATA: UPSTREAM(FEET) = 1013.50 DOWNSTREAM(FEET) = 1010.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.872
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.923
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	1.09	0.20	0.100	75	8.87

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.85
 TOTAL AREA(ACRES) = 1.09 PEAK FLOW RATE(CFS) = 2.85

FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.87
 RAINFALL INTENSITY(INCH/HR) = 2.92
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.09
 TOTAL STREAM AREA(ACRES) = 1.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.85

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.21	7.47	3.225	0.20(0.02)	0.10	1.9	95.00
1	6.24	8.02	3.097	0.20(0.02)	0.10	2.0	40.00
1	6.18	9.68	2.781	0.20(0.02)	0.10	2.3	80.00
1	6.02	10.63	2.635	0.20(0.02)	0.10	2.3	60.00
2	2.85	8.87	2.923	0.20(0.02)	0.10	1.1	96.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.86	7.47	3.225	0.20(0.02)	0.10	2.8	95.00
2	8.97	8.02	3.097	0.20(0.02)	0.10	3.0	40.00
3	9.06	8.87	2.923	0.20(0.02)	0.10	3.2	96.00
4	8.89	9.68	2.781	0.20(0.02)	0.10	3.3	80.00
5	8.59	10.63	2.635	0.20(0.02)	0.10	3.4	60.00

1	8.86	7.47	3.225	0.20(0.02)	0.10	2.8	95.00
2	8.97	8.02	3.097	0.20(0.02)	0.10	3.0	40.00
3	9.06	8.87	2.923	0.20(0.02)	0.10	3.2	96.00
4	8.89	9.68	2.781	0.20(0.02)	0.10	3.3	80.00
5	8.59	10.63	2.635	0.20(0.02)	0.10	3.4	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 9.06 Tc(MIN.) = 8.87
 EFFECTIVE AREA(ACRES) = 3.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.4
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 110.00 = 447.40 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 3.4 TC(MIN.) = 8.87
 EFFECTIVE AREA(ACRES) = 3.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 9.06

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.86	7.47	3.225	0.20(0.02)	0.10	2.8	95.00
2	8.97	8.02	3.097	0.20(0.02)	0.10	3.0	40.00
3	9.06	8.87	2.923	0.20(0.02)	0.10	3.2	96.00
4	8.89	9.68	2.781	0.20(0.02)	0.10	3.3	80.00
5	8.59	10.63	2.635	0.20(0.02)	0.10	3.4	60.00

END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:
Tait & Associates, Inc
10 year Existing Condition Outlet#5

FILE NAME: DRM10EX5.DAT
TIME/DATE OF STUDY: 08:03 10/21/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	MANNING LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 510.00 TO NODE 520.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.00
ELEVATION DATA: UPSTREAM(FEET) = 1014.88 DOWNSTREAM(FEET) = 1010.08

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.188
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.593
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.55 0.20 0.100 75 6.19
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.98
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 4.98
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.5 TC(MIN.) = 6.19
EFFECTIVE AREA(ACRES) = 1.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 4.98
=====

END OF RATIONAL METHOD ANALYSIS



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Analysis prepared by:

Tait & Associates, Inc
10-year Existing Condition Watershed #6 (Sheetflow)

FILE NAME: DRM10EX6.DAT
TIME/DATE OF STUDY: 08:15 10/21/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	MANNING LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 60.00 TO NODE 65.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 104.00
ELEVATION DATA: UPSTREAM(FEET) = 1017.50 DOWNSTREAM(FEET) = 1010.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.44 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.60
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.60

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.4 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.44 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 1.60

END OF RATIONAL METHOD ANALYSIS



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Analysis prepared by:
Tait & Associates, Inc
100- year Existing Condition Outlet #3

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD EXISTING CONDITION HYDROLOGY OUTFALL 3 *
* 100-YEAR STORM EVENT EM *

FILE NAME: DRM00EX3.DAT
TIME/DATE OF STUDY: 10:18 08/14/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- CROWN TO STREET-CROSSFALL WIDTH (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE/ WAY (FT)	CURB GUTTER-GEOMETRIES: HEIGHT (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67
2	30.0	25.0	0.017/0.017/0.017	0.67
3	50.0	45.0	0.017/0.017/0.017	0.67

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 326.73
ELEVATION DATA: UPSTREAM(FEET) = 1332.32 DOWNSTREAM(FEET) = 1331.94

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 15.223
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.269
SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.21	0.30	0.500	76	15.22
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	1.55	0.20	0.500	91	15.22

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 5.01
TOTAL AREA(ACRES) = 1.76 PEAK FLOW RATE(CFS) = 5.01

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 1331.94 DOWNSTREAM ELEVATION(FEET) = 1328.22
STREET LENGTH(FEET) = 177.44 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 10.42
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.01
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.93

STREET FLOW TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 16.21
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.154
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	0.93	0.20	0.500	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 2.56
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 7.38

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 11.10
 FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH*VELOCITY(FT*FT/SEC.) = 1.01
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 504.17 FEET.

 FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1328.22 DOWNSTREAM(FEET) = 1260.18
 FLOW LENGTH(FEET) = 960.76 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.86
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.38
 PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 17.45
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1464.93 FEET.

 FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.023
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	5.09	0.20	0.500	91
COMMERCIAL	D	0.54	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
 SUBAREA AREA(ACRES) = 5.63 SUBAREA RUNOFF(CFS) = 14.85

EFFECTIVE AREA(ACRES) = 8.32 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 21.92

 FLOW PROCESS FROM NODE 103.00 TO NODE 105.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1260.18 DOWNSTREAM(FEET) = 1245.52
 FLOW LENGTH(FEET) = 775.08 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.40
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.92
 PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 18.49
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2240.01 FEET.

 FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 18.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.924
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	3.73	0.20	0.500	91
COMMERCIAL	D	0.65	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
 SUBAREA AREA(ACRES) = 4.38 SUBAREA RUNOFF(CFS) = 11.18
 EFFECTIVE AREA(ACRES) = 12.70 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 12.7 PEAK FLOW RATE(CFS) = 32.36

 FLOW PROCESS FROM NODE 105.00 TO NODE 107.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1245.52 DOWNSTREAM(FEET) = 1240.60
 FLOW LENGTH(FEET) = 98.55 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.38

GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 32.36
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 18.59
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 2338.56 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	4.20	0.30	0.500	76
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	1.16	0.25	0.500	86
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	12.06	0.20	0.500	91
COMMERCIAL	C	0.60	0.25	0.100	86
COMMERCIAL	D	0.97	0.20	0.100	91
PUBLIC PARK	C	0.70	0.25	0.850	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.481
 SUBAREA AREA(ACRES) = 19.69 SUBAREA RUNOFF(CFS) = 49.71
 EFFECTIVE AREA(ACRES) = 32.39 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 81.97

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	D	0.53	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
 SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 1.31
 EFFECTIVE AREA(ACRES) = 32.92 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 32.9 PEAK FLOW RATE(CFS) = 83.28

FLOW PROCESS FROM NODE 107.00 TO NODE 109.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1240.60 DOWNSTREAM(FEET) = 1239.01
 FLOW LENGTH(FEET) = 81.43 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 26.51
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 83.28
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 18.64
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 2419.99 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.64
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.911
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.52	0.25	0.100	86
COMMERCIAL	D	0.97	0.20	0.100	91
CONDOMINIUMS	C	1.00	0.25	0.350	86
CONDOMINIUMS	D	10.74	0.20	0.350	91
PUBLIC PARK	D	0.07	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.325
 SUBAREA AREA(ACRES) = 13.30 SUBAREA RUNOFF(CFS) = 34.05
 EFFECTIVE AREA(ACRES) = 46.22 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 117.19

FLOW PROCESS FROM NODE 109.00 TO NODE 111.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1239.07 DOWNSTREAM(FEET) = 1210.33
 FLOW LENGTH(FEET) = 407.01 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 25.32
 GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 117.19
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 18.91

```

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.
*****
FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.887
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.69 0.20 0.100 91
CONDOMINIUMS D 0.09 0.20 0.350 91
PUBLIC PARK D 0.85 0.20 0.850 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 4.09
EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 120.29
*****
FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00
FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.02
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 120.29
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 18.93
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.
*****
FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 13.30 0.20 0.350 91
PUBLIC PARK D 3.90 0.20 0.850 91

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463
SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 43.23
EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 163.45
*****
FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95
FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.12
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 163.45
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 19.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.
*****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL "11+ DWELLINGS/ACRE" C 1.51 0.25 0.200 86
RESIDENTIAL "11+ DWELLINGS/ACRE" D 5.27 0.20 0.200 91
COMMERCIAL D 0.27 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 17.63
EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 177.23
*****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

```

MAINLINE Tc(MIN.) = 19.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.27	0.25	0.200	86
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	3.23	0.20	0.200	91
COMMERCIAL	D	0.27	0.20	0.100	91

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
 SUBAREA AREA(ACRES) = 4.77 SUBAREA RUNOFF(CFS) = 11.93
 EFFECTIVE AREA(ACRES) = 76.87 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 76.9 PEAK FLOW RATE(CFS) = 189.15

 FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.71
 RAINFALL INTENSITY(INCH/HR) = 2.82
 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.41
 EFFECTIVE STREAM AREA(ACRES) = 76.87
 TOTAL STREAM AREA(ACRES) = 76.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 189.15

 FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
 ELEVATION DATA: UPSTREAM(FEET) = 1332.00 DOWNSTREAM(FEET) = 1330.74

$Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.172
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.903
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
CONDOMINIUMS	D	1.42	0.20	0.350	91	11.17

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA RUNOFF(CFS) = 4.90
 TOTAL AREA(ACRES) = 1.42 PEAK FLOW RATE(CFS) = 4.90

 FLOW PROCESS FROM NODE 201.00 TO NODE 203.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 3 USED)<<<<

UPSTREAM ELEVATION(FEET) = 1330.74 DOWNSTREAM ELEVATION(FEET) = 1308.01
 STREET LENGTH(FEET) = 789.61 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.41
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.48
 HALFSTREET FLOOD WIDTH(FEET) = 18.40
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.01
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.39
 STREET FLOW TRAVEL TIME(MIN.) = 2.63 Tc(MIN.) = 13.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.459

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.91	0.20	0.400	91
CONDOMINIUMS	D	4.97	0.20	0.350	91

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
 SUBAREA AREA(ACRES) = 6.88 SUBAREA RUNOFF(CFS) = 20.96
 EFFECTIVE AREA(ACRES) = 8.30 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 25.30

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 22.45
 FLOW VELOCITY(FEET/SEC.) = 5.65 DEPTH*VELOCITY(FT*FT/SEC.) = 3.08
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1120.62 FEET.

FLOW PROCESS FROM NODE 203.00 TO NODE 205.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1308.01 DOWNSTREAM ELEVATION(FEET) = 1245.00
STREET LENGTH(FEET) = 901.07 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.00
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 9.09
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.14
STREET FLOW TRAVEL TIME(MIN.) = 1.65 Tc(MIN.) = 15.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.242

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.07	0.20	0.400	91
COMMERCIAL	D	0.73	0.20	0.100	91
CONDOMINIUMS	D	11.58	0.20	0.350	91
PUBLIC PARK	D	0.01	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 12.39 SUBAREA RUNOFF(CFS) = 35.40
EFFECTIVE AREA(ACRES) = 20.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 20.7 PEAK FLOW RATE(CFS) = 59.07

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 25.51
FLOW VELOCITY(FEET/SEC.) = 9.84 DEPTH*VELOCITY(FT*FT/SEC.) = 6.08
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 2021.69 FEET.

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1245.00 DOWNSTREAM(FEET) = 1229.65
FLOW LENGTH(FEET) = 135.30 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.43
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 59.07
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 15.52
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2156.99 FEET.

FLOW PROCESS FROM NODE 206.00 TO NODE 210.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1229.65 DOWNSTREAM ELEVATION(FEET) = 1166.68
STREET LENGTH(FEET) = 1205.30 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.77
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.90
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.50
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 18.06
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.964

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.38	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	9.23	0.20	0.200	91
COMMERCIAL	D	0.42	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.197
SUBAREA AREA(ACRES) = 13.03 SUBAREA RUNOFF(CFS) = 34.27

EFFECTIVE AREA(ACRES) = 33.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 88.17

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 24.10
 FLOW VELOCITY(FEET/SEC.) = 8.19 DEPTH*VELOCITY(FT*FT/SEC.) = 4.86
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 3362.29 FEET.

 FLOW PROCESS FROM NODE 210.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1166.68 DOWNSTREAM(FEET) = 1159.95
 FLOW LENGTH(FEET) = 307.60 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.07
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.17
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 18.24
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 119.00 = 3669.89 FEET.

 FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 18.24
 RAINFALL INTENSITY(INCH/HR) = 2.95
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.29
 EFFECTIVE STREAM AREA(ACRES) = 33.72
 TOTAL STREAM AREA(ACRES) = 33.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 88.17

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	189.15	19.71	2.820	0.21(0.09)	0.41	76.9	100.00
2	88.17	18.24	2.947	0.20(0.06)	0.29	33.7	200.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	271.44	18.24	2.947	0.21(0.08)	0.37	104.9	200.00
2	273.44	19.71	2.820	0.21(0.08)	0.37	110.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 273.44 Tc(MIN.) = 19.71
 EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 110.6
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

 FLOW PROCESS FROM NODE 119.00 TO NODE 121.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1159.95 DOWNSTREAM(FEET) = 1150.00
 FLOW LENGTH(FEET) = 321.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 37.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.10
 GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 273.44
 PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 19.94
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 121.00 = 4244.83 FEET.

 FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 19.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.801
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.04	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	8.06	0.20	0.200	91
COMMERCIAL	C	0.97	0.25	0.100	86
COMMERCIAL	D	1.54	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.185
 SUBAREA AREA(ACRES) = 16.61 SUBAREA RUNOFF(CFS) = 41.26
 EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35

TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 312.33

FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1150.00 DOWNSTREAM(FEET) = 1140.00

FLOW LENGTH(FEET) = 798.79 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.91

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 312.33

PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 20.78

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 5043.62 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.78

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.736

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.79	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	17.92	0.20	0.200	91
APARTMENTS	C	4.46	0.25	0.200	86
APARTMENTS	D	0.69	0.20	0.200	91
COMMERCIAL	C	0.78	0.25	0.100	86
COMMERCIAL	D	1.88	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.192

SUBAREA AREA(ACRES) = 32.52 SUBAREA RUNOFF(CFS) = 78.84

EFFECTIVE AREA(ACRES) = 159.72 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31

TOTAL AREA(ACRES) = 159.7 PEAK FLOW RATE(CFS) = 383.70

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	386.28	19.31	2.852	0.21(0.07)	0.31	154.0	200.00
2	383.70	20.78	2.736	0.21(0.07)	0.31	159.7	100.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 386.28 Tc(MIN.) = 19.31

AREA-AVERAGED Fm(INCH/HR) = 0.07 AREA-AVERAGED Fp(INCH/HR) = 0.21

AREA-AVERAGED Ap = 0.31 EFFECTIVE AREA(ACRES) = 154.01

FLOW PROCESS FROM NODE 123.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1140.00 DOWNSTREAM(FEET) = 1122.00

FLOW LENGTH(FEET) = 579.78 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 27.23

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 386.28

PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 19.67

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 19.67

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.823

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	2.85	0.25	0.200	86
COMMERCIAL	C	0.56	0.25	0.100	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.184

SUBAREA AREA(ACRES) = 3.41 SUBAREA RUNOFF(CFS) = 8.52

EFFECTIVE AREA(ACRES) = 157.42 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31

TOTAL AREA(ACRES) = 163.1 PEAK FLOW RATE(CFS) = 390.70

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 19.67

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.823

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					

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"11+ DWELLINGS/ACRE"    C      2.54    0.25    0.200    86
COMMERCIAL              C      0.97    0.25    0.100    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.172
SUBAREA AREA(ACRES) = 3.51    SUBAREA RUNOFF(CFS) = 8.78
EFFECTIVE AREA(ACRES) = 160.93    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21    AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 166.6    PEAK FLOW RATE(CFS) = 399.48

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FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.67
RAINFALL INTENSITY(INCH/HR) = 2.82
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 160.93
TOTAL STREAM AREA(ACRES) = 166.64
PEAK FLOW RATE(CFS) AT CONFLUENCE = 399.48

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FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 320.55
ELEVATION DATA: UPSTREAM(FEET) = 1163.74    DOWNSTREAM(FEET) = 1148.43

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.616
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.789
SUBAREA Tc AND LOSS RATE DATA(AMC III):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.29	0.25	0.200	86	5.99
COMMERCIAL	C	1.36	0.25	0.100	86	5.62

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.118
SUBAREA RUNOFF(CFS) = 8.55
TOTAL AREA(ACRES) = 1.65    PEAK FLOW RATE(CFS) = 8.55

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FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

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-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<

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=====
UPSTREAM ELEVATION(FEET) = 1148.43    DOWNSTREAM ELEVATION(FEET) = 1141.94
STREET LENGTH(FEET) = 235.77    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 50.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

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SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 20.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.47
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.93
STREET FLOW TRAVEL TIME(MIN.) = 0.88    Tc(MIN.) = 6.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.326
SUBAREA LOSS RATE DATA(AMC III):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.47	0.25	0.200	86
COMMERCIAL	C	4.51	0.25	0.100	86

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
SUBAREA AREA(ACRES) = 4.98    SUBAREA RUNOFF(CFS) = 23.75
EFFECTIVE AREA(ACRES) = 6.63    AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.25    AREA-AVERAGED Ap = 0.11
TOTAL AREA(ACRES) = 6.6    PEAK FLOW RATE(CFS) = 31.62

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48    HALFSTREET FLOOD WIDTH(FEET) = 18.75
FLOW VELOCITY(FEET/SEC.) = 4.96    DEPTH*VELOCITY(FT*FT/SEC.) = 2.40
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 556.32 FEET.

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FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 41

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 1141.94    DOWNSTREAM(FEET) = 1122.00

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FLOW LENGTH(FEET) = 643.31 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.57
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 31.62
 PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 7.28
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1199.63 FEET.

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 7.28
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.987
 SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" C 2.51 0.25 0.200 86
 COMMERCIAL C 3.05 0.25 0.100 86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
 SUBAREA AREA(ACRES) = 5.56 SUBAREA RUNOFF(CFS) = 24.77
 EFFECTIVE AREA(ACRES) = 12.19 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.13
 TOTAL AREA(ACRES) = 12.2 PEAK FLOW RATE(CFS) = 54.37

 FLOW PROCESS FROM NODE 303.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1122.13 DOWNSTREAM(FEET) = 1122.00
 FLOW LENGTH(FEET) = 81.38 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 39.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94
 GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 54.37
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 7.56
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 129.00 = 1281.01 FEET.

 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.56
 RAINFALL INTENSITY(INCH/HR) = 4.88
 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25
 AREA-AVERAGED Ap = 0.13
 EFFECTIVE STREAM AREA(ACRES) = 12.19
 TOTAL STREAM AREA(ACRES) = 12.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 54.37

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	399.48	19.67	2.823	0.21(0.06)	0.31	160.9	200.00
1	396.47	21.13	2.709	0.21(0.07)	0.31	166.6	100.00
2	54.37	7.56	4.882	0.25(0.03)	0.13	12.2	300.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	322.56	7.56	4.882	0.21(0.06)	0.28	74.0	300.00
2	430.76	19.67	2.823	0.21(0.06)	0.29	173.1	200.00
3	426.48	21.13	2.709	0.21(0.06)	0.30	178.8	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 430.76 Tc(MIN.) = 19.67
 EFFECTIVE AREA(ACRES) = 173.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 178.8
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

 FLOW PROCESS FROM NODE 129.00 TO NODE 131.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1122.00 DOWNSTREAM(FEET) = 1121.90
 FLOW LENGTH(FEET) = 35.44 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.13
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 430.76
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 19.70
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 131.00 = 5658.84 FEET.

FLOW PROCESS FROM NODE 131.00 TO NODE 131.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.70
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.86 0.25 0.100 86
COMMERCIAL D 0.14 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 5.03
EFFECTIVE AREA(ACRES) = 175.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 180.8 PEAK FLOW RATE(CFS) = 434.71

FLOW PROCESS FROM NODE 131.00 TO NODE 133.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1103.76 DOWNSTREAM(FEET) = 1101.65
FLOW LENGTH(FEET) = 503.15 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 434.71
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 20.16
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 133.00 = 6161.99 FEET.

FLOW PROCESS FROM NODE 133.00 TO NODE 133.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.16
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.783
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.00 0.25 0.100 86
COMMERCIAL D 0.87 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.87 SUBAREA RUNOFF(CFS) = 4.65

EFFECTIVE AREA(ACRES) = 176.99 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 182.7 PEAK FLOW RATE(CFS) = 434.71
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1101.65 DOWNSTREAM(FEET) = 1101.33
FLOW LENGTH(FEET) = 60.37 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 434.71
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 20.21
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 6222.36 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.21
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.779
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.36 0.25 0.100 86
COMMERCIAL D 0.44 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.98
EFFECTIVE AREA(ACRES) = 177.79 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 183.5 PEAK FLOW RATE(CFS) = 434.84

FLOW PROCESS FROM NODE 135.00 TO NODE 137.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1101.33 DOWNSTREAM(FEET) = 1098.66
FLOW LENGTH(FEET) = 408.71 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 434.84
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 20.59
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 137.00 = 6631.07 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.59
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.750
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 4.06 0.25 0.100 86
COMMERCIAL D 1.08 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.14 SUBAREA RUNOFF(CFS) = 12.61
EFFECTIVE AREA(ACRES) = 182.93 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 188.6 PEAK FLOW RATE(CFS) = 442.82

FLOW PROCESS FROM NODE 137.00 TO NODE 141.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1098.66 DOWNSTREAM(FEET) = 1093.99
FLOW LENGTH(FEET) = 318.57 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.64
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 442.82
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 20.87
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 141.00 = 6949.64 FEET.

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.87
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.728
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 5.78 0.25 0.100 86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.78 SUBAREA RUNOFF(CFS) = 14.06
EFFECTIVE AREA(ACRES) = 188.71 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 194.4 PEAK FLOW RATE(CFS) = 453.33

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.87
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.728
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 0.87 0.25 0.400 86
COMMERCIAL C 0.68 0.25 0.100 86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.268
SUBAREA AREA(ACRES) = 1.55 SUBAREA RUNOFF(CFS) = 3.71
EFFECTIVE AREA(ACRES) = 190.26 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 196.0 PEAK FLOW RATE(CFS) = 457.05

FLOW PROCESS FROM NODE 141.00 TO NODE 145.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1093.99 DOWNSTREAM(FEET) = 1076.30
FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.86
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 457.05
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 21.18
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.18

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.705
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.71 0.25 0.100 86
COMMERCIAL D 0.32 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03 SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 191.29 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0 PEAK FLOW RATE(CFS) = 457.05
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.705
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 1.02 0.25 0.350 86
CONDOMINIUMS D 4.41 0.20 0.350 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43 SUBAREA RUNOFF(CFS) = 12.86
EFFECTIVE AREA(ACRES) = 196.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4 PEAK FLOW RATE(CFS) = 468.42

FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1076.30 DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 36.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.84
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 468.42
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 21.31
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.31
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.696
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 4.75 0.25 0.350 86
CONDOMINIUMS D 1.68 0.20 0.350 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43 SUBAREA RUNOFF(CFS) = 15.12
EFFECTIVE AREA(ACRES) = 203.15 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9 PEAK FLOW RATE(CFS) = 481.90

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.31
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.696
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.40 0.25 0.100 86
PUBLIC PARK C 0.62 0.25 0.850 86
PUBLIC PARK D 0.03 0.20 0.850 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 204.20 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9 PEAK FLOW RATE(CFS) = 484.31

FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1053.58 DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.66
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 484.31
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 21.43

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.43

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.687

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.41	0.25	0.100	86
COMMERCIAL	D	1.11	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 3.65

EFFECTIVE AREA(ACRES) = 205.72 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 211.4 PEAK FLOW RATE(CFS) = 486.34

FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1023.54 DOWNSTREAM(FEET) = 1007.62

FLOW LENGTH(FEET) = 210.38 MANNING'S N = 0.013

DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 37.63

GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 486.34

PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.53

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.53

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	91
PUBLIC PARK	D	2.01	0.20	0.850	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627

SUBAREA AREA(ACRES) = 2.86 SUBAREA RUNOFF(CFS) = 6.58

EFFECTIVE AREA(ACRES) = 208.58 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29

TOTAL AREA(ACRES) = 214.3 PEAK FLOW RATE(CFS) = 491.68

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.53

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.27	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.65

EFFECTIVE AREA(ACRES) = 208.85 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 214.6 PEAK FLOW RATE(CFS) = 492.33

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.53

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL	C	5.30	0.25	0.500	86

"5-7 DWELLINGS/ACRE"

RESIDENTIAL

"5-7 DWELLINGS/ACRE"

RESIDENTIAL

"8-10 DWELLINGS/ACRE"

RESIDENTIAL

"8-10 DWELLINGS/ACRE"

APARTMENTS

COMMERCIAL

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375

SUBAREA AREA(ACRES) = 21.08 SUBAREA RUNOFF(CFS) = 49.11

EFFECTIVE AREA(ACRES) = 229.93 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29

TOTAL AREA(ACRES) = 235.6 PEAK FLOW RATE(CFS) = 541.44

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.53
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 4.68 0.20 0.100 91
PUBLIC PARK C 4.30 0.25 0.850 86
PUBLIC PARK D 0.67 0.20 0.850 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 9.65 SUBAREA RUNOFF(CFS) = 22.27
EFFECTIVE AREA(ACRES) = 239.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 245.3 PEAK FLOW RATE(CFS) = 563.71

FLOW PROCESS FROM NODE 153.00 TO NODE 155.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.62 DOWNSTREAM(FEET) = 1004.25
FLOW LENGTH(FEET) = 568.89 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.71
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 563.71
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 21.86
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 21.86
RAINFALL INTENSITY(INCH/HR) = 2.66
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.30
EFFECTIVE STREAM AREA(ACRES) = 239.58
TOTAL STREAM AREA(ACRES) = 245.29

PEAK FLOW RATE(CFS) AT CONFLUENCE = 563.71

FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 295.31
ELEVATION DATA: UPSTREAM(FEET) = 1025.50 DOWNSTREAM(FEET) = 1017.82

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.137
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.502
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL C 0.15 0.25 0.100 86 6.14
COMMERCIAL D 0.73 0.20 0.100 91 6.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.34
TOTAL AREA(ACRES) = 0.88 PEAK FLOW RATE(CFS) = 4.34

FLOW PROCESS FROM NODE 401.00 TO NODE 403.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1017.82 DOWNSTREAM(FEET) = 1017.71
FLOW LENGTH(FEET) = 249.58 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.63
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.34
PIPE TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 8.68
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 544.89 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.68
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.510
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.27 0.25 0.100 86

COMMERCIAL D 0.80 0.20 0.100 91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 4.32
 EFFECTIVE AREA(ACRES) = 1.95 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 7.88

 FLOW PROCESS FROM NODE 403.00 TO NODE 405.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1017.71 DOWNSTREAM(FEET) = 1016.04
 FLOW LENGTH(FEET) = 247.50 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.27
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.88
 PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 9.46
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 405.00 = 792.39 FEET.

 FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.293
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.50	0.25	0.100	86
COMMERCIAL	D	2.45	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 2.95 SUBAREA RUNOFF(CFS) = 11.34
 EFFECTIVE AREA(ACRES) = 4.90 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 4.9 PEAK FLOW RATE(CFS) = 18.84

 FLOW PROCESS FROM NODE 405.00 TO NODE 155.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1016.04 DOWNSTREAM(FEET) = 1014.57
 FLOW LENGTH(FEET) = 96.59 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.15
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 18.84
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 9.64
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 155.00 = 888.98 FEET.

 FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.64
 RAINFALL INTENSITY(INCH/HR) = 4.25
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 4.90
 TOTAL STREAM AREA(ACRES) = 4.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.84

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	525.25	10.10	4.135	0.23(0.07)	0.30	140.5	300.00
1	563.71	21.86	2.657	0.22(0.07)	0.30	239.6	200.00
1	554.95	23.34	2.559	0.22(0.07)	0.30	245.3	100.00
2	18.84	9.64	4.247	0.21(0.02)	0.10	4.9	400.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	533.94	9.64	4.247	0.23(0.07)	0.29	139.0	400.00
2	543.59	10.10	4.135	0.23(0.07)	0.29	145.4	300.00
3	575.46	21.86	2.657	0.22(0.07)	0.30	244.5	200.00
4	566.26	23.34	2.559	0.22(0.07)	0.30	250.2	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 575.46 Tc(MIN.) = 21.86
 EFFECTIVE AREA(ACRES) = 244.48 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
 TOTAL AREA(ACRES) = 250.2
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 157.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.25 DOWNSTREAM(FEET) = 1002.94
FLOW LENGTH(FEET) = 122.44 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.31
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 575.46
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 21.93
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 157.00 = 8951.01 FEET.

FLOW PROCESS FROM NODE 157.00 TO NODE 157.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.652
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.37 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.37 SUBAREA RUNOFF(CFS) = 3.25
EFFECTIVE AREA(ACRES) = 245.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 251.6 PEAK FLOW RATE(CFS) = 575.46
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 157.00 TO NODE 158.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1002.94 DOWNSTREAM(FEET) = 1002.32
FLOW LENGTH(FEET) = 58.04 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.31
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 575.46
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 21.96
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9009.05 FEET.

FLOW PROCESS FROM NODE 158.00 TO NODE 158.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.96
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.650
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.19 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 2.82
EFFECTIVE AREA(ACRES) = 247.04 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 252.7 PEAK FLOW RATE(CFS) = 575.46
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 158.00 TO NODE 160.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1002.32 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 106.27 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 39.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.63
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 575.46
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 22.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 160.00 = 9115.32 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 252.7 TC(MIN.) = 22.00
EFFECTIVE AREA(ACRES) = 247.04 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.295
PEAK FLOW RATE(CFS) = 575.46

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 533.94 9.79 4.209 0.23(0.06) 0.29 141.6 400.00
2 543.59 10.25 4.100 0.23(0.06) 0.29 148.0 300.00
3 575.46 22.00 2.647 0.22(0.06) 0.29 247.0 200.00
4 566.26 23.49 2.550 0.22(0.07) 0.30 252.7 100.00

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:
Tait & Associates, Inc
100-year Existing Condition Outlet#4

FILE NAME: DRM10EX4.DAT
TIME/DATE OF STUDY: 06:45 10/21/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
=== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150
2 30.0 25.0 0.017/0.017/0.017 0.67 1.50 0.0312 0.125 0.0150
3 50.0 45.0 0.017/0.017/0.017 0.67 2.00 0.0312 0.167 0.0150
=====

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 40.00 TO NODE 50.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 71.00
ELEVATION DATA: UPSTREAM(FEET) = 1011.40 DOWNSTREAM(FEET) = 1010.05

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.29 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.61
TOTAL AREA(ACRES) = 0.29 PEAK FLOW RATE(CFS) = 1.61

FLOW PROCESS FROM NODE 50.00 TO NODE 70.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.75 DOWNSTREAM(FEET) = 1008.82
FLOW LENGTH(FEET) = 185.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.61
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 6.61
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 70.00 = 256.00 FEET.

FLOW PROCESS FROM NODE 70.00 TO NODE 70.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.61
RAINFALL INTENSITY(INCH/HR) = 5.27
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.29
TOTAL STREAM AREA(ACRES) = 0.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

FLOW PROCESS FROM NODE 60.00 TO NODE 70.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 284.40
ELEVATION DATA: UPSTREAM(FEET) = 1010.40 DOWNSTREAM(FEET) = 1009.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 9.213
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.359
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA F_p A_p SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.76 0.20 0.100 75 9.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.97
TOTAL AREA(ACRES) = 0.76 PEAK FLOW RATE(CFS) = 2.97

FLOW PROCESS FROM NODE 70.00 TO NODE 70.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.21
RAINFALL INTENSITY(INCH/HR) = 4.36
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.76
TOTAL STREAM AREA(ACRES) = 0.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.97

** CONFLUENCE DATA **
STREAM Q T_c Intensity F_p (F_m) A_p A_e HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 1.61 6.61 5.275 0.20(0.02) 0.10 0.3 40.00
2 2.97 9.21 4.359 0.20(0.02) 0.10 0.8 60.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM Q T_c Intensity F_p (F_m) A_p A_e HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 4.19 6.61 5.275 0.20(0.02) 0.10 0.8 40.00

2 4.30 9.21 4.359 0.20(0.02) 0.10 1.0 60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.30 T_c (MIN.) = 9.21
EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 70.00 = 284.40 FEET.

FLOW PROCESS FROM NODE 70.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.82 DOWNSTREAM(FEET) = 1008.50
FLOW LENGTH(FEET) = 63.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.93
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.30
PIPE TRAVEL TIME(MIN.) = 0.54 T_c (MIN.) = 9.76
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 347.40 FEET.

FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.76
RAINFALL INTENSITY(INCH/HR) = 4.22
AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.05
TOTAL STREAM AREA(ACRES) = 1.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.30

FLOW PROCESS FROM NODE 80.00 TO NODE 90.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 282.00
ELEVATION DATA: UPSTREAM(FEET) = 1009.60 DOWNSTREAM(FEET) = 1008.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM $T_c(MIN.) = 8.805$
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.474
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.56	0.20	0.100	75	8.81

 SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(INCH/HR) = 0.20$
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
 SUBAREA RUNOFF(CFS) = 2.24
 TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 2.24

 FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.81
 RAINFALL INTENSITY(INCH/HR) = 4.47
 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 0.56
 TOTAL STREAM AREA(ACRES) = 0.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.24

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.19	7.15	5.041	0.20(0.02)	0.10	0.8	40.00
1	4.30	9.76	4.218	0.20(0.02)	0.10	1.0	60.00
2	2.24	8.81	4.474	0.20(0.02)	0.10	0.6	80.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	6.24	7.15	5.041	0.20(0.02)	0.10	1.3	40.00
2	6.50	8.81	4.474	0.20(0.02)	0.10	1.5	80.00
3	6.41	9.76	4.218	0.20(0.02)	0.10	1.6	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.50 $T_c(MIN.) = 8.81$
 EFFECTIVE AREA(ACRES) = 1.53 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$ AREA-AVERAGED $A_p = 0.10$

TOTAL AREA(ACRES) = 1.6
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 90.00 = 347.40 FEET.

FLOW PROCESS FROM NODE 90.00 TO NODE 100.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
 ELEVATION DATA: UPSTREAM(FEET) = 1008.50 DOWNSTREAM(FEET) = 1008.15
 FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.50
 PIPE TRAVEL TIME(MIN.) = 0.61 $T_c(MIN.) = 9.41$
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 100.00 = 417.40 FEET.

FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.41
 RAINFALL INTENSITY(INCH/HR) = 4.31
 AREA-AVERAGED $F_m(INCH/HR) = 0.02$
 AREA-AVERAGED $F_p(INCH/HR) = 0.20$
 AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 1.53
 TOTAL STREAM AREA(ACRES) = 1.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.50

FLOW PROCESS FROM NODE 95.00 TO NODE 98.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 165.00
 ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1009.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM $T_c(MIN.) = 6.507$
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.320
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
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COMMERCIAL D 0.72 0.20 0.100 75 6.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 3.43
 TOTAL AREA(ACRES) = 0.72 PEAK FLOW RATE(CFS) = 3.43

 FLOW PROCESS FROM NODE 98.00 TO NODE 100.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.54 DOWNSTREAM(FEET) = 1008.15
 FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.89
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.43
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 7.21
 LONGEST FLOWPATH FROM NODE 95.00 TO NODE 100.00 = 245.00 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 100.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.21
 RAINFALL INTENSITY(INCH/HR) = 5.02
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.72
 TOTAL STREAM AREA(ACRES) = 0.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.43

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.24	7.76	4.810	0.20(0.02)	0.10	1.3	40.00
1	6.50	9.41	4.306	0.20(0.02)	0.10	1.5	80.00
1	6.41	10.37	4.075	0.20(0.02)	0.10	1.6	60.00
2	3.43	7.21	5.016	0.20(0.02)	0.10	0.7	95.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.49	7.21	5.016	0.20(0.02)	0.10	1.9	95.00
2	9.53	7.76	4.810	0.20(0.02)	0.10	2.0	40.00
3	9.45	9.41	4.306	0.20(0.02)	0.10	2.3	80.00
4	9.20	10.37	4.075	0.20(0.02)	0.10	2.3	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.53 Tc(MIN.) = 7.76
 EFFECTIVE AREA(ACRES) = 2.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 2.3
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 100.00 = 417.40 FEET.

 FLOW PROCESS FROM NODE 100.00 TO NODE 110.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.15 DOWNSTREAM(FEET) = 1008.00
 FLOW LENGTH(FEET) = 30.00 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 1.92
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 6.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.53
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 8.02
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 110.00 = 447.40 FEET.

 FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.02
 RAINFALL INTENSITY(INCH/HR) = 4.72
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.01
 TOTAL STREAM AREA(ACRES) = 2.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.53

 FLOW PROCESS FROM NODE 96.00 TO NODE 110.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 420.00
 ELEVATION DATA: UPSTREAM(FEET) = 1013.50 DOWNSTREAM(FEET) = 1010.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.872
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.455
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	1.09	0.20	0.100	75	8.87

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 4.35
 TOTAL AREA(ACRES) = 1.09 PEAK FLOW RATE(CFS) = 4.35

 FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.87
 RAINFALL INTENSITY(INCH/HR) = 4.45
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.09
 TOTAL STREAM AREA(ACRES) = 1.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.35

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.49	7.47	4.915	0.20(0.02)	0.10	1.9	95.00
1	9.53	8.02	4.720	0.20(0.02)	0.10	2.0	40.00
1	9.45	9.68	4.239	0.20(0.02)	0.10	2.3	80.00
1	9.20	10.63	4.017	0.20(0.02)	0.10	2.3	60.00
2	4.35	8.87	4.455	0.20(0.02)	0.10	1.1	96.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.53	7.47	4.915	0.20(0.02)	0.10	2.8	95.00
2	13.70	8.02	4.720	0.20(0.02)	0.10	3.0	40.00
3	13.84	8.87	4.455	0.20(0.02)	0.10	3.2	96.00
4	13.59	9.68	4.239	0.20(0.02)	0.10	3.3	80.00
5	13.12	10.63	4.017	0.20(0.02)	0.10	3.4	60.00

1	13.53	7.47	4.915	0.20(0.02)	0.10	2.8	95.00
2	13.70	8.02	4.720	0.20(0.02)	0.10	3.0	40.00
3	13.84	8.87	4.455	0.20(0.02)	0.10	3.2	96.00
4	13.59	9.68	4.239	0.20(0.02)	0.10	3.3	80.00
5	13.12	10.63	4.017	0.20(0.02)	0.10	3.4	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 13.84 Tc(MIN.) = 8.87
 EFFECTIVE AREA(ACRES) = 3.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.4
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 110.00 = 447.40 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 3.4 TC(MIN.) = 8.87
 EFFECTIVE AREA(ACRES) = 3.22 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 13.84

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.53	7.47	4.915	0.20(0.02)	0.10	2.8	95.00
2	13.70	8.02	4.720	0.20(0.02)	0.10	3.0	40.00
3	13.84	8.87	4.455	0.20(0.02)	0.10	3.2	96.00
4	13.59	9.68	4.239	0.20(0.02)	0.10	3.3	80.00
5	13.12	10.63	4.017	0.20(0.02)	0.10	3.4	60.00

END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:
Tait & Associates, Inc
100-year Existing Condition Outlet#5

FILE NAME: DRM10EX5.DAT
TIME/DATE OF STUDY: 08:00 10/21/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	MANNING LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 510.00 TO NODE 520.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 256.00
ELEVATION DATA: UPSTREAM(FEET) = 1014.88 DOWNSTREAM(FEET) = 1010.08

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.188
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.476
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	1.55	0.20	0.100	75	6.19

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 7.61
TOTAL AREA(ACRES) = 1.55 PEAK FLOW RATE(CFS) = 7.61

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.55 T_c (MIN.) = 6.19
EFFECTIVE AREA(ACRES) = 1.55 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.100
PEAK FLOW RATE(CFS) = 7.61

=====

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:
Tait & Associates, Inc
100-year Existing Condition Watershed#6 (Sheetflow)

FILE NAME: DRM10EX6.DAT
TIME/DATE OF STUDY: 08:18 10/21/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / SIDE / WAY	OUT-/PARK- SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 60.00 TO NODE 65.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 104.00
ELEVATION DATA: UPSTREAM(FEET) = 1017.50 DOWNSTREAM(FEET) = 1010.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.44 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.44
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 2.44
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.4 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.44 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 2.44
=====

END OF RATIONAL METHOD ANALYSIS

↑

Appendix D – Proposed Condition Hydrology Results

Dry Stack Lease Area

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR DRY STACK LEASE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 1 *
* 10-YEAR STORM EVENT DM *

FILE NAME: 1P10R.DAT
TIME/DATE OF STUDY: 09:39 11/12/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167 0.0150	
2	10.0	1.0	0.001/0.001/0.005	0.08	0.10 0.0100 0.010 0.0080	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
- (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.46
ELEVATION DATA: UPSTREAM(FEET) = 1091.22 DOWNSTREAM(FEET) = 1064.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.812
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.934
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL POOR COVER "OPEN BRUSH"	C	0.11	0.25	1.000	84	8.81
NATURAL POOR COVER "OPEN BRUSH"	D	0.21	0.20	1.000	88	8.81

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.78
TOTAL AREA(ACRES) = 0.32 PEAK FLOW RATE(CFS) = 0.78

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1064.62 DOWNSTREAM(FEET) = 1054.83
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.33 CHANNEL SLOPE = 0.0506
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.843
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL POOR COVER "OPEN BRUSH"	C	0.50	0.25	1.000	84
NATURAL POOR COVER "OPEN BRUSH"	D	0.17	0.20	1.000	88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.57
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.47
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 0.50
Tc(MIN.) = 9.31
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 1.57
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 2.33

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 7.22
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 521.79 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1054.83 DOWNSTREAM(FEET) = 1025.41
CHANNEL LENGTH THRU SUBAREA(FEET) = 50.65 CHANNEL SLOPE = 0.5808
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 1.00
CHANNEL FLOW THRU SUBAREA(CFS) = 2.33
FLOW VELOCITY(FEET/SEC.) = 3.17 FLOW DEPTH(FEET) = 0.61
TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 9.58
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 572.44 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 16.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1021.34 DOWNSTREAM(FEET) = 1019.68
FLOW LENGTH(FEET) = 33.59 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.12
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.33
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 9.64
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.00 = 606.03 FEET.

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.64
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.06	0.20	0.100	75
PUBLIC PARK	D	0.03	0.20	0.850	75
NATURAL POOR COVER "OPEN BRUSH"	C	0.96	0.25	1.000	84

NATURAL POOR COVER

"OPEN BRUSH" D 0.53 0.20 1.000 88

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963

SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.64

EFFECTIVE AREA(ACRES) = 2.57 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.98

TOTAL AREA(ACRES) = 2.6 PEAK FLOW RATE(CFS) = 5.92

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.64

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.03	0.25	0.100	69
COMMERCIAL	D	0.64	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 1.67

EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.18

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80

TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 7.59

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.64

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.45	0.25	0.100	69
COMMERCIAL	D	0.05	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.24

EFFECTIVE AREA(ACRES) = 3.74 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.70

TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 8.83

FLOW PROCESS FROM NODE 16.00 TO NODE 18.00 IS CODE = 41

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1019.68 DOWNSTREAM(FEET) = 1017.06
FLOW LENGTH(FEET) = 52.88 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.84
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.83
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 9.72
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.00 = 658.91 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.63 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 4.37 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 10.35

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.10 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1017.06 DOWNSTREAM(FEET) = 1012.75
FLOW LENGTH(FEET) = 14.88 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.46
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.35
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.73
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.10 = 673.79 FEET.

*****
FLOW PROCESS FROM NODE 18.10 TO NODE 18.20 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.75 DOWNSTREAM(FEET) = 1008.36
FLOW LENGTH(FEET) = 219.25 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.72
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.35
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 10.15
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.20 = 893.04 FEET.

*****
FLOW PROCESS FROM NODE 18.20 TO NODE 20.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.36 DOWNSTREAM(FEET) = 1005.03
FLOW LENGTH(FEET) = 180.14 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.45
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.35
PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 10.50
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 30.00 TO NODE 32.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 225.50
ELEVATION DATA: UPSTREAM(FEET) = 1025.00 DOWNSTREAM(FEET) = 1013.76

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.56 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.04

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TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 2.04
*****
FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.76 DOWNSTREAM(FEET) = 1011.14
CHANNEL LENGTH THRU SUBAREA(FEET) = 259.51 CHANNEL SLOPE = 0.0101
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 24.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.11 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.74
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.52
AVERAGE FLOW DEPTH(FEET) = 0.25 TRAVEL TIME(MIN.) = 1.72
Tc(MIN.) = 6.72
SUBAREA AREA(ACRES) = 1.11 SUBAREA RUNOFF(CFS) = 3.40
EFFECTIVE AREA(ACRES) = 1.67 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 5.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.28 FLOW VELOCITY(FEET/SEC.) = 2.73
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 34.00 = 485.01 FEET.
*****
FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 6.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.68 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 5.15
EFFECTIVE AREA(ACRES) = 3.35 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.3 PEAK FLOW RATE(CFS) = 10.27

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*****
FLOW PROCESS FROM NODE 34.00 TO NODE 40.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.82 DOWNSTREAM(FEET) = 1006.66
FLOW LENGTH(FEET) = 129.58 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.09
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.27
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 6.99
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 40.00 = 614.59 FEET.
*****
FLOW PROCESS FROM NODE 40.00 TO NODE 20.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1006.66 DOWNSTREAM(FEET) = 1005.03
FLOW LENGTH(FEET) = 153.64 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.88
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.27
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 7.36
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 768.23 FEET.
*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====
*****
FLOW PROCESS FROM NODE 50.00 TO NODE 52.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 254.38
ELEVATION DATA: UPSTREAM(FEET) = 1023.20 DOWNSTREAM(FEET) = 1016.01

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.686
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.771
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc

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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
COMMERCIAL	C	0.11	0.25	0.100	69	5.69
COMMERCIAL	D	0.16	0.20	0.100	75	5.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.91
TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 0.91

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1016.07 DOWNSTREAM(FEET) = 1014.85
CHANNEL LENGTH THRU SUBAREA(FEET) = 106.00 CHANNEL SLOPE = 0.0115
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 40.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.350

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.02 0.25 0.100 69
COMMERCIAL D 0.50 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.35
AVERAGE FLOW DEPTH(FEET) = 0.06 TRAVEL TIME(MIN.) = 1.31
Tc(MIN.) = 6.99
SUBAREA AREA(ACRES) = 0.52 SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 0.79 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 2.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 1.59
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 360.38 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1014.85 DOWNSTREAM(FEET) = 1013.17
CHANNEL LENGTH THRU SUBAREA(FEET) = 198.61 CHANNEL SLOPE = 0.0085
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 24.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.005

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.75 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.37
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.27
AVERAGE FLOW DEPTH(FEET) = 0.25 TRAVEL TIME(MIN.) = 1.46
Tc(MIN.) = 8.45
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 2.02
EFFECTIVE AREA(ACRES) = 1.54 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 4.14

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.27 FLOW VELOCITY(FEET/SEC.) = 2.37
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 558.99 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.00 DOWNSTREAM(FEET) = 1007.45
FLOW LENGTH(FEET) = 16.94 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.81
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.14
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 8.47
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 575.93 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.47
RAINFALL INTENSITY(INCH/HR) = 3.00
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.54
TOTAL STREAM AREA(ACRES) = 1.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.14

FLOW PROCESS FROM NODE 57.00 TO NODE 59.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 319.33
ELEVATION DATA: UPSTREAM(FEET) = 1023.00 DOWNSTREAM(FEET) = 1015.14

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 6.402
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.523
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.30	0.25	0.100	69	6.40
COMMERCIAL	D	0.76	0.20	0.100	75	6.40

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.34
TOTAL AREA(ACRES) = 1.06 PEAK FLOW RATE(CFS) = 3.34

FLOW PROCESS FROM NODE 59.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.80 DOWNSTREAM(FEET) = 1007.45
FLOW LENGTH(FEET) = 166.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.31
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.34
PIPE TRAVEL TIME(MIN.) = 0.38 T_c (MIN.) = 6.78
LONGEST FLOWPATH FROM NODE 57.00 TO NODE 56.00 = 485.39 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.78
RAINFALL INTENSITY(INCH/HR) = 3.41
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.10

EFFECTIVE STREAM AREA(ACRES) = 1.06
TOTAL STREAM AREA(ACRES) = 1.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.34

FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 1015.75 DOWNSTREAM(FEET) = 1011.60

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.419
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.96	0.20	0.100	75	7.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.78
TOTAL AREA(ACRES) = 0.96 PEAK FLOW RATE(CFS) = 2.78

FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.60 DOWNSTREAM(FEET) = 1010.91
CHANNEL LENGTH THRU SUBAREA(FEET) = 131.89 CHANNEL SLOPE = 0.0052
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 24.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.993
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.06	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.01
AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 1.09
 T_c (MIN.) = 8.51
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 2.84
EFFECTIVE AREA(ACRES) = 2.02 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 5.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 2.13
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 62.00 = 461.89 FEET.

 FLOW PROCESS FROM NODE 62.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.50 DOWNSTREAM(FEET) = 1007.45
 FLOW LENGTH(FEET) = 9.46 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.50
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.40
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 8.55
 LONGEST FLOWPATH FROM NODE 60.00 TO NODE 56.00 = 471.35 FEET.

 FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.55
 RAINFALL INTENSITY(INCH/HR) = 2.99
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 2.02
 TOTAL STREAM AREA(ACRES) = 2.02
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.40

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.14	8.47	3.001	0.20(0.02)	0.10	1.5	50.00
2	3.34	6.78	3.409	0.21(0.02)	0.10	1.1	57.00
3	5.40	8.55	2.986	0.20(0.02)	0.10	2.0	60.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.14	8.47	3.001	0.20(0.02)	0.10	1.5	50.00
2	3.34	6.78	3.409	0.21(0.02)	0.10	1.1	57.00
3	5.40	8.55	2.986	0.20(0.02)	0.10	2.0	60.00

1	12.01	6.78	3.409	0.21(0.02)	0.10	3.9	57.00
2	12.46	8.47	3.001	0.20(0.02)	0.10	4.6	50.00
3	12.44	8.55	2.986	0.20(0.02)	0.10	4.6	60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 12.46 Tc(MIN.) = 8.47
 EFFECTIVE AREA(ACRES) = 4.60 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 4.6
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 575.93 FEET.

 FLOW PROCESS FROM NODE 56.00 TO NODE 20.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.45 DOWNSTREAM(FEET) = 1005.03
 FLOW LENGTH(FEET) = 72.58 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.09
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 12.46
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 8.58
 LONGEST FLOWPATH FROM NODE 50.00 TO NODE 20.00 = 648.51 FEET.

 FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.01	6.89	3.378	0.21(0.02)	0.10	3.9	57.00
2	12.46	8.58	2.979	0.20(0.02)	0.10	4.6	50.00
3	12.44	8.66	2.964	0.20(0.02)	0.10	4.6	60.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 20.00 = 648.51 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.35	10.50	2.653	0.23(0.14)	0.62	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.76	6.89	3.378	0.23(0.07)	0.32	6.8	57.00

```

2      22.01   8.58   2.979  0.23( 0.07) 0.33   8.2   50.00
3      22.03   8.66   2.964  0.23( 0.07) 0.33   8.2   60.00
4      21.48  10.50   2.653  0.23( 0.08) 0.35   9.0   10.00
TOTAL AREA(ACRES) =      9.0

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

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PEAK FLOW RATE(CFS) =      22.03  Tc(MIN.) =      8.655
EFFECTIVE AREA(ACRES) =      8.22  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.33
TOTAL AREA(ACRES) =      9.0
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      20.00 =    1073.18 FEET.

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*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE = 11
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>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
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** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.76	6.89	3.378	0.23(0.07)	0.32	6.8	57.00
2	22.01	8.58	2.979	0.23(0.07)	0.33	8.2	50.00
3	22.03	8.66	2.964	0.23(0.07)	0.33	8.2	60.00
4	21.48	10.50	2.653	0.23(0.08)	0.35	9.0	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.27	7.36	3.254	0.20(0.02)	0.10	3.3	30.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 768.23 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	30.75	6.89	3.378	0.22(0.06)	0.25	9.9	57.00
2	31.38	7.36	3.254	0.22(0.06)	0.25	10.5	30.00
3	31.42	8.58	2.979	0.22(0.06)	0.26	11.5	50.00
4	31.39	8.66	2.964	0.22(0.06)	0.26	11.6	60.00
5	29.85	10.50	2.653	0.22(0.06)	0.28	12.3	10.00

TOTAL AREA(ACRES) = 12.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) =      31.42  Tc(MIN.) =      8.579
EFFECTIVE AREA(ACRES) =     11.52  AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.25
TOTAL AREA(ACRES) =     12.3
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      20.00 =    1073.18 FEET.

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*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 1 <<<<<
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*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.00 IS CODE = 12
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>>>>CLEAR MEMORY BANK # 2 <<<<<
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*****
FLOW PROCESS FROM NODE      20.00 TO NODE      20.10 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1005.03  DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 27.36  MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.78
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.42
PIPE TRAVEL TIME(MIN.) = 0.03  Tc(MIN.) = 8.60
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      20.10 =    1100.54 FEET.

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*****
FLOW PROCESS FROM NODE      20.10 TO NODE      20.10 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.60
RAINFALL INTENSITY(INCH/HR) = 2.97
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.26
EFFECTIVE STREAM AREA(ACRES) = 11.52
TOTAL STREAM AREA(ACRES) = 12.34
PEAK FLOW RATE(CFS) AT CONFLUENCE = 31.42

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*****
FLOW PROCESS FROM NODE      35.00 TO NODE      38.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) = 311.01
 ELEVATION DATA: UPSTREAM(FEET) = 1010.14 DOWNSTREAM(FEET) = 1009.23

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.699
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.777

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	1.27	0.20	0.100	75	9.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 3.15
 TOTAL AREA(ACRES) = 1.27 PEAK FLOW RATE(CFS) = 3.15

 FLOW PROCESS FROM NODE 38.00 TO NODE 20.10 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.29 DOWNSTREAM(FEET) = 1004.44
 FLOW LENGTH(FEET) = 276.89 MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.31
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.15
 PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 10.77
 LONGEST FLOWPATH FROM NODE 35.00 TO NODE 20.10 = 587.90 FEET.

 FLOW PROCESS FROM NODE 20.10 TO NODE 20.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.77
 RAINFALL INTENSITY(INCH/HR) = 2.62
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.27
 TOTAL STREAM AREA(ACRES) = 1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
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1	30.75	6.92	3.371	0.22(0.06)	0.25	9.9	57.00
1	31.38	7.38	3.247	0.22(0.06)	0.25	10.5	30.00
1	31.42	8.60	2.974	0.22(0.06)	0.26	11.5	50.00
1	31.39	8.68	2.959	0.22(0.06)	0.26	11.6	60.00
1	29.85	10.53	2.649	0.22(0.06)	0.28	12.3	10.00
2	3.15	10.77	2.615	0.20(0.02)	0.10	1.3	35.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	33.36	6.92	3.371	0.22(0.05)	0.24	10.7	57.00
2	34.06	7.38	3.247	0.22(0.05)	0.24	11.4	30.00
3	34.28	8.60	2.974	0.22(0.05)	0.25	12.5	50.00
4	34.26	8.68	2.959	0.22(0.05)	0.25	12.6	60.00
5	32.97	10.53	2.649	0.22(0.06)	0.27	13.6	10.00
6	32.61	10.77	2.615	0.22(0.06)	0.27	13.6	35.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 34.28 Tc(MIN.) = 8.60
 EFFECTIVE AREA(ACRES) = 12.54 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.25
 TOTAL AREA(ACRES) = 13.6
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.10 = 1100.54 FEET.

 FLOW PROCESS FROM NODE 20.10 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.44 DOWNSTREAM(FEET) = 999.43
 FLOW LENGTH(FEET) = 46.42 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.40
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 34.28
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 8.64
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 1146.96 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 8.64
RAINFALL INTENSITY(INCH/HR) = 2.97
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.25
EFFECTIVE STREAM AREA(ACRES) = 12.54
TOTAL STREAM AREA(ACRES) = 13.61
PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.28

FLOW PROCESS FROM NODE 63.00 TO NODE 64.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 227.61
ELEVATION DATA: UPSTREAM(FEET) = 1012.28 DOWNSTREAM(FEET) = 1009.09

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.258
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.570
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.42 0.20 0.100 75 6.26
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 0.42 PEAK FLOW RATE(CFS) = 1.34

FLOW PROCESS FROM NODE 61.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.34 DOWNSTREAM(FEET) = 999.43
FLOW LENGTH(FEET) = 113.97 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.18
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.34
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 6.49
LONGEST FLOWPATH FROM NODE 63.00 TO NODE 22.00 = 341.58 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.49
RAINFALL INTENSITY(INCH/HR) = 3.50
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.42
TOTAL STREAM AREA(ACRES) = 0.42
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.34

FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 324.27
ELEVATION DATA: UPSTREAM(FEET) = 1014.21 DOWNSTREAM(FEET) = 1009.42

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.134
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.311
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.97 0.20 0.100 75 7.13
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.87
TOTAL AREA(ACRES) = 0.97 PEAK FLOW RATE(CFS) = 2.87

FLOW PROCESS FROM NODE 66.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.48 DOWNSTREAM(FEET) = 999.43
FLOW LENGTH(FEET) = 69.95 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.57
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.87
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 7.24
LONGEST FLOWPATH FROM NODE 65.00 TO NODE 22.00 = 394.22 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.24
RAINFALL INTENSITY(INCH/HR) = 3.28
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.97
TOTAL STREAM AREA(ACRES) = 0.97
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.87

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	33.36	6.96	3.359	0.22(0.05)	0.24	10.7	57.00
1	34.06	7.42	3.237	0.22(0.05)	0.24	11.4	30.00
1	34.28	8.64	2.966	0.22(0.05)	0.25	12.5	50.00
1	34.26	8.72	2.952	0.22(0.05)	0.25	12.6	60.00
1	32.97	10.57	2.643	0.22(0.06)	0.27	13.6	10.00
1	32.61	10.81	2.610	0.22(0.06)	0.27	13.6	35.00
2	1.34	6.49	3.496	0.20(0.02)	0.10	0.4	63.00
3	2.87	7.24	3.285	0.20(0.02)	0.10	1.0	65.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	36.49	6.49	3.496	0.22(0.05)	0.22	11.3	63.00
2	37.48	6.96	3.359	0.22(0.05)	0.22	12.1	57.00
3	37.91	7.24	3.285	0.22(0.05)	0.22	12.5	65.00
4	38.14	7.42	3.237	0.22(0.05)	0.22	12.8	30.00
5	38.01	8.64	2.966	0.22(0.05)	0.23	13.9	50.00
6	37.97	8.72	2.952	0.22(0.05)	0.23	14.0	60.00
7	36.29	10.57	2.643	0.22(0.06)	0.25	15.0	10.00
8	35.89	10.81	2.610	0.22(0.06)	0.25	15.0	35.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 38.14 Tc(MIN.) = 7.42
EFFECTIVE AREA(ACRES) = 12.76 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 15.0
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 1146.96 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 999.43 DOWNSTREAM(FEET) = 995.70
FLOW LENGTH(FEET) = 36.54 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.58
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.14
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 7.45
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 24.00 = 1183.50 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.0 TC(MIN.) = 7.45
EFFECTIVE AREA(ACRES) = 12.76 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.224
PEAK FLOW RATE(CFS) = 38.14

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	36.49	6.52	3.487	0.22(0.05)	0.22	11.3	63.00
2	37.48	6.99	3.351	0.22(0.05)	0.22	12.1	57.00
3	37.91	7.26	3.278	0.22(0.05)	0.22	12.5	65.00
4	38.14	7.45	3.230	0.22(0.05)	0.22	12.8	30.00
5	38.01	8.67	2.961	0.22(0.05)	0.23	13.9	50.00
6	37.97	8.75	2.946	0.22(0.05)	0.23	14.0	60.00
7	36.29	10.60	2.639	0.22(0.06)	0.25	15.0	10.00
8	35.89	10.84	2.606	0.22(0.06)	0.25	15.0	35.00

END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

TAIT & ASSOCIATES INC.
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SANTA ANA, CALIFORNIA 92705

***** DESCRIPTION OF STUDY *****

- * DANA POINT HARBOR DRY STACK LEASE AREA
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 1
* 100-YEAR STORM EVENT DM

FILE NAME: 1P00R.DAT
TIME/DATE OF STUDY: 15:40 11/12/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

Table with columns: NO., HALF-WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN-/OUT-/PARK-SIDE / SIDE/ WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES (n), MANNING FACTOR. Contains 2 rows of data.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.46
ELEVATION DATA: UPSTREAM(FEET) = 1091.22 DOWNSTREAM(FEET) = 1064.62

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.812
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.472
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"OPEN BRUSH" C 0.11 0.25 1.000 96 8.81
NATURAL POOR COVER
"OPEN BRUSH" D 0.21 0.20 1.000 98 8.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.23
TOTAL AREA(ACRES) = 0.32 PEAK FLOW RATE(CFS) = 1.23

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1064.62 DOWNSTREAM(FEET) = 1054.83
CHANNEL LENGTH THRU SUBAREA(FEET) = 193.33 CHANNEL SLOPE = 0.0506
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.346
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL POOR COVER
"OPEN BRUSH" C 0.50 0.25 1.000 96
NATURAL POOR COVER
"OPEN BRUSH" D 0.17 0.20 1.000 98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.16
AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 0.45
Tc(MIN.) = 9.26
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 2.48
EFFECTIVE AREA(ACRES) = 0.99 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 3.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 FLOW VELOCITY(FEET/SEC.) = 8.03
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 521.79 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 14.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1054.83 DOWNSTREAM(FEET) = 1025.41
CHANNEL LENGTH THRU SUBAREA(FEET) = 50.65 CHANNEL SLOPE = 0.5808
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 1.00
CHANNEL FLOW THRU SUBAREA(CFS) = 3.67
FLOW VELOCITY(FEET/SEC.) = 3.54 FLOW DEPTH(FEET) = 0.72
TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 9.50
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 14.00 = 572.44 FEET.

FLOW PROCESS FROM NODE 14.00 TO NODE 16.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1021.34 DOWNSTREAM(FEET) = 1019.68
FLOW LENGTH(FEET) = 33.59 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.27
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.67
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 9.56
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 16.00 = 606.03 FEET.

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.06 0.20 0.100 91
PUBLIC PARK D 0.03 0.20 0.850 91
NATURAL POOR COVER
"OPEN BRUSH" C 0.96 0.25 1.000 96

NATURAL POOR COVER

"OPEN BRUSH" D 0.53 0.20 1.000 98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 5.75
EFFECTIVE AREA(ACRES) = 2.57 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 2.6 PEAK FLOW RATE(CFS) = 9.35

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.03 0.25 0.100 86
COMMERCIAL D 0.64 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.67 SUBAREA RUNOFF(CFS) = 2.56
EFFECTIVE AREA(ACRES) = 3.24 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 11.91

FLOW PROCESS FROM NODE 16.00 TO NODE 16.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.45 0.25 0.100 86
COMMERCIAL D 0.05 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.91
EFFECTIVE AREA(ACRES) = 3.74 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.70
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 13.82

FLOW PROCESS FROM NODE 16.00 TO NODE 18.00 IS CODE = 41

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1019.68 DOWNSTREAM(FEET) = 1017.06
FLOW LENGTH(FEET) = 52.88 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.24
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.82
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 9.63
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.00 = 658.91 FEET.

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.63
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.251
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.63 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.63 SUBAREA RUNOFF(CFS) = 2.40
EFFECTIVE AREA(ACRES) = 4.37 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 16.16

*****
FLOW PROCESS FROM NODE 18.00 TO NODE 18.10 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1017.06 DOWNSTREAM(FEET) = 1012.75
FLOW LENGTH(FEET) = 14.88 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.57
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.16
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.64
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.10 = 673.79 FEET.

*****
FLOW PROCESS FROM NODE 18.10 TO NODE 18.20 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.75 DOWNSTREAM(FEET) = 1008.36
FLOW LENGTH(FEET) = 219.25 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.14
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.16
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 10.04
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 18.20 = 893.04 FEET.

*****
FLOW PROCESS FROM NODE 18.20 TO NODE 20.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.36 DOWNSTREAM(FEET) = 1005.03
FLOW LENGTH(FEET) = 180.14 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.14
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.16
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 10.36
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

*****
FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 30.00 TO NODE 32.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 225.50
ELEVATION DATA: UPSTREAM(FEET) = 1025.00 DOWNSTREAM(FEET) = 1013.76

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.56 0.20 0.100 91 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.11
TOTAL AREA(ACRES) = 0.56 PEAK FLOW RATE(CFS) = 3.11

FLOW PROCESS FROM NODE 32.00 TO NODE 34.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1013.76	DOWNSTREAM(FEET) =	1011.14
CHANNEL LENGTH THRU SUBAREA(FEET) =	259.51	CHANNEL SLOPE =	0.0101
CHANNEL BASE(FEET) =	0.00	"Z" FACTOR =	24.000
MANNING'S FACTOR =	0.015	MAXIMUM DEPTH(FEET) =	2.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	5.292		

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.11	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.75

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.76

AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 1.57

Tc(MIN.) = 6.57

SUBAREA AREA(ACRES) = 1.11 SUBAREA RUNOFF(CFS) = 5.27

EFFECTIVE AREA(ACRES) = 1.67 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 7.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

LENGTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 3.01

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 34.00 = 485.01 FEET.

FLOW PROCESS FROM NODE 34.00 TO NODE 34.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 6.57

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.292

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.68	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 1.68 SUBAREA RUNOFF(CFS) = 7.97

EFFECTIVE AREA(ACRES) = 3.35 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 3.3 PEAK FLOW RATE(CFS) = 15.90

FLOW PROCESS FROM NODE 34.00 TO NODE 40.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1008.82	DOWNSTREAM(FEET) =	1006.66
FLOW LENGTH(FEET) =	129.58	MANNING'S N =	0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS	14.5	INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	9.00		
ESTIMATED PIPE DIAMETER(INCH) =	21.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	15.90		
PIPE TRAVEL TIME(MIN.) =	0.24	Tc(MIN.) =	6.81
LONGEST FLOWPATH FROM NODE	30.00	TO NODE	40.00 =
			614.59 FEET.

FLOW PROCESS FROM NODE 40.00 TO NODE 20.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1006.66	DOWNSTREAM(FEET) =	1005.03
FLOW LENGTH(FEET) =	153.64	MANNING'S N =	0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS	15.1	INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.66		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	15.90		
PIPE TRAVEL TIME(MIN.) =	0.33	Tc(MIN.) =	7.14
LONGEST FLOWPATH FROM NODE	30.00	TO NODE	20.00 =
			768.23 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 50.00 TO NODE 52.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) =	254.38		
ELEVATION DATA: UPSTREAM(FEET) =	1023.20	DOWNSTREAM(FEET) =	1016.01

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.686

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.748

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.11	0.25	0.100	86	5.69
COMMERCIAL	D	0.16	0.20	0.100	91	5.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.39
TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 1.39

FLOW PROCESS FROM NODE 52.00 TO NODE 53.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1016.07 DOWNSTREAM(FEET) = 1014.85
CHANNEL LENGTH THRU SUBAREA(FEET) = 106.00 CHANNEL SLOPE = 0.0115
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 40.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.190

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.02	0.25	0.100	86
COMMERCIAL	D	0.50	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.59
AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 1.11
Tc(MIN.) = 6.79
SUBAREA AREA(ACRES) = 0.52 SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 0.79 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.8 PEAK FLOW RATE(CFS) = 3.68

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.09 FLOW VELOCITY(FEET/SEC.) = 1.80
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 53.00 = 360.38 FEET.

FLOW PROCESS FROM NODE 53.00 TO NODE 54.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1014.85 DOWNSTREAM(FEET) = 1013.17
CHANNEL LENGTH THRU SUBAREA(FEET) = 198.61 CHANNEL SLOPE = 0.0085
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 24.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.691

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.75	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.26
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.52
AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 1.31
Tc(MIN.) = 8.11
SUBAREA AREA(ACRES) = 0.75 SUBAREA RUNOFF(CFS) = 3.15
EFFECTIVE AREA(ACRES) = 1.54 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 6.47

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.32 FLOW VELOCITY(FEET/SEC.) = 2.67
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 54.00 = 558.99 FEET.

FLOW PROCESS FROM NODE 54.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.00 DOWNSTREAM(FEET) = 1007.45
FLOW LENGTH(FEET) = 16.94 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.64
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.47
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 8.12
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 575.93 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.12
RAINFALL INTENSITY(INCH/HR) = 4.69
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.54
TOTAL STREAM AREA(ACRES) = 1.54

PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.47

FLOW PROCESS FROM NODE 57.00 TO NODE 59.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 319.33
ELEVATION DATA: UPSTREAM(FEET) = 1023.00 DOWNSTREAM(FEET) = 1015.14

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.402
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.370
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.30	0.25	0.100	86	6.40
COMMERCIAL	D	0.76	0.20	0.100	91	6.40

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 5.10
TOTAL AREA(ACRES) = 1.06 PEAK FLOW RATE(CFS) = 5.10

FLOW PROCESS FROM NODE 59.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.80 DOWNSTREAM(FEET) = 1007.45
FLOW LENGTH(FEET) = 166.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.91
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.10
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 6.75
LONGEST FLOWPATH FROM NODE 57.00 TO NODE 56.00 = 485.39 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.75
RAINFALL INTENSITY(INCH/HR) = 5.21
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.21

AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.06
TOTAL STREAM AREA(ACRES) = 1.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.10

FLOW PROCESS FROM NODE 60.00 TO NODE 61.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 1015.75 DOWNSTREAM(FEET) = 1011.60

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.419
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.935
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.96	0.20	0.100	91	7.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.25
TOTAL AREA(ACRES) = 0.96 PEAK FLOW RATE(CFS) = 4.25

FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1011.60 DOWNSTREAM(FEET) = 1010.91
CHANNEL LENGTH THRU SUBAREA(FEET) = 131.89 CHANNEL SLOPE = 0.0052
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 24.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.595
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.06	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.43
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.24
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 0.98
Tc(MIN.) = 8.40
SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 4.36
EFFECTIVE AREA(ACRES) = 2.02 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 8.32

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.38 FLOW VELOCITY(FEET/SEC.) = 2.35
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 62.00 = 461.89 FEET.

FLOW PROCESS FROM NODE 62.00 TO NODE 56.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.50 DOWNSTREAM(FEET) = 1007.45
FLOW LENGTH(FEET) = 9.46 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.00
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.32
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.43
LONGEST FLOWPATH FROM NODE 60.00 TO NODE 56.00 = 471.35 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 56.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 8.43
RAINFALL INTENSITY(INCH/HR) = 4.59
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.02
TOTAL STREAM AREA(ACRES) = 2.02
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.32

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.47	8.12	4.685	0.20(0.02)	0.10	1.5	50.00
2	5.10	6.75	5.209	0.21(0.02)	0.10	1.1	57.00
3	8.32	8.43	4.586	0.20(0.02)	0.10	2.0	60.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER NODE
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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	18.65	6.75	5.209	0.21(0.02)	0.10	4.0 57.00
2	19.25	8.12	4.685	0.20(0.02)	0.10	4.5 50.00
3	19.14	8.43	4.586	0.20(0.02)	0.10	4.6 60.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 19.25 Tc(MIN.) = 8.12
EFFECTIVE AREA(ACRES) = 4.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.6
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 56.00 = 575.93 FEET.

FLOW PROCESS FROM NODE 56.00 TO NODE 20.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.45 DOWNSTREAM(FEET) = 1005.03
FLOW LENGTH(FEET) = 72.58 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.35
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.25
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 8.22
LONGEST FLOWPATH FROM NODE 50.00 TO NODE 20.00 = 648.51 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.65	6.85	5.166	0.21(0.02)	0.10	4.0	57.00
2	19.25	8.22	4.653	0.20(0.02)	0.10	4.5	50.00
3	19.14	8.53	4.555	0.20(0.02)	0.10	4.6	60.00

LONGEST FLOWPATH FROM NODE 50.00 TO NODE 20.00 = 648.51 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.16	10.36	4.075	0.23(0.14)	0.62	4.4	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER NODE
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1	32.30	6.85	5.166	0.23(0.07)	0.32	6.8	57.00
2	33.95	8.22	4.653	0.23(0.07)	0.32	8.0	50.00
3	34.07	8.53	4.555	0.23(0.07)	0.33	8.2	60.00
4	33.27	10.36	4.075	0.23(0.08)	0.35	9.0	10.00

TOTAL AREA(ACRES) = 9.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 34.07 Tc(MIN.) = 8.532
EFFECTIVE AREA(ACRES) = 8.22 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 9.0
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	32.30	6.85	5.166	0.23(0.07)	0.32	6.8	57.00
2	33.95	8.22	4.653	0.23(0.07)	0.32	8.0	50.00
3	34.07	8.53	4.555	0.23(0.07)	0.33	8.2	60.00
4	33.27	10.36	4.075	0.23(0.08)	0.35	9.0	10.00

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	15.90	7.14	5.044	0.20(0.02)	0.10	3.3	30.00

LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 768.23 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	47.92	6.85	5.166	0.22(0.06)	0.25	10.1	57.00
2	48.55	7.14	5.044	0.22(0.06)	0.25	10.4	30.00
3	48.61	8.22	4.653	0.22(0.06)	0.26	11.4	50.00
4	48.42	8.53	4.555	0.22(0.06)	0.26	11.6	60.00
5	46.10	10.36	4.075	0.22(0.06)	0.28	12.3	10.00

TOTAL AREA(ACRES) = 12.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 48.61 Tc(MIN.) = 8.222
EFFECTIVE AREA(ACRES) = 11.36 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 12.3
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.00 = 1073.18 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<
=====

FLOW PROCESS FROM NODE 20.00 TO NODE 20.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<
=====

FLOW PROCESS FROM NODE 20.00 TO NODE 20.10 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.03 DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 27.36 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.51
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.61
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 8.24
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.10 = 1100.54 FEET.

FLOW PROCESS FROM NODE 20.10 TO NODE 20.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.24
RAINFALL INTENSITY(INCH/HR) = 4.65
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.26
EFFECTIVE STREAM AREA(ACRES) = 11.36
TOTAL STREAM AREA(ACRES) = 12.34
PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.61

FLOW PROCESS FROM NODE 35.00 TO NODE 38.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 311.01
ELEVATION DATA: UPSTREAM(FEET) = 1010.14 DOWNSTREAM(FEET) = 1009.23

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.699
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.233
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.27 0.20 0.100 91 9.70
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.82
TOTAL AREA(ACRES) = 1.27 PEAK FLOW RATE(CFS) = 4.82

*****
FLOW PROCESS FROM NODE 38.00 TO NODE 20.10 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1006.29 DOWNSTREAM(FEET) = 1004.44
FLOW LENGTH(FEET) = 276.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.65
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.82
PIPE TRAVEL TIME(MIN.) = 0.99 Tc(MIN.) = 10.69
LONGEST FLOWPATH FROM NODE 35.00 TO NODE 20.10 = 587.90 FEET.

*****
FLOW PROCESS FROM NODE 20.10 TO NODE 20.10 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.69
RAINFALL INTENSITY(INCH/HR) = 4.00
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.27
TOTAL STREAM AREA(ACRES) = 1.27
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.82

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER

```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	47.92	6.87	5.159	0.22(0.06)	0.25	10.1 57.00
1	48.55	7.16	5.037	0.22(0.06)	0.25	10.4 30.00
1	48.61	8.24	4.648	0.22(0.06)	0.26	11.4 50.00
1	48.42	8.55	4.550	0.22(0.06)	0.26	11.6 60.00
1	46.10	10.38	4.071	0.22(0.06)	0.28	12.3 10.00
2	4.82	10.69	4.003	0.20(0.02)	0.10	1.3 35.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	51.91	6.87	5.159	0.22(0.05)	0.24	10.9	57.00
2	52.61	7.16	5.037	0.22(0.05)	0.24	11.3	30.00
3	52.92	8.24	4.648	0.22(0.05)	0.24	12.3	50.00
4	52.80	8.55	4.550	0.22(0.05)	0.25	12.6	60.00
5	50.86	10.38	4.071	0.22(0.06)	0.27	13.6	10.00
6	50.14	10.69	4.003	0.22(0.06)	0.27	13.6	35.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 52.92 Tc(MIN.) = 8.24
EFFECTIVE AREA(ACRES) = 12.34 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.24
TOTAL AREA(ACRES) = 13.6
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 20.10 = 1100.54 FEET.

FLOW PROCESS FROM NODE 20.10 TO NODE 22.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.44 DOWNSTREAM(FEET) = 999.43
FLOW LENGTH(FEET) = 46.42 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.95
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 52.92
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.26
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 1146.96 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 8.26
RAINFALL INTENSITY(INCH/HR) = 4.64
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.24
EFFECTIVE STREAM AREA(ACRES) = 12.34
TOTAL STREAM AREA(ACRES) = 13.61
PEAK FLOW RATE(CFS) AT CONFLUENCE = 52.92

FLOW PROCESS FROM NODE 63.00 TO NODE 64.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 227.61
ELEVATION DATA: UPSTREAM(FEET) = 1012.28 DOWNSTREAM(FEET) = 1009.09

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.258
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.441
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.42 0.20 0.100 91 6.26
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.05
TOTAL AREA(ACRES) = 0.42 PEAK FLOW RATE(CFS) = 2.05

FLOW PROCESS FROM NODE 61.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.34 DOWNSTREAM(FEET) = 999.43
FLOW LENGTH(FEET) = 113.97 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.20
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.05
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 6.46
LONGEST FLOWPATH FROM NODE 63.00 TO NODE 22.00 = 341.58 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.46
RAINFALL INTENSITY(INCH/HR) = 5.34
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.42
TOTAL STREAM AREA(ACRES) = 0.42
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.05

FLOW PROCESS FROM NODE 65.00 TO NODE 66.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 324.27
ELEVATION DATA: UPSTREAM(FEET) = 1014.21 DOWNSTREAM(FEET) = 1009.42

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.134
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.047
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.97 0.20 0.100 91 7.13
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.39
TOTAL AREA(ACRES) = 0.97 PEAK FLOW RATE(CFS) = 4.39

FLOW PROCESS FROM NODE 66.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.48 DOWNSTREAM(FEET) = 999.43
FLOW LENGTH(FEET) = 69.95 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.97
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.39
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 7.22
LONGEST FLOWPATH FROM NODE 65.00 TO NODE 22.00 = 394.22 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.22
 RAINFALL INTENSITY(INCH/HR) = 5.01
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.97
 TOTAL STREAM AREA(ACRES) = 0.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	51.91	6.89	5.147	0.22(0.05)	0.24	10.9	57.00
1	52.61	7.18	5.027	0.22(0.05)	0.24	11.3	30.00
1	52.92	8.26	4.639	0.22(0.05)	0.24	12.3	50.00
1	52.80	8.57	4.542	0.22(0.05)	0.25	12.6	60.00
1	50.86	10.41	4.065	0.22(0.06)	0.27	13.6	10.00
1	50.14	10.72	3.997	0.22(0.06)	0.27	13.6	35.00
2	2.05	6.46	5.340	0.20(0.02)	0.10	0.4	63.00
3	4.39	7.22	5.011	0.20(0.02)	0.10	1.0	65.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	56.75	6.46	5.340	0.22(0.05)	0.22	11.5	63.00
2	58.18	6.89	5.147	0.22(0.05)	0.22	12.2	57.00
3	58.91	7.18	5.027	0.22(0.05)	0.22	12.7	30.00
4	58.93	7.22	5.011	0.22(0.05)	0.22	12.7	65.00
5	58.76	8.26	4.639	0.22(0.05)	0.23	13.7	50.00
6	58.52	8.57	4.542	0.22(0.05)	0.23	14.0	60.00
7	55.97	10.41	4.065	0.22(0.06)	0.25	15.0	10.00
8	55.17	10.72	3.997	0.22(0.06)	0.25	15.0	35.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 58.93 Tc(MIN.) = 7.22
 EFFECTIVE AREA(ACRES) = 12.72 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 15.0
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 1146.96 FEET.

 FLOW PROCESS FROM NODE 22.00 TO NODE 24.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 999.43 DOWNSTREAM(FEET) = 995.70
 FLOW LENGTH(FEET) = 36.54 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 33.35
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 58.93
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 7.24
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 24.00 = 1183.50 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.0 TC(MIN.) = 7.24
 EFFECTIVE AREA(ACRES) = 12.72 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.223
 PEAK FLOW RATE(CFS) = 58.93

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	56.75	6.48	5.332	0.22(0.05)	0.22	11.5	63.00
2	58.18	6.91	5.139	0.22(0.05)	0.22	12.2	57.00
3	58.91	7.20	5.019	0.22(0.05)	0.22	12.7	30.00
4	58.93	7.24	5.004	0.22(0.05)	0.22	12.7	65.00
5	58.76	8.28	4.633	0.22(0.05)	0.23	13.7	50.00
6	58.52	8.59	4.537	0.22(0.05)	0.23	14.0	60.00
7	55.97	10.43	4.060	0.22(0.06)	0.25	15.0	10.00
8	55.17	10.74	3.993	0.22(0.06)	0.25	15.0	35.00

 END OF RATIONAL METHOD ANALYSIS



2P10R

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR DRY STACK LEASE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 2 *
* 10-YEAR STORM EVENT DM *

FILE NAME: 2P10R.DAT
TIME/DATE OF STUDY: 15:27 12/03/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

Table with 10 columns: NO., HALF-CROWN TO WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL IN- / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER GEOMETRIES HIKE (FT), MANNING FACTOR (n). Rows 1 and 2.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

2P10R

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 108.66
ELEVATION DATA: UPSTREAM(FEET) = 1014.39 DOWNSTREAM(FEET) = 1013.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.184
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.976
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.59 0.20 0.100 75 5.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.10
TOTAL AREA(ACRES) = 0.59 PEAK FLOW RATE(CFS) = 2.10

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 91
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

UPSTREAM NODE ELEVATION(FEET) = 1013.50
DOWNSTREAM NODE ELEVATION(FEET) = 1009.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 318.38
"V" GUTTER WIDTH(FEET) = 4.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = 0.130
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 1.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.198
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.01 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.12
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.21
AVERAGE FLOW DEPTH(FEET) = 0.13 FLOOD WIDTH(FEET) = 18.50
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 2.40 Tc(MIN.) = 7.58
SUBAREA AREA(ACRES) = 0.01 SUBAREA RUNOFF(CFS) = 0.03
EFFECTIVE AREA(ACRES) = 0.60 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

2P10R
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.13 FLOOD WIDTH(FEET) = 18.50
FLOW VELOCITY(FEET/SEC.) = 2.20 DEPTH*VELOCITY(FT*FT/SEC) = 0.29
LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 427.04 FEET.

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1013.50	DOWNSTREAM(FEET) =	1009.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	318.38	CHANNEL SLOPE =	0.0141
CHANNEL BASE(FEET) =	0.00	"Z" FACTOR =	25.000
MANNING'S FACTOR =	0.013	MAXIMUM DEPTH(FEET) =	1.00
CHANNEL FLOW THRU SUBAREA(CFS) =	2.10		
FLOW VELOCITY(FEET/SEC.) =	2.64	FLOW DEPTH(FEET) =	0.18
TRAVEL TIME(MIN.) =	2.01	Tc(MIN.) =	9.59
LONGEST FLOWPATH FROM NODE	80.00	TO NODE	82.00 = 745.42 FEET.

FLOW PROCESS FROM NODE 82.00 TO NODE 82.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	9.59				
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =	2.795				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	D	1.10	0.20	0.100	75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.20				
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.100				
SUBAREA AREA(ACRES) =	1.10	SUBAREA RUNOFF(CFS) =	2.75		
EFFECTIVE AREA(ACRES) =	1.70	AREA-AVERAGED Fm(INCH/HR) =	0.02		
AREA-AVERAGED Fp(INCH/HR) =	0.20	AREA-AVERAGED Ap =	0.10		
TOTAL AREA(ACRES) =	1.7	PEAK FLOW RATE(CFS) =	4.25		

=====

END OF STUDY SUMMARY:					
TOTAL AREA(ACRES) =	1.7	TC(MIN.) =	9.59		
EFFECTIVE AREA(ACRES) =	1.70	AREA-AVERAGED Fm(INCH/HR) =	0.02		
AREA-AVERAGED Fp(INCH/HR) =	0.20	AREA-AVERAGED Ap =	0.100		
PEAK FLOW RATE(CFS) =	4.25				

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2P10R
END OF RATIONAL METHOD ANALYSIS

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2P00R

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR DRY STACK LEASE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 2 *
* 100-YEAR STORM EVENT DM *

FILE NAME: 2P00R.DAT
TIME/DATE OF STUDY: 15:30 12/03/2019

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

Table with columns: NO., HALF-CROWN TO WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER-GEOMETRIES: LIP (FT), HIKE (FT), MANNING FACTOR (n). Rows 1 and 2.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- 1. Relative Flow-Depth = 0.50 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

2P00R

FLOW PROCESS FROM NODE 80.00 TO NODE 81.00 IS CODE = 21
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 108.66
ELEVATION DATA: UPSTREAM(FEET) = 1014.39 DOWNSTREAM(FEET) = 1013.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.184
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.061
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.59 0.20 0.100 91 5.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.21
TOTAL AREA(ACRES) = 0.59 PEAK FLOW RATE(CFS) = 3.21

FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 91
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

UPSTREAM NODE ELEVATION(FEET) = 1013.50
DOWNSTREAM NODE ELEVATION(FEET) = 1009.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 318.38
"V" GUTTER WIDTH(FEET) = 4.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0130
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.929
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.01 0.20 0.100 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.36
AVERAGE FLOW DEPTH(FEET) = 0.15 FLOOD WIDTH(FEET) = 22.54
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 2.25 Tc(MIN.) = 7.44
SUBAREA AREA(ACRES) = 0.01 SUBAREA RUNOFF(CFS) = 0.04
EFFECTIVE AREA(ACRES) = 0.60 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

2P00R
 TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 3.21
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.15 FLOOD WIDTH(FEET) = 22.54
 FLOW VELOCITY(FEET/SEC.) = 2.34 DEPTH*VELOCITY(FT*FT/SEC) = 0.36
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 427.04 FEET.

 FLOW PROCESS FROM NODE 81.00 TO NODE 82.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1013.50 DOWNSTREAM(FEET) = 1009.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 318.38 CHANNEL SLOPE = 0.0141
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 25.000
 MANNING'S FACTOR = 0.013 MAXIMUM DEPTH(FEET) = 1.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 3.21
 FLOW VELOCITY(FEET/SEC.) = 2.94 FLOW DEPTH(FEET) = 0.21
 TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 9.24
 LONGEST FLOWPATH FROM NODE 80.00 TO NODE 82.00 = 745.42 FEET.

 FLOW PROCESS FROM NODE 82.00 TO NODE 82.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.352
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.10	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 4.29
 EFFECTIVE AREA(ACRES) = 1.70 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 6.63

=====

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 1.7 TC(MIN.) = 9.24
 EFFECTIVE AREA(ACRES) = 1.70 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 6.63
 =====

2P00R
 END OF RATIONAL METHOD ANALYSIS



Commercial Core Retail Area

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C1) *
* 10-YEAR STORM EVENT EM *

FILE NAME: 3P10R1.DAT
TIME/DATE OF STUDY: 12:37 11/06/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-DEPTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0313	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 5.00 TO NODE 10.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 237.70
ELEVATION DATA: UPSTREAM(FEET) = 1024.36 DOWNSTREAM(FEET) = 1022.82

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.430
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.235
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.53 0.20 0.100 75 7.43
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.53
TOTAL AREA(ACRES) = 0.53 PEAK FLOW RATE(CFS) = 1.53

FLOW PROCESS FROM NODE 10.00 TO NODE 25.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1018.82 DOWNSTREAM(FEET) = 1013.21
FLOW LENGTH(FEET) = 128.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.20
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.53
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 7.73
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 25.00 = 366.20 FEET.

FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.73
RAINFALL INTENSITY(INCH/HR) = 3.16
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.53
TOTAL STREAM AREA(ACRES) = 0.53

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.53
*****
FLOW PROCESS FROM NODE      15.00 TO NODE      20.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.12
ELEVATION DATA: UPSTREAM(FEET) = 1022.76 DOWNSTREAM(FEET) = 1020.33

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.484
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.222
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.52    0.20   0.100  75  7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.50
TOTAL AREA(ACRES) = 0.52 PEAK FLOW RATE(CFS) = 1.50
*****
FLOW PROCESS FROM NODE      20.00 TO NODE      25.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1016.33 DOWNSTREAM(FEET) = 1013.21
FLOW LENGTH(FEET) = 95.42 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.50
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 7.73
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 25.00 = 375.54 FEET.
*****
FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.73
RAINFALL INTENSITY(INCH/HR) = 3.16
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

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AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.50

** CONFLUENCE DATA **
STREAM  Q   Tc Intensity Fp(Fm)   Ap   Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES) NODE
1       1.53  7.73  3.163  0.20( 0.02) 0.10  0.5  5.00
2       1.50  7.73  3.162  0.20( 0.02) 0.10  0.5  15.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM  Q   Tc Intensity Fp(Fm)   Ap   Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES) NODE
1       3.03  7.73  3.163  0.20( 0.02) 0.10  1.0  5.00
2       3.03  7.73  3.162  0.20( 0.02) 0.10  1.0  15.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 3.03 Tc(MIN.) = 7.73
EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 25.00 = 375.54 FEET.
*****
FLOW PROCESS FROM NODE      25.00 TO NODE      50.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.21 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 93.26 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 5.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.62
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.03
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 8.06
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 50.00 = 468.80 FEET.
*****
FLOW PROCESS FROM NODE      50.00 TO NODE      50.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.06

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RAINFALL INTENSITY(INCH/HR) = 3.09
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.05
TOTAL STREAM AREA(ACRES) = 1.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.03

FLOW PROCESS FROM NODE 30.00 TO NODE 35.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 290.76
ELEVATION DATA: UPSTREAM(FEET) = 1025.90 DOWNSTREAM(FEET) = 1022.84

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.309
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.266
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS	Tc
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
COMMERCIAL	D	0.66	0.20	0.100	75	7.31

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.93
TOTAL AREA(ACRES) = 0.66 PEAK FLOW RATE(CFS) = 1.93

FLOW PROCESS FROM NODE 35.00 TO NODE 50.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1018.84 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 96.14 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.01
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.93
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 7.49
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 386.90 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.49
RAINFALL INTENSITY(INCH/HR) = 3.22
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.66
TOTAL STREAM AREA(ACRES) = 0.66
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.93

FLOW PROCESS FROM NODE 40.00 TO NODE 45.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 254.54
ELEVATION DATA: UPSTREAM(FEET) = 1022.72 DOWNSTREAM(FEET) = 1020.22

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.027
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.340
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS	Tc
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
COMMERCIAL	D	0.45	0.20	0.100	75	7.03

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 0.45 PEAK FLOW RATE(CFS) = 1.34

FLOW PROCESS FROM NODE 45.00 TO NODE 50.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1016.22 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 43.84 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 2.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.98
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.34
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 7.11
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 50.00 = 298.38 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.11
RAINFALL INTENSITY(INCH/HR) = 3.32
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.45
TOTAL STREAM AREA(ACRES) = 0.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.34

** CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-4.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.17 Tc(MIN.) = 7.49
EFFECTIVE AREA(ACRES) = 2.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 50.00 = 468.80 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 55.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.27 DOWNSTREAM(FEET) = 1011.60
FLOW LENGTH(FEET) = 67.04 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 7.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.68
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 6.17
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 7.68
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 55.00 = 535.84 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 60.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1011.60 DOWNSTREAM(FEET) = 1006.10
FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.21
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.17
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 7.75
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 60.00 = 585.84 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.2 TC(MIN.) = 7.75
EFFECTIVE AREA(ACRES) = 2.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 6.17

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-4.

END OF RATIONAL METHOD ANALYSIS



 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * DANA POINT HARBOR COMMERCIAL CORE AREA *
 * RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C2) *
 * 10-YEAR STORM EVENT EM *

FILE NAME: 3P10RC2.DAT
 TIME/DATE OF STUDY: 16:25 11/08/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	38.0	33.0	0.017/0.017/0.017	0.50	2.00 0.0312 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 FLOW PROCESS FROM NODE 210.00 TO NODE 215.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 338.92
 ELEVATION DATA: UPSTREAM(FEET) = 1016.94 DOWNSTREAM(FEET) = 1012.21

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.344
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.257
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.44	0.20	0.100	75	7.34

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.28
 TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.28

 FLOW PROCESS FROM NODE 215.00 TO NODE 220.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.80 DOWNSTREAM(FEET) = 1009.20
 FLOW LENGTH(FEET) = 116.40 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.13
 GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.28
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 7.97
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 220.00 = 455.32 FEET.

 FLOW PROCESS FROM NODE 220.00 TO NODE 220.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 7.97
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.109
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.11	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.11 SUBAREA RUNOFF(CFS) = 0.31

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EFFECTIVE AREA(ACRES) = 0.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.53
*****
FLOW PROCESS FROM NODE 220.00 TO NODE 225.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.20 DOWNSTREAM(FEET) = 1009.04
FLOW LENGTH(FEET) = 30.22 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.31
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.53
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 8.12
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 225.00 = 485.54 FEET.
*****
FLOW PROCESS FROM NODE 225.00 TO NODE 230.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.04 DOWNSTREAM(FEET) = 1008.10
FLOW LENGTH(FEET) = 93.51 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.09
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.53
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 8.50
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 230.00 = 579.05 FEET.
*****
FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.996
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 1.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.39 SUBAREA RUNOFF(CFS) = 3.72
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

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TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 5.20
*****
FLOW PROCESS FROM NODE 230.00 TO NODE 310.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.10 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 211.44 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.69
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.20
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 9.12
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 310.00 = 790.49 FEET.
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1<<<<<
=====
FLOW PROCESS FROM NODE 235.00 TO NODE 240.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 327.34
ELEVATION DATA: UPSTREAM(FEET) = 1014.52 DOWNSTREAM(FEET) = 1013.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.026
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.894
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.56 0.20 0.100 75 9.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.03
TOTAL AREA(ACRES) = 1.56 PEAK FLOW RATE(CFS) = 4.03
*****
FLOW PROCESS FROM NODE 240.00 TO NODE 260.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1010.00 DOWNSTREAM(FEET) = 1009.30
FLOW LENGTH(FEET) = 51.88 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.14
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.03
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 9.19
LONGEST FLOWPATH FROM NODE 235.00 TO NODE 260.00 = 379.22 FEET.

*****
FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.19
RAINFALL INTENSITY(INCH/HR) = 2.86
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.56
TOTAL STREAM AREA(ACRES) = 1.56
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.03

*****
FLOW PROCESS FROM NODE 245.00 TO NODE 250.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.47
ELEVATION DATA: UPSTREAM(FEET) = 1028.80 DOWNSTREAM(FEET) = 1017.91

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.123
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.615
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.35 0.20 0.100 75 6.12
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.13
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.13

*****
FLOW PROCESS FROM NODE 250.00 TO NODE 255.00 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 1017.91 DOWNSTREAM ELEVATION(FEET) = 1012.98
STREET LENGTH(FEET) = 127.77 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 38.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 33.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.39
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.22
HALFSTREET FLOOD WIDTH(FEET) = 5.55
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.35
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.73
STREET FLOW TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 6.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.416
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.17 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.17 SUBAREA RUNOFF(CFS) = 0.52
EFFECTIVE AREA(ACRES) = 0.52 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.23 HALFSTREET FLOOD WIDTH(FEET) = 6.06
FLOW VELOCITY(FEET/SEC.) = 3.41 DEPTH*VELOCITY(FT*FT/SEC.) = 0.77
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 255.00 = 458.24 FEET.

*****
FLOW PROCESS FROM NODE 255.00 TO NODE 260.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1009.98 DOWNSTREAM(FEET) = 1009.30
FLOW LENGTH(FEET) = 11.80 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.03

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GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.59
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.78
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 260.00 = 470.04 FEET.

FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.78
RAINFALL INTENSITY(INCH/HR) = 3.41
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.59

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.03	9.19	2.863	0.20(0.02)	0.10	1.6	235.00
2	1.59	6.78	3.409	0.20(0.02)	0.10	0.5	245.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.14	6.78	3.409	0.20(0.02)	0.10	1.7	245.00
2	5.37	9.19	2.863	0.20(0.02)	0.10	2.1	235.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.37 Tc(MIN.) = 9.19
EFFECTIVE AREA(ACRES) = 2.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 260.00 = 470.04 FEET.

FLOW PROCESS FROM NODE 260.00 TO NODE 310.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.30 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 59.46 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.79
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.37
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 9.29
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 310.00 = 529.50 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 265.00 TO NODE 270.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.82
ELEVATION DATA: UPSTREAM(FEET) = 1012.91 DOWNSTREAM(FEET) = 1012.03

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.29 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.05
TOTAL AREA(ACRES) = 0.29 PEAK FLOW RATE(CFS) = 1.05

FLOW PROCESS FROM NODE 270.00 TO NODE 305.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.17 DOWNSTREAM(FEET) = 1005.73
FLOW LENGTH(FEET) = 4306.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 1.34
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.05
PIPE TRAVEL TIME(MIN.) = 53.46 Tc(MIN.) = 58.46

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4386.82 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 58.46
RAINFALL INTENSITY(INCH/HR) = 0.99
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.29
TOTAL STREAM AREA(ACRES) = 0.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.05

FLOW PROCESS FROM NODE 275.00 TO NODE 280.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.91
ELEVATION DATA: UPSTREAM(FEET) = 1014.36 DOWNSTREAM(FEET) = 1012.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.35 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.27
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.27

FLOW PROCESS FROM NODE 280.00 TO NODE 285.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.17 DOWNSTREAM(FEET) = 1007.30
FLOW LENGTH(FEET) = 43.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.16
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1.27
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 5.14
LONGEST FLOWPATH FROM NODE 275.00 TO NODE 285.00 = 143.97 FEET.

FLOW PROCESS FROM NODE 285.00 TO NODE 285.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.14
RAINFALL INTENSITY(INCH/HR) = 4.00
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.35
TOTAL STREAM AREA(ACRES) = 0.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.27

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.05	58.46	0.992	0.20(0.02)	0.10	0.3	265.00
2	1.27	5.14	3.996	0.20(0.02)	0.10	0.3	275.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.65	5.14	3.996	0.20(0.02)	0.10	0.4	275.00
2	1.37	58.46	0.992	0.20(0.02)	0.10	0.6	265.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.65 Tc(MIN.) = 5.14
EFFECTIVE AREA(ACRES) = 0.38 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 285.00 = 4386.82 FEET.

FLOW PROCESS FROM NODE 285.00 TO NODE 305.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.30 DOWNSTREAM(FEET) = 1006.51

FLOW LENGTH(FEET) = 39.74 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.52
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.65
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.26
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4426.56 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.26
RAINFALL INTENSITY(INCH/HR) = 3.94
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.38
TOTAL STREAM AREA(ACRES) = 0.64
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.65

FLOW PROCESS FROM NODE 290.00 TO NODE 295.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 1028.87 DOWNSTREAM(FEET) = 1018.79

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.213
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.584

SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.35 0.20 0.100 75 6.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.12
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.12

FLOW PROCESS FROM NODE 295.00 TO NODE 300.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1018.79 DOWNSTREAM ELEVATION(FEET) = 1012.93
STREET LENGTH(FEET) = 145.27 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 38.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 33.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.53
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.22
HALFSTREET FLOOD WIDTH(FEET) = 5.81
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
STREET FLOW TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 6.91
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.373
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.81
EFFECTIVE AREA(ACRES) = 0.62 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 1.87

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.23 HALFSTREET FLOOD WIDTH(FEET) = 6.58
FLOW VELOCITY(FEET/SEC.) = 3.59 DEPTH*VELOCITY(FT*FT/SEC.) = 0.84
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 300.00 = 475.27 FEET.

FLOW PROCESS FROM NODE 300.00 TO NODE 305.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1008.93 DOWNSTREAM(FEET) = 1006.51
FLOW LENGTH(FEET) = 77.81 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.72
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.87

PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 7.10
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 305.00 = 553.08 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.10
RAINFALL INTENSITY(INCH/HR) = 3.32
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.62
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.87

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.65	5.26	3.944	0.20(0.02)	0.10	0.4	275.00
1	1.37	58.59	0.991	0.20(0.02)	0.10	0.6	265.00
2	1.87	7.10	3.320	0.20(0.02)	0.10	0.6	290.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.30	5.26	3.944	0.20(0.02)	0.10	0.8	275.00
2	3.51	7.10	3.320	0.20(0.02)	0.10	1.0	290.00
3	1.92	58.59	0.991	0.20(0.02)	0.10	1.3	265.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.51 Tc(MIN.) = 7.10
EFFECTIVE AREA(ACRES) = 1.00 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.3
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4426.56 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.51 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 25.97 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.65
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.51
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 7.17
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.30	5.32	3.916	0.20(0.02)	0.10	0.8	275.00
2	3.51	7.17	3.303	0.20(0.02)	0.10	1.0	290.00
3	1.92	58.66	0.990	0.20(0.02)	0.10	1.3	265.00

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.20	9.12	2.877	0.20(0.02)	0.10	1.9	210.00

LONGEST FLOWPATH FROM NODE 210.00 TO NODE 310.00 = 790.49 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.44	5.32	3.916	0.20(0.02)	0.10	2.0	275.00
2	8.20	7.17	3.303	0.20(0.02)	0.10	2.5	290.00
3	8.65	9.12	2.877	0.20(0.02)	0.10	3.0	210.00
4	3.68	58.66	0.990	0.20(0.02)	0.10	3.2	265.00

TOTAL AREA(ACRES) = 3.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.65 Tc(MIN.) = 9.117
EFFECTIVE AREA(ACRES) = 2.95 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.44	5.32	3.916	0.20(0.02)	0.10	2.0	275.00
2	8.20	7.17	3.303	0.20(0.02)	0.10	2.5	290.00
3	8.65	9.12	2.877	0.20(0.02)	0.10	3.0	210.00
4	3.68	58.66	0.990	0.20(0.02)	0.10	3.2	265.00

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.14	6.88	3.382	0.20(0.02)	0.10	1.7	245.00
2	5.37	9.29	2.847	0.20(0.02)	0.10	2.1	235.00

LONGEST FLOWPATH FROM NODE 245.00 TO NODE 310.00 = 529.50 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.05	5.32	3.916	0.20(0.02)	0.10	3.3	275.00
2	13.22	6.88	3.382	0.20(0.02)	0.10	4.1	245.00
3	13.37	7.17	3.303	0.20(0.02)	0.10	4.2	290.00
4	14.00	9.12	2.877	0.20(0.02)	0.10	5.0	210.00
5	14.00	9.29	2.847	0.20(0.02)	0.10	5.0	235.00
6	5.52	58.66	0.990	0.20(0.02)	0.10	5.3	265.00

TOTAL AREA(ACRES) = 5.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 14.00 Tc(MIN.) = 9.117
EFFECTIVE AREA(ACRES) = 5.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.3
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 310.00 TO NODE 315.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.99 DOWNSTREAM(FEET) = 1005.73
FLOW LENGTH(FEET) = 26.46 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.23
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.00
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 9.18
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 315.00 = 4478.99 FEET.

FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.18
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.866
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.23 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 5.24 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.5 PEAK FLOW RATE(CFS) = 14.00
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 315.00 TO NODE 345.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.73 DOWNSTREAM(FEET) = 1004.92
FLOW LENGTH(FEET) = 80.73 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.29
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.00
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 9.36
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

FLOW PROCESS FROM NODE 345.00 TO NODE 345.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 320.00 TO NODE 325.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

```

>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 194.49
ELEVATION DATA: UPSTREAM(FEET) = 1012.87 DOWNSTREAM(FEET) = 1010.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.209
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.586
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp     Ap   SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      1.11   0.20   0.100  75   6.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.56
TOTAL AREA(ACRES) = 1.11 PEAK FLOW RATE(CFS) = 3.56

*****
FLOW PROCESS FROM NODE 325.00 TO NODE 340.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.30 DOWNSTREAM(FEET) = 1005.32
FLOW LENGTH(FEET) = 211.93 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.77
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.56
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 6.82
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 406.42 FEET.

*****
FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.82
RAINFALL INTENSITY(INCH/HR) = 3.40
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.11
TOTAL STREAM AREA(ACRES) = 1.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.56

*****
FLOW PROCESS FROM NODE 330.00 TO NODE 335.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 115.56
ELEVATION DATA: UPSTREAM(FEET) = 1012.86 DOWNSTREAM(FEET) = 1011.03

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp     Ap   SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.57   0.20   0.100  75   5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.07
TOTAL AREA(ACRES) = 0.57 PEAK FLOW RATE(CFS) = 2.07

*****
FLOW PROCESS FROM NODE 335.00 TO NODE 340.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.03 DOWNSTREAM(FEET) = 1005.32
FLOW LENGTH(FEET) = 16.08 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.70
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.07
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
LONGEST FLOWPATH FROM NODE 330.00 TO NODE 340.00 = 131.64 FEET.

*****
FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.02
RAINFALL INTENSITY(INCH/HR) = 4.05
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.57
TOTAL STREAM AREA(ACRES) = 0.57
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.07

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** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.56	6.82	3.398	0.20(0.02)	0.10	1.1	320.00
2	2.07	5.02	4.050	0.20(0.02)	0.10	0.6	330.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.20	5.02	4.050	0.20(0.02)	0.10	1.4	330.00
2	5.30	6.82	3.398	0.20(0.02)	0.10	1.7	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.30 Tc(MIN.) = 6.82
EFFECTIVE AREA(ACRES) = 1.68 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.7
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 406.42 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 345.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.32 DOWNSTREAM(FEET) = 1004.92
FLOW LENGTH(FEET) = 28.45 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.75
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.30
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 6.89
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 345.00 = 434.87 FEET.

FLOW PROCESS FROM NODE 345.00 TO NODE 345.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.20	5.09	4.017	0.20(0.02)	0.10	1.4	330.00
2	5.30	6.89	3.378	0.20(0.02)	0.10	1.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 345.00 = 434.87 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	12.16	5.58	3.813	0.20(0.02)	0.10	3.5	275.00
2	13.22	7.12	3.314	0.20(0.02)	0.10	4.3	245.00
3	13.37	7.42	3.239	0.20(0.02)	0.10	4.5	290.00
4	14.00	9.36	2.834	0.20(0.02)	0.10	5.2	210.00
5	14.00	9.53	2.805	0.20(0.02)	0.10	5.3	235.00
6	5.52	58.98	0.987	0.20(0.02)	0.10	5.5	265.00

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.90	5.09	4.017	0.20(0.02)	0.10	4.6	330.00
2	17.39	5.58	3.813	0.20(0.02)	0.10	5.0	275.00
3	18.36	6.89	3.378	0.20(0.02)	0.10	5.9	320.00
4	18.42	7.12	3.314	0.20(0.02)	0.10	6.0	245.00
5	18.45	7.42	3.239	0.20(0.02)	0.10	6.2	290.00
6	18.44	9.36	2.834	0.20(0.02)	0.10	6.9	210.00
7	18.39	9.53	2.805	0.20(0.02)	0.10	6.9	235.00
8	7.05	58.98	0.987	0.20(0.02)	0.10	7.2	265.00

TOTAL AREA(ACRES) = 7.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 18.45 Tc(MIN.) = 7.415
EFFECTIVE AREA(ACRES) = 6.16 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 7.2
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

FLOW PROCESS FROM NODE 345.00 TO NODE 350.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1004.92 DOWNSTREAM(FEET) = 1003.56
FLOW LENGTH(FEET) = 135.29 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.70
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.45
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 7.71
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 350.00 = 4695.01 FEET.

FLOW PROCESS FROM NODE 350.00 TO NODE 350.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 7.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.168
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.41 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 1.16
EFFECTIVE AREA(ACRES) = 6.57 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 7.6 PEAK FLOW RATE(CFS) = 18.61

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 17.35 5.39 3.888 0.20(0.02) 0.10 5.0 330.00
2 17.78 5.87 3.701 0.20(0.02) 0.10 5.4 275.00
3 18.60 7.18 3.298 0.20(0.02) 0.10 6.3 320.00
4 18.63 7.42 3.238 0.20(0.02) 0.10 6.4 245.00
5 18.61 7.71 3.168 0.20(0.02) 0.10 6.6 290.00
6 18.44 9.66 2.784 0.20(0.02) 0.10 7.3 210.00
7 18.39 9.82 2.757 0.20(0.02) 0.10 7.4 235.00
8 7.05 59.34 0.984 0.20(0.02) 0.10 7.6 265.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 18.63 Tc(MIN.) = 7.42
AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 6.43

FLOW PROCESS FROM NODE 350.00 TO NODE 450.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.56 DOWNSTREAM(FEET) = 997.40
FLOW LENGTH(FEET) = 169.48 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 9.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.38
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.63
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 7.65
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 450.00 = 4864.49 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.6 TC(MIN.) = 7.65
EFFECTIVE AREA(ACRES) = 6.43 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 18.63

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 17.35 5.62 3.795 0.20(0.02) 0.10 5.0 330.00
2 17.78 6.11 3.620 0.20(0.02) 0.10 5.4 275.00
3 18.60 7.41 3.240 0.20(0.02) 0.10 6.3 320.00
4 18.63 7.65 3.183 0.20(0.02) 0.10 6.4 245.00
5 18.61 7.94 3.115 0.20(0.02) 0.10 6.6 290.00
6 18.44 9.88 2.747 0.20(0.02) 0.10 7.3 210.00
7 18.39 10.05 2.720 0.20(0.02) 0.10 7.4 235.00
8 7.05 59.65 0.981 0.20(0.02) 0.10 7.6 265.00

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C3) *
* 10-YEAR STORM EVENT EM *

FILE NAME: 3P10R2.DAT
TIME/DATE OF STUDY: 15:20 11/06/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 70.00 TO NODE 75.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 241.09
ELEVATION DATA: UPSTREAM(FEET) = 1023.41 DOWNSTREAM(FEET) = 1018.83

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.026
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.648
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.67	0.20	0.100	75	6.03

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.19
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 2.19

FLOW PROCESS FROM NODE 75.00 TO NODE 90.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1014.83 DOWNSTREAM(FEET) = 1010.64
FLOW LENGTH(FEET) = 250.04 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.58
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.19
PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 6.77
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 90.00 = 491.13 FEET.

FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.77
RAINFALL INTENSITY(INCH/HR) = 3.41
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.19

*****
FLOW PROCESS FROM NODE      80.00 TO NODE      85.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  186.71
ELEVATION DATA: UPSTREAM(FEET) =  1020.22  DOWNSTREAM(FEET) =  1018.15

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.059
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.636
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.36   0.20   0.100  75  6.06
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  1.17
TOTAL AREA(ACRES) =  0.36  PEAK FLOW RATE(CFS) =  1.17

*****
FLOW PROCESS FROM NODE      85.00 TO NODE      90.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1014.15  DOWNSTREAM(FEET) =  1010.64
FLOW LENGTH(FEET) =  24.11  MANNING'S N =  0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS  2.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.21
GIVEN PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  1.17
PIPE TRAVEL TIME(MIN.) =  0.04  Tc(MIN.) =  6.10
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      90.00 =  210.82 FEET.

*****
FLOW PROCESS FROM NODE      90.00 TO NODE      90.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  6.10
RAINFALL INTENSITY(INCH/HR) =  3.62
AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20

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AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.36
TOTAL STREAM AREA(ACRES) =  0.36
PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.17

** CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1        2.19  6.77  3.411  0.20( 0.02) 0.10  0.7   70.00
2        1.17  6.10  3.623  0.20( 0.02) 0.10  0.4   80.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1        3.26  6.10  3.623  0.20( 0.02) 0.10  1.0   80.00
2        3.29  6.77  3.411  0.20( 0.02) 0.10  1.0   70.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =  3.29  Tc(MIN.) =  6.77
EFFECTIVE AREA(ACRES) =  1.03  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =  1.0
LONGEST FLOWPATH FROM NODE      70.00 TO NODE      90.00 =  491.13 FEET.

*****
FLOW PROCESS FROM NODE      90.00 TO NODE      105.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1010.64  DOWNSTREAM(FEET) =  1009.86
FLOW LENGTH(FEET) =  155.14  MANNING'S N =  0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS  7.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  3.87
GIVEN PIPE DIAMETER(INCH) =  24.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  3.29
PIPE TRAVEL TIME(MIN.) =  0.67  Tc(MIN.) =  7.44
LONGEST FLOWPATH FROM NODE      70.00 TO NODE      105.00 =  646.27 FEET.

*****
FLOW PROCESS FROM NODE      105.00 TO NODE      105.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  7.44

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RAINFALL INTENSITY(INCH/HR) = 3.23
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.03
 TOTAL STREAM AREA(ACRES) = 1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.29

FLOW PROCESS FROM NODE 95.00 TO NODE 100.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.14
 ELEVATION DATA: UPSTREAM(FEET) = 1020.24 DOWNSTREAM(FEET) = 1018.28

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.481
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.851
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS	Tc
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
COMMERCIAL	D	0.37	0.20	0.100	75	5.48

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.28
 TOTAL AREA(ACRES) = 0.37 PEAK FLOW RATE(CFS) = 1.28

FLOW PROCESS FROM NODE 100.00 TO NODE 105.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1014.28 DOWNSTREAM(FEET) = 1009.86
 FLOW LENGTH(FEET) = 24.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 2.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.36
 GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.28
 PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 5.52
 LONGEST FLOWPATH FROM NODE 95.00 TO NODE 105.00 = 179.25 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.52
 RAINFALL INTENSITY(INCH/HR) = 3.84
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.37
 TOTAL STREAM AREA(ACRES) = 0.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.28

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.26	6.77	3.413	0.20(0.02)	0.10	1.0	80.00
1	3.29	7.44	3.232	0.20(0.02)	0.10	1.0	70.00
2	1.28	5.52	3.837	0.20(0.02)	0.10	0.4	95.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.27	5.52	3.837	0.20(0.02)	0.10	1.2	95.00
2	4.40	6.77	3.413	0.20(0.02)	0.10	1.3	80.00
3	4.36	7.44	3.232	0.20(0.02)	0.10	1.4	70.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.40 Tc(MIN.) = 6.77
 EFFECTIVE AREA(ACRES) = 1.33 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 70.00 TO NODE 105.00 = 646.27 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 120.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.86 DOWNSTREAM(FEET) = 1009.61
 FLOW LENGTH(FEET) = 48.61 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.23
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.40
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 6.96
 LONGEST FLOWPATH FROM NODE 70.00 TO NODE 120.00 = 694.88 FEET.

FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 6.96

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.359

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 2.55

EFFECTIVE AREA(ACRES) = 2.18 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 6.56

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	6.75	5.71	3.762	0.20(0.02)	0.10	2.0	95.00
2	6.56	6.96	3.359	0.20(0.02)	0.10	2.2	80.00
3	6.41	7.63	3.185	0.20(0.02)	0.10	2.2	70.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 6.75 Tc(MIN.) = 5.71

AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20

AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 2.01

FLOW PROCESS FROM NODE 120.00 TO NODE 125.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.61 DOWNSTREAM(FEET) = 1006.10

FLOW LENGTH(FEET) = 79.38 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 5.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.85

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 6.75

PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 5.84

LONGEST FLOWPATH FROM NODE 70.00 TO NODE 125.00 = 774.26 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.2 TC(MIN.) = 5.84

EFFECTIVE AREA(ACRES) = 2.01 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 6.75

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	6.75	5.84	3.712	0.20(0.02)	0.10	2.0	95.00
2	6.56	7.10	3.322	0.20(0.02)	0.10	2.2	80.00
3	6.41	7.77	3.153	0.20(0.02)	0.10	2.2	70.00

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C4) *
* 10-YEAR STORM EVENT EM *

FILE NAME: 3P10RC4.DAT
TIME/DATE OF STUDY: 16:23 11/08/2019

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0313 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 150.00 TO NODE 155.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 179.74
ELEVATION DATA: UPSTREAM(FEET) = 1012.55 DOWNSTREAM(FEET) = 1011.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.144
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.309
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.48	0.20	0.100	75	7.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.42
TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 1.42

FLOW PROCESS FROM NODE 155.00 TO NODE 170.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 1008.74 DOWNSTREAM(FEET) = 1006.15
FLOW LENGTH(FEET) = 142.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.12
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.42
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 7.61
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 170.00 = 322.63 FEET.

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<<<

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.61
RAINFALL INTENSITY(INCH/HR) = 3.19
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.48
TOTAL STREAM AREA(ACRES) = 0.48

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.42

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FLOW PROCESS FROM NODE   160.00 TO NODE   165.00 IS CODE =  21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  159.96
ELEVATION DATA: UPSTREAM(FEET) =  1012.82  DOWNSTREAM(FEET) =  1011.69

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.233
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.578
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.49    0.20    0.100  75  6.23
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) =  1.57
TOTAL AREA(ACRES) =  0.49  PEAK FLOW RATE(CFS) =  1.57

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FLOW PROCESS FROM NODE   165.00 TO NODE   170.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1008.51  DOWNSTREAM(FEET) =  1006.15
FLOW LENGTH(FEET) =  150.95  MANNING'S N =  0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS  5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  4.97
GIVEN PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  1.57
PIPE TRAVEL TIME(MIN.) =  0.51  Tc(MIN.) =  6.74
LONGEST FLOWPATH FROM NODE   160.00 TO NODE   170.00 =  310.91 FEET.

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FLOW PROCESS FROM NODE   170.00 TO NODE   170.00 IS CODE =  1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) =  6.74
RAINFALL INTENSITY(INCH/HR) =  3.42
AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20

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AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.49
TOTAL STREAM AREA(ACRES) =  0.49
PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.57

** CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       1.42   7.61   3.191   0.20( 0.02) 0.10   0.5   150.00
2       1.57   6.74   3.422   0.20( 0.02) 0.10   0.5   160.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1       2.92   6.74   3.422   0.20( 0.02) 0.10   0.9   160.00
2       2.88   7.61   3.191   0.20( 0.02) 0.10   1.0   150.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =  2.92  Tc(MIN.) =  6.74
EFFECTIVE AREA(ACRES) =  0.92  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =  1.0
LONGEST FLOWPATH FROM NODE   150.00 TO NODE   170.00 =  322.63 FEET.

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FLOW PROCESS FROM NODE   170.00 TO NODE   175.00 IS CODE =  41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1006.15  DOWNSTREAM(FEET) =  1005.93
FLOW LENGTH(FEET) =  43.72  MANNING'S N =  0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS  7.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  3.74
GIVEN PIPE DIAMETER(INCH) =  24.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  2.92
PIPE TRAVEL TIME(MIN.) =  0.19  Tc(MIN.) =  6.93
LONGEST FLOWPATH FROM NODE   150.00 TO NODE   175.00 =  366.35 FEET.

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FLOW PROCESS FROM NODE   175.00 TO NODE   175.00 IS CODE =  81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) =  6.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.366
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.50   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.50   SUBAREA RUNOFF(CFS) = 1.51
EFFECTIVE AREA(ACRES) = 1.42  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.5     PEAK FLOW RATE(CFS) = 4.26

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FLOW PROCESS FROM NODE 175.00 TO NODE 180.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1005.93 DOWNSTREAM(FEET) = 1005.30
FLOW LENGTH(FEET) = 126.36 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.14
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.26
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 7.44
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 180.00 = 492.71 FEET.

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FLOW PROCESS FROM NODE 180.00 TO NODE 180.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) = 7.44
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.232
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.31   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.31   SUBAREA RUNOFF(CFS) = 0.90
EFFECTIVE AREA(ACRES) = 1.73  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.8     PEAK FLOW RATE(CFS) = 4.99

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FLOW PROCESS FROM NODE 180.00 TO NODE 185.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1005.30 DOWNSTREAM(FEET) = 1004.75

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FLOW LENGTH(FEET) = 110.17 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.32
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.99
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 7.87
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 185.00 = 602.88 FEET.

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FLOW PROCESS FROM NODE 185.00 TO NODE 185.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) = 7.87
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.131
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.36   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.36   SUBAREA RUNOFF(CFS) = 1.01
EFFECTIVE AREA(ACRES) = 2.09  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1     PEAK FLOW RATE(CFS) = 5.84

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FLOW PROCESS FROM NODE 185.00 TO NODE 450.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1004.75 DOWNSTREAM(FEET) = 997.40
FLOW LENGTH(FEET) = 67.82 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.92
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.84
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 7.95
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.1 TC(MIN.) = 7.95
EFFECTIVE AREA(ACRES) = 2.09 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 5.84

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** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE

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1	5.84	7.95	3.111	0.20(0.02)	0.10	2.1	160.00
2	5.64	8.83	2.930	0.20(0.02)	0.10	2.1	150.00

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END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION OVERALL LINE C *
* 10-YEAR STORM EVENT EM *

FILE NAME: 3P10ROV.DAT
TIME/DATE OF STUDY: 12:56 11/11/2019

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 326.73
ELEVATION DATA: UPSTREAM(FEET) = 1332.32 DOWNSTREAM(FEET) = 1331.94

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.223
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.21	0.30	0.500	56	15.22
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	1.55	0.20	0.500	75	15.22

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 3.23
TOTAL AREA(ACRES) = 1.76 PEAK FLOW RATE(CFS) = 3.23

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1331.94 DOWNSTREAM ELEVATION(FEET) = 1328.22
STREET LENGTH(FEET) = 177.44 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.05
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 8.56
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.75
STREET FLOW TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 16.31

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.062
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.93 0.20 0.500 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 1.64
EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.74

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 9.15
FLOW VELOCITY(FEET/SEC.) = 2.84 DEPTH*VELOCITY(FT*FT/SEC.) = 0.81
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 504.17 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1328.22 DOWNSTREAM(FEET) = 1260.18
FLOW LENGTH(FEET) = 960.76 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.35
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.74
PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 17.72
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1464.93 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 17.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 5.09 0.20 0.500 75
COMMERCIAL D 0.54 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 5.63 SUBAREA RUNOFF(CFS) = 9.49
EFFECTIVE AREA(ACRES) = 8.32 AREA-AVERAGED Fm(INCH/HR) = 0.10

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 14.00

FLOW PROCESS FROM NODE 103.00 TO NODE 105.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1260.18 DOWNSTREAM(FEET) = 1245.52
FLOW LENGTH(FEET) = 775.08 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.92
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.00
PIPE TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 19.35
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2240.01 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 19.35
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.869
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 3.73 0.20 0.500 75
COMMERCIAL D 0.65 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 4.38 SUBAREA RUNOFF(CFS) = 7.02
EFFECTIVE AREA(ACRES) = 12.70 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 12.7 PEAK FLOW RATE(CFS) = 20.30

FLOW PROCESS FROM NODE 105.00 TO NODE 107.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1245.52 DOWNSTREAM(FEET) = 1240.60
FLOW LENGTH(FEET) = 98.55 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 10.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.63
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 20.30
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 19.46
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 2338.56 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.20 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 1.16 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 12.06 0.20 0.500 75
COMMERCIAL C 0.60 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
PUBLIC PARK C 0.70 0.25 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.481
SUBAREA AREA(ACRES) = 19.69 SUBAREA RUNOFF(CFS) = 31.07
EFFECTIVE AREA(ACRES) = 32.39 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 51.30

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.46
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 0.53 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 0.81
EFFECTIVE AREA(ACRES) = 32.92 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 32.9 PEAK FLOW RATE(CFS) = 52.11

FLOW PROCESS FROM NODE 107.00 TO NODE 109.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1240.60 DOWNSTREAM(FEET) = 1239.01
FLOW LENGTH(FEET) = 81.43 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.59
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 52.11
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 19.55
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 2419.99 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.859
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.52 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
CONDOMINIUMS C 1.00 0.25 0.350 69
CONDOMINIUMS D 10.74 0.20 0.350 75
PUBLIC PARK D 0.07 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.325
SUBAREA AREA(ACRES) = 13.30 SUBAREA RUNOFF(CFS) = 21.45
EFFECTIVE AREA(ACRES) = 46.22 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 73.43

FLOW PROCESS FROM NODE 109.00 TO NODE 111.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1239.07 DOWNSTREAM(FEET) = 1210.33
FLOW LENGTH(FEET) = 407.01 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.99
GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.43
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 19.84
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.

FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.84
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.843
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.69 0.20 0.100 75
CONDOMINIUMS D 0.09 0.20 0.350 75
PUBLIC PARK D 0.85 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 2.56
EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 75.32

FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00
FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.45
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 75.32
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 19.86
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.

FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.842
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS D 13.30 0.20 0.350 75
PUBLIC PARK D 3.90 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 27.07
EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 102.34

FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95
FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 23.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.17
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 102.34
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 20.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL "11+ DWELLINGS/ACRE" C 1.51 0.25 0.200 69
RESIDENTIAL "11+ DWELLINGS/ACRE" D 5.27 0.20 0.200 75
COMMERCIAL D 0.27 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 11.15
EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 110.93

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C       1.27   0.25  0.200  69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D       3.23   0.20  0.200  75
COMMERCIAL          D       0.27   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
SUBAREA AREA(ACRES) = 4.77   SUBAREA RUNOFF(CFS) = 7.54
EFFECTIVE AREA(ACRES) = 76.87   AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 76.9   PEAK FLOW RATE(CFS) = 118.47

*****
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.71
RAINFALL INTENSITY(INCH/HR) = 1.80
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.41
EFFECTIVE STREAM AREA(ACRES) = 76.87
TOTAL STREAM AREA(ACRES) = 76.87
PEAK FLOW RATE(CFS) AT CONFLUENCE = 118.47

*****
FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
ELEVATION DATA: UPSTREAM(FEET) = 1332.00   DOWNSTREAM(FEET) = 1330.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.172
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
CONDOMINIUMS       D       1.42   0.20  0.350  75  11.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 3.18
TOTAL AREA(ACRES) = 1.42   PEAK FLOW RATE(CFS) = 3.18

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*****
FLOW PROCESS FROM NODE 201.00 TO NODE 203.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 1330.74   DOWNSTREAM ELEVATION(FEET) = 1308.01
STREET LENGTH(FEET) = 789.61   CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 15.33
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.52
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.92
STREET FLOW TRAVEL TIME(MIN.) = 2.91   Tc(MIN.) = 14.08
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D       1.91   0.20  0.400  75
CONDOMINIUMS       D       4.97   0.20  0.350  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
SUBAREA AREA(ACRES) = 6.88   SUBAREA RUNOFF(CFS) = 13.44
EFFECTIVE AREA(ACRES) = 8.30   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20   AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 8.3   PEAK FLOW RATE(CFS) = 16.22

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) = 18.84
FLOW VELOCITY(FEET/SEC.) = 5.05   DEPTH*VELOCITY(FT*FT/SEC.) = 2.45
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1120.62 FEET.

*****
FLOW PROCESS FROM NODE 203.00 TO NODE 205.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

```

>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 1308.01 DOWNSTREAM ELEVATION(FEET) = 1245.00
STREET LENGTH(FEET) = 901.07 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 27.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.87
AVERAGE FLOW VELOCITY(FEET/SEC.) = 8.15
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.07
STREET FLOW TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 15.92
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.090
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.07	0.20	0.400	75
COMMERCIAL	D	0.73	0.20	0.100	75
CONDOMINIUMS	D	11.58	0.20	0.350	75
PUBLIC PARK	D	0.01	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 12.39 SUBAREA RUNOFF(CFS) = 22.56
EFFECTIVE AREA(ACRES) = 20.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 20.7 PEAK FLOW RATE(CFS) = 37.64

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.37
FLOW VELOCITY(FEET/SEC.) = 8.81 DEPTH*VELOCITY(FT*FT/SEC.) = 4.80
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 2021.69 FEET.

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1245.00 DOWNSTREAM(FEET) = 1229.65

FLOW LENGTH(FEET) = 135.30 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.64
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 16.03
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2156.99 FEET.

FLOW PROCESS FROM NODE 206.00 TO NODE 210.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1229.65 DOWNSTREAM ELEVATION(FEET) = 1166.68
STREET LENGTH(FEET) = 1205.30 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.52
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 19.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.08
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.56
STREET FLOW TRAVEL TIME(MIN.) = 2.84 Tc(MIN.) = 18.86
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.897
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.38	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	9.23	0.20	0.200	75
COMMERCIAL	D	0.42	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.197
SUBAREA AREA(ACRES) = 13.03 SUBAREA RUNOFF(CFS) = 21.75
EFFECTIVE AREA(ACRES) = 33.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 55.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12
 FLOW VELOCITY(FEET/SEC.) = 7.33 DEPTH*VELOCITY(FT*FT/SEC.) = 3.82
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 3362.29 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1166.68 DOWNSTREAM(FEET) = 1159.95
 FLOW LENGTH(FEET) = 307.60 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.76
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 55.78
 PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 19.15
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 119.00 = 3669.89 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.15
 RAINFALL INTENSITY(INCH/HR) = 1.88
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.29
 EFFECTIVE STREAM AREA(ACRES) = 33.72
 TOTAL STREAM AREA(ACRES) = 33.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.78

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	118.47	20.71	1.798	0.21(0.09)	0.41	76.9	100.00
2	55.78	19.15	1.880	0.20(0.06)	0.29	33.7	200.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	170.61	19.15	1.880	0.21(0.08)	0.37	104.8 200.00
2	171.73	20.71	1.798	0.21(0.08)	0.37	110.6 100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 171.73 Tc(MIN.) = 20.71
 EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 110.6
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 121.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1159.95 DOWNSTREAM(FEET) = 1150.00
 FLOW LENGTH(FEET) = 321.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 27.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.88
 GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 171.73
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 20.97
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 121.00 = 4244.83 FEET.

FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.97
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.785
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	6.04	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	8.06	0.20	0.200	75
COMMERCIAL	C	0.97	0.25	0.100	69
COMMERCIAL	D	1.54	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.185
 SUBAREA AREA(ACRES) = 16.61 SUBAREA RUNOFF(CFS) = 26.08
 EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 196.08

FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1150.00 DOWNSTREAM(FEET) = 1140.00
FLOW LENGTH(FEET) = 798.79 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.28
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 196.08
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 21.84
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 5043.62 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.84
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 6.79 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 17.92 0.20 0.200 75
APARTMENTS C 4.46 0.25 0.200 69
APARTMENTS D 0.69 0.20 0.200 75
COMMERCIAL C 0.78 0.25 0.100 69
COMMERCIAL D 1.88 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.192
SUBAREA AREA(ACRES) = 32.52 SUBAREA RUNOFF(CFS) = 49.82
EFFECTIVE AREA(ACRES) = 159.72 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 159.7 PEAK FLOW RATE(CFS) = 241.18

** PEAK FLOW RATE TABLE **

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 243.02 Tc(MIN.) = 20.28
AREA-AVERAGED Fm(INCH/HR) = 0.07 AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.31 EFFECTIVE AREA(ACRES) = 153.93

FLOW PROCESS FROM NODE 123.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1140.00 DOWNSTREAM(FEET) = 1122.00
FLOW LENGTH(FEET) = 579.78 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.38
GIVEN PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 243.02
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 20.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.85 0.25 0.200 69
COMMERCIAL C 0.56 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.184
SUBAREA AREA(ACRES) = 3.41 SUBAREA RUNOFF(CFS) = 5.38
EFFECTIVE AREA(ACRES) = 157.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 163.1 PEAK FLOW RATE(CFS) = 245.37

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.71
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.54 0.25 0.200 69
COMMERCIAL C 0.97 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.172
SUBAREA AREA(ACRES) = 3.51 SUBAREA RUNOFF(CFS) = 5.54

EFFECTIVE AREA(ACRES) = 160.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 166.6 PEAK FLOW RATE(CFS) = 250.91

 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 20.71
 RAINFALL INTENSITY(INCH/HR) = 1.80
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.31
 EFFECTIVE STREAM AREA(ACRES) = 160.85
 TOTAL STREAM AREA(ACRES) = 166.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 250.91

 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 320.55
 ELEVATION DATA: UPSTREAM(FEET) = 1163.74 DOWNSTREAM(FEET) = 1148.43

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.616
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.798
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.29	0.25	0.200	69	5.99
COMMERCIAL	C	1.36	0.25	0.100	69	5.62

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.118
 SUBAREA RUNOFF(CFS) = 5.60
 TOTAL AREA(ACRES) = 1.65 PEAK FLOW RATE(CFS) = 5.60

 FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 3 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1148.43 DOWNSTREAM ELEVATION(FEET) = 1141.94

STREET LENGTH(FEET) = 235.77 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.31
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.39
 HALFSTREET FLOOD WIDTH(FEET) = 13.04
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.05
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.56
 STREET FLOW TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 6.59
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.467

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.47	0.25	0.200	69
COMMERCIAL	C	4.51	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109
 SUBAREA AREA(ACRES) = 4.98 SUBAREA RUNOFF(CFS) = 15.42
 EFFECTIVE AREA(ACRES) = 6.63 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.11
 TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 20.52

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.68
 FLOW VELOCITY(FEET/SEC.) = 4.49 DEPTH*VELOCITY(FT*FT/SEC.) = 1.93
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 556.32 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1141.94 DOWNSTREAM(FEET) = 1122.13
 FLOW LENGTH(FEET) = 643.31 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.99
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 20.52

PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 7.48
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1199.63 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 7.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.223
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.51 0.25 0.200 69
COMMERCIAL C 3.05 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
SUBAREA AREA(ACRES) = 5.56 SUBAREA RUNOFF(CFS) = 15.95
EFFECTIVE AREA(ACRES) = 12.19 AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 12.2 PEAK FLOW RATE(CFS) = 35.01

FLOW PROCESS FROM NODE 303.00 TO NODE 129.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1122.13 DOWNSTREAM(FEET) = 1122.00
FLOW LENGTH(FEET) = 81.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.60
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.01
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 7.77
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 129.00 = 1281.01 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.77
RAINFALL INTENSITY(INCH/HR) = 3.15
AREA-AVERAGED Fm(INCH/HR) = 0.03
AREA-AVERAGED Fp(INCH/HR) = 0.25

AREA-AVERAGED Ap = 0.13
EFFECTIVE STREAM AREA(ACRES) = 12.19
TOTAL STREAM AREA(ACRES) = 12.19
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.01

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	250.91	20.71	1.798	0.21(0.06)	0.31	160.9	200.00
1	248.85	22.27	1.725	0.21(0.07)	0.31	166.6	100.00
2	35.01	7.77	3.152	0.25(0.03)	0.13	12.2	300.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	202.77	7.77	3.152	0.21(0.06)	0.28	72.6	300.00
2	270.73	20.71	1.798	0.21(0.06)	0.29	173.0	200.00
3	267.84	22.27	1.725	0.21(0.06)	0.30	178.8	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 270.73 Tc(MIN.) = 20.71
EFFECTIVE AREA(ACRES) = 173.04 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 178.8
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 131.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1105.04 DOWNSTREAM(FEET) = 1103.76
FLOW LENGTH(FEET) = 35.44 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 30.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.77
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 270.73
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 20.74
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 131.00 = 5658.84 FEET.

FLOW PROCESS FROM NODE 131.00 TO NODE 131.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.74

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.797
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL C 1.86 0.25 0.100 69
 COMMERCIAL D 0.14 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 3.19
 EFFECTIVE AREA(ACRES) = 175.04 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 180.8 PEAK FLOW RATE(CFS) = 273.30

 FLOW PROCESS FROM NODE 131.00 TO NODE 133.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1103.76 DOWNSTREAM(FEET) = 1101.65
 FLOW LENGTH(FEET) = 503.15 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 273.30
 PIPE TRAVEL TIME(MIN.) = 0.73 Tc(MIN.) = 21.47
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 133.00 = 6161.99 FEET.

 FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 21.47
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.762
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL C 1.00 0.25 0.100 69
 COMMERCIAL D 0.87 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.87 SUBAREA RUNOFF(CFS) = 2.93
 EFFECTIVE AREA(ACRES) = 176.91 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 182.7 PEAK FLOW RATE(CFS) = 273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1101.65 DOWNSTREAM(FEET) = 1101.33
 FLOW LENGTH(FEET) = 60.37 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 273.30
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.55
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 6222.36 FEET.

 FLOW PROCESS FROM NODE 135.00 TO NODE 137.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 21.55
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL C 0.36 0.25 0.100 69
 COMMERCIAL D 0.44 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.25
 EFFECTIVE AREA(ACRES) = 177.71 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 183.5 PEAK FLOW RATE(CFS) = 273.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 135.00 TO NODE 137.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1101.33 DOWNSTREAM(FEET) = 1098.66
 FLOW LENGTH(FEET) = 408.71 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 273.30
 PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 22.15
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 137.00 = 6631.07 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.15

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.730

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.06	0.25	0.100	69
COMMERCIAL	D	1.08	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 5.14 SUBAREA RUNOFF(CFS) = 7.89

EFFECTIVE AREA(ACRES) = 182.85 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 188.6 PEAK FLOW RATE(CFS) = 274.83

FLOW PROCESS FROM NODE 137.00 TO NODE 141.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1098.66 DOWNSTREAM(FEET) = 1093.99

FLOW LENGTH(FEET) = 318.57 MANNING'S N = 0.013

DEPTH OF FLOW IN 66.0 INCH PIPE IS 41.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 17.63

GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 274.83

PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 22.45

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 141.00 = 6949.64 FEET.

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.45

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.78	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 5.78 SUBAREA RUNOFF(CFS) = 8.80

EFFECTIVE AREA(ACRES) = 188.63 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 194.4 PEAK FLOW RATE(CFS) = 281.44

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.45

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	0.87	0.25	0.400	69
COMMERCIAL	C	0.68	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.268

SUBAREA AREA(ACRES) = 1.55 SUBAREA RUNOFF(CFS) = 2.30

EFFECTIVE AREA(ACRES) = 190.18 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 196.0 PEAK FLOW RATE(CFS) = 283.74

FLOW PROCESS FROM NODE 141.00 TO NODE 145.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1093.99 DOWNSTREAM(FEET) = 1076.30

FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013

DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 24.75

GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 283.74

PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 22.79

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.79

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.702

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.71	0.25	0.100	69
COMMERCIAL	D	0.32	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 5.78 SUBAREA RUNOFF(CFS) = 8.80

EFFECTIVE AREA(ACRES) = 188.63 AREA-AVERAGED Fm(INCH/HR) = 0.06

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03 SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 191.21 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0 PEAK FLOW RATE(CFS) = 283.74
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 22.79
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.702
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 1.02 0.25 0.350 69
CONDOMINIUMS D 4.41 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43 SUBAREA RUNOFF(CFS) = 7.96
EFFECTIVE AREA(ACRES) = 196.64 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4 PEAK FLOW RATE(CFS) = 290.74

FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1076.30 DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 27.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.70
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 290.74
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 22.93
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 22.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.696
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS C 4.75 0.25 0.350 69
CONDOMINIUMS D 1.68 0.20 0.350 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43 SUBAREA RUNOFF(CFS) = 9.34
EFFECTIVE AREA(ACRES) = 203.07 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9 PEAK FLOW RATE(CFS) = 298.99

FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 22.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.696
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.40 0.25 0.100 69
PUBLIC PARK C 0.62 0.25 0.850 69
PUBLIC PARK D 0.03 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 1.47
EFFECTIVE AREA(ACRES) = 204.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9 PEAK FLOW RATE(CFS) = 300.46

FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1053.58 DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 25.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 36.98
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 300.46
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 23.07
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 23.07
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.690
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL   C   0.41   0.25   0.100   69
COMMERCIAL   D   1.11   0.20   0.100   75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.52   SUBAREA RUNOFF(CFS) = 2.28
EFFECTIVE AREA(ACRES) = 205.64   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 211.4   PEAK FLOW RATE(CFS) = 301.68

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FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 1023.54   DOWNSTREAM(FEET) = 1007.62
FLOW LENGTH(FEET) = 210.38   MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.58
GIVEN PIPE DIAMETER(INCH) = 60.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 301.68
PIPE TRAVEL TIME(MIN.) = 0.10   Tc(MIN.) = 23.17
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

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FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 23.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.686
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL   D   0.85   0.20   0.100   75
PUBLIC PARK   D   2.01   0.20   0.850   75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627
SUBAREA AREA(ACRES) = 2.86   SUBAREA RUNOFF(CFS) = 4.02
EFFECTIVE AREA(ACRES) = 208.50   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 214.3   PEAK FLOW RATE(CFS) = 304.89

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FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 23.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.686
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL   D   0.27   0.20   0.100   75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.27   SUBAREA RUNOFF(CFS) = 0.40
EFFECTIVE AREA(ACRES) = 208.77   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 214.6   PEAK FLOW RATE(CFS) = 305.29

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FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 23.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.686
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C   5.30   0.25   0.500   69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   D   0.58   0.20   0.500   75
RESIDENTIAL
"8-10 DWELLINGS/ACRE"   C   9.75   0.25   0.400   69
RESIDENTIAL
"8-10 DWELLINGS/ACRE"   D   1.01   0.20   0.400   75
APARTMENTS   C   2.16   0.25   0.200   69
COMMERCIAL   C   2.28   0.25   0.100   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375
SUBAREA AREA(ACRES) = 21.08   SUBAREA RUNOFF(CFS) = 30.24
EFFECTIVE AREA(ACRES) = 229.85   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 235.6   PEAK FLOW RATE(CFS) = 335.53

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FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 23.17

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.686
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL D 4.68 0.20 0.100 75
 PUBLIC PARK C 4.30 0.25 0.850 69
 PUBLIC PARK D 0.67 0.20 0.850 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
 SUBAREA AREA(ACRES) = 9.65 SUBAREA RUNOFF(CFS) = 13.63
 EFFECTIVE AREA(ACRES) = 239.50 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
 TOTAL AREA(ACRES) = 245.3 PEAK FLOW RATE(CFS) = 349.17

 FLOW PROCESS FROM NODE 153.00 TO NODE 154.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1007.62 DOWNSTREAM(FEET) = 1006.10
 FLOW LENGTH(FEET) = 446.62 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.78
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 349.17
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 23.59
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

 FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 1 <<<<<<
 =====

PEAK FLOWRATE TABLE FILE NAME: 3p10rc1.DNA
 MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.10	7.37	0.20(0.02)	0.10	2.0	40.00
2	6.17	7.75	0.20(0.02)	0.10	2.1	30.00
3	6.13	8.32	0.20(0.02)	0.10	2.2	5.00
4	6.13	8.33	0.20(0.02)	0.10	2.2	15.00

 TOTAL AREA(ACRES) = 2.2

 FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<<
 =====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	323.47	10.96	2.589	0.23(0.07)	0.30	139.0	300.00
2	349.17	23.59	1.669	0.22(0.07)	0.30	239.5	200.00
3	343.72	25.18	1.608	0.22(0.07)	0.30	245.3	100.00

 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.10	7.37	3.251	0.20(0.02)	0.10	2.0	40.00
2	6.17	7.75	3.159	0.20(0.02)	0.10	2.1	30.00
3	6.13	8.32	3.031	0.20(0.02)	0.10	2.2	5.00
4	6.13	8.33	3.031	0.20(0.02)	0.10	2.2	15.00

 LONGEST FLOWPATH FROM NODE 15.00 TO NODE 154.00 = 585.84 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	280.61	7.37	3.251	0.23(0.07)	0.29	95.5	40.00
2	286.43	7.75	3.159	0.23(0.07)	0.29	100.3	30.00
3	294.87	8.32	3.031	0.23(0.07)	0.29	107.7	5.00
4	294.92	8.33	3.031	0.23(0.07)	0.29	107.8	15.00
5	328.70	10.96	2.589	0.23(0.07)	0.29	141.2	300.00
6	352.52	23.59	1.669	0.22(0.07)	0.30	241.7	200.00
7	346.95	25.18	1.608	0.22(0.07)	0.30	247.4	100.00

 TOTAL AREA(ACRES) = 247.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 352.52 Tc(MIN.) = 23.591
 EFFECTIVE AREA(ACRES) = 241.66 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 247.4
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

 FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<<
 =====

 FLOW PROCESS FROM NODE 154.00 TO NODE 155.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.60

FLOW LENGTH(FEET) = 122.27 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.95
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 352.52
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 23.70
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

 FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 1 <<<<<

PEAK FLOWRATE TABLE FILE NAME: 3p10rc3.DNA

MEMORY BANK # 1 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.75	5.84	0.20(0.02)	0.10	2.0	95.00	
2	6.56	7.10	0.20(0.02)	0.10	2.2	80.00	
3	6.41	7.77	0.20(0.02)	0.10	2.2	70.00	
TOTAL AREA(ACRES) =							2.2

 FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	280.61	7.51	3.215	0.23(0.07)	0.29	95.5	40.00
2	286.43	7.89	3.127	0.23(0.07)	0.29	100.3	30.00
3	294.87	8.46	3.003	0.23(0.07)	0.29	107.7	5.00
4	294.92	8.46	3.003	0.23(0.07)	0.29	107.8	15.00
5	328.70	11.08	2.573	0.23(0.07)	0.29	141.2	300.00
6	352.52	23.70	1.664	0.22(0.07)	0.30	241.7	200.00
7	346.95	25.29	1.604	0.22(0.07)	0.30	247.4	100.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 =							8828.57 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.75	5.84	3.712	0.20(0.02)	0.10	2.0	95.00
2	6.56	7.10	3.322	0.20(0.02)	0.10	2.2	80.00
3	6.41	7.77	3.153	0.20(0.02)	0.10	2.2	70.00
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 155.00 =							774.26 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	259.55	5.84	3.712	0.23(0.06)	0.29	76.3	95.00
2	280.62	7.10	3.322	0.23(0.07)	0.29	92.4	80.00
3	287.08	7.51	3.215	0.23(0.07)	0.29	97.7	40.00
4	291.04	7.77	3.153	0.23(0.07)	0.29	101.1	70.00
5	292.79	7.89	3.127	0.23(0.07)	0.29	102.6	30.00
6	300.97	8.46	3.003	0.23(0.07)	0.29	110.0	5.00
7	301.02	8.46	3.003	0.23(0.07)	0.29	110.0	15.00
8	333.92	11.08	2.573	0.23(0.07)	0.29	143.4	300.00
9	355.89	23.70	1.664	0.22(0.07)	0.30	243.9	200.00
10	350.19	25.29	1.604	0.22(0.07)	0.30	249.7	100.00
TOTAL AREA(ACRES) =							249.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 355.89 Tc(MIN.) = 23.704
 EFFECTIVE AREA(ACRES) = 243.91 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 249.7
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

 FLOW PROCESS FROM NODE 155.00 TO NODE 158.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1004.60 DOWNSTREAM(FEET) = 1001.69

FLOW LENGTH(FEET) = 202.60 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 18.13

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 355.89

PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 23.89

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9031.17 FEET.

 FLOW PROCESS FROM NODE 158.00 TO NODE 450.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1001.69 DOWNSTREAM(FEET) = 997.40

FLOW LENGTH(FEET) = 30.38 MANNING'S N = 0.013

DEPTH OF FLOW IN 60.0 INCH PIPE IS 25.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 44.15

GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 355.89

PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 23.90

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

MEMORY BANK # 2 IS EMPTY - PROCESS IGNORED.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 2 <<<<<

PEAK FLOWRATE TABLE FILE NAME: 3P10RC2.DNA

MEMORY BANK # 2 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap (INCH/HR)	Ae (ACRES)	HEADWATER NODE
1	17.35	5.62	0.20(0.02)	0.10	5.0	330.00
2	17.78	6.11	0.20(0.02)	0.10	5.4	275.00
3	18.60	7.41	0.20(0.02)	0.10	6.3	320.00
4	18.63	7.65	0.20(0.02)	0.10	6.4	245.00
5	18.61	7.94	0.20(0.02)	0.10	6.6	290.00
6	18.44	9.88	0.20(0.02)	0.10	7.3	210.00
7	18.39	10.05	0.20(0.02)	0.10	7.4	235.00
8	7.05	59.65	0.20(0.02)	0.10	7.6	265.00
TOTAL AREA(ACRES) =						7.6

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (INCH/HR)	Ae (ACRES)	HEADWATER NODE
1	259.55	6.05	3.638	0.23(0.06)	0.29	76.3	95.00
2	280.62	7.30	3.267	0.23(0.07)	0.29	92.4	80.00
3	287.08	7.72	3.165	0.23(0.07)	0.29	97.7	40.00
4	291.04	7.98	3.106	0.23(0.07)	0.29	101.1	70.00
5	292.79	8.09	3.080	0.23(0.07)	0.29	102.6	30.00
6	300.97	8.69	2.957	0.23(0.07)	0.29	110.0	5.00
7	301.02	8.70	2.956	0.23(0.07)	0.29	110.0	15.00
8	333.92	11.29	2.545	0.23(0.07)	0.29	143.4	300.00
9	355.89	23.90	1.656	0.22(0.07)	0.30	243.9	200.00
10	350.19	25.49	1.596	0.22(0.07)	0.30	249.7	100.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.							

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (INCH/HR)	Ae (ACRES)	HEADWATER NODE
1	17.35	5.62	3.795	0.20(0.02)	0.10	5.0	330.00
2	17.78	6.11	3.620	0.20(0.02)	0.10	5.4	275.00
3	18.60	7.41	3.240	0.20(0.02)	0.10	6.3	320.00
4	18.63	7.65	3.183	0.20(0.02)	0.10	6.4	245.00
5	18.61	7.94	3.115	0.20(0.02)	0.10	6.6	290.00
6	18.44	9.88	2.747	0.20(0.02)	0.10	7.3	210.00
7	18.39	10.05	2.720	0.20(0.02)	0.10	7.4	235.00
8	7.05	59.65	0.981	0.20(0.02)	0.10	7.6	265.00
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 450.00 = 4864.49 FEET.							

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (INCH/HR)	Ae (ACRES)	HEADWATER NODE
1	269.02	5.62	3.795	0.22(0.06)	0.28	75.8	330.00
2	277.29	6.05	3.638	0.22(0.06)	0.28	81.6	95.00
3	278.20	6.11	3.620	0.22(0.06)	0.28	82.3	275.00
4	299.15	7.30	3.267	0.22(0.06)	0.28	98.6	80.00
5	300.90	7.41	3.240	0.22(0.06)	0.28	100.1	320.00
6	304.55	7.65	3.183	0.22(0.06)	0.28	103.2	245.00
7	305.70	7.72	3.165	0.22(0.06)	0.28	104.2	40.00
8	309.01	7.94	3.115	0.22(0.06)	0.28	107.1	290.00
9	309.65	7.98	3.106	0.22(0.06)	0.28	107.7	70.00
10	311.38	8.09	3.080	0.22(0.06)	0.28	109.2	30.00
11	319.52	8.69	2.957	0.22(0.06)	0.28	116.9	5.00
12	319.57	8.70	2.956	0.22(0.06)	0.28	116.9	15.00
13	334.53	9.88	2.747	0.22(0.06)	0.28	132.7	210.00
14	336.63	10.05	2.720	0.22(0.06)	0.28	134.9	235.00
15	352.03	11.29	2.545	0.22(0.06)	0.28	150.8	300.00
16	371.11	23.90	1.656	0.22(0.06)	0.29	251.3	200.00
17	365.05	25.49	1.596	0.22(0.06)	0.29	257.1	100.00
18	216.40	59.65	0.981	0.22(0.06)	0.29	257.3	265.00
TOTAL AREA(ACRES) =							257.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 371.11 Tc(MIN.) = 23.902
EFFECTIVE AREA(ACRES) = 251.34 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 257.3
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 3 <<<<<

MEMORY BANK # 3 IS EMPTY - PROCESS IGNORED.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

 >>>>DEFINE MEMORY BANK # 3 <<<<<<

 PEAK FLOWRATE TABLE FILE NAME: 3p10rc4.DNA
 MEMORY BANK # 3 DEFINED AS FOLLOWS:
 STREAM Q Tc Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 5.84 7.95 0.20(0.02) 0.10 2.1 160.00
 2 5.64 8.83 0.20(0.02) 0.10 2.1 150.00
 TOTAL AREA(ACRES) = 2.1

 FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

 >>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<<

** MAIN STREAM CONFLUENCE DATA **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 269.02 5.62 3.795 0.22(0.06) 0.28 75.8 330.00
 2 277.29 6.05 3.638 0.22(0.06) 0.28 81.6 95.00
 3 278.20 6.11 3.620 0.22(0.06) 0.28 82.3 275.00
 4 299.15 7.30 3.267 0.22(0.06) 0.28 98.6 80.00
 5 300.90 7.41 3.240 0.22(0.06) 0.28 100.1 320.00
 6 304.55 7.65 3.183 0.22(0.06) 0.28 103.2 245.00
 7 305.70 7.72 3.165 0.22(0.06) 0.28 104.2 40.00
 8 309.01 7.94 3.115 0.22(0.06) 0.28 107.1 290.00
 9 309.65 7.98 3.106 0.22(0.06) 0.28 107.7 70.00
 10 311.38 8.09 3.080 0.22(0.06) 0.28 109.2 30.00
 11 319.52 8.69 2.957 0.22(0.06) 0.28 116.9 5.00
 12 319.57 8.70 2.956 0.22(0.06) 0.28 116.9 15.00
 13 334.53 9.88 2.747 0.22(0.06) 0.28 132.7 210.00
 14 336.63 10.05 2.720 0.22(0.06) 0.28 134.9 235.00
 15 352.03 11.29 2.545 0.22(0.06) 0.28 150.8 300.00
 16 371.11 23.90 1.656 0.22(0.06) 0.29 251.3 200.00
 17 365.05 25.49 1.596 0.22(0.06) 0.29 257.1 100.00
 18 216.40 59.65 0.981 0.22(0.06) 0.29 257.3 265.00
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 5.84 7.95 3.111 0.20(0.02) 0.10 2.1 160.00
 2 5.64 8.83 2.930 0.20(0.02) 0.10 2.1 150.00
 LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

** PEAK FLOW RATE TABLE **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	274.06	5.62	3.795	0.22(0.06)	0.27	77.3 330.00
2	282.50	6.05	3.638	0.22(0.06)	0.27	83.2 95.00
3	283.42	6.11	3.620	0.22(0.06)	0.27	83.9 275.00
4	304.78	7.30	3.267	0.22(0.06)	0.27	100.5 80.00
5	306.57	7.41	3.240	0.22(0.06)	0.27	102.0 320.00
6	310.29	7.65	3.183	0.22(0.06)	0.27	105.2 245.00
7	311.47	7.72	3.165	0.22(0.06)	0.27	106.2 40.00
8	314.84	7.94	3.115	0.22(0.06)	0.27	109.2 290.00
9	315.11	7.95	3.111	0.22(0.06)	0.27	109.4 160.00
10	315.48	7.98	3.106	0.22(0.06)	0.27	109.8 70.00
11	317.19	8.09	3.080	0.22(0.06)	0.27	111.3 30.00
12	325.19	8.69	2.957	0.22(0.06)	0.28	119.0 5.00
13	325.23	8.70	2.956	0.22(0.06)	0.28	119.0 15.00
14	326.94	8.83	2.930	0.22(0.06)	0.28	120.9 150.00
15	339.81	9.88	2.747	0.22(0.06)	0.28	134.8 210.00
16	341.86	10.05	2.720	0.22(0.06)	0.28	137.0 235.00
17	356.92	11.29	2.545	0.22(0.06)	0.28	152.9 300.00
18	374.28	23.90	1.656	0.22(0.06)	0.29	253.5 200.00
19	368.10	25.49	1.596	0.22(0.06)	0.29	259.3 100.00
20	218.27	59.65	0.981	0.22(0.06)	0.29	259.4 265.00
TOTAL AREA(ACRES) =						259.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 374.28 Tc(MIN.) = 23.902
 EFFECTIVE AREA(ACRES) = 253.48 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
 TOTAL AREA(ACRES) = 259.4
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

 FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 997.40 DOWNSTREAM(FEET) = 992.80
 FLOW LENGTH(FEET) = 47.05 MANNING'S N = 0.013
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 29.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 39.03
 GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 374.28
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 23.92
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 460.00 = 9108.60 FEET.

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 259.4 TC(MIN.) = 23.92
 EFFECTIVE AREA(ACRES) = 253.48 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
 PEAK FLOW RATE(CFS) = 374.28

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	274.06	5.64	3.787	0.22(0.06)	0.27	77.3	330.00
2	282.50	6.08	3.630	0.22(0.06)	0.27	83.2	95.00
3	283.42	6.13	3.613	0.22(0.06)	0.27	83.9	275.00
4	304.78	7.33	3.262	0.22(0.06)	0.27	100.5	80.00
5	306.57	7.43	3.234	0.22(0.06)	0.27	102.0	320.00
6	310.29	7.67	3.178	0.22(0.06)	0.27	105.2	245.00
7	311.47	7.74	3.160	0.22(0.06)	0.27	106.2	40.00
8	314.84	7.96	3.111	0.22(0.06)	0.27	109.2	290.00
9	315.11	7.97	3.107	0.22(0.06)	0.27	109.4	160.00
10	315.48	8.00	3.101	0.22(0.06)	0.27	109.8	70.00
11	317.19	8.12	3.076	0.22(0.06)	0.27	111.3	30.00
12	325.19	8.71	2.953	0.22(0.06)	0.28	119.0	5.00
13	325.23	8.72	2.952	0.22(0.06)	0.28	119.0	15.00
14	326.94	8.85	2.926	0.22(0.06)	0.28	120.9	150.00
15	339.81	9.91	2.744	0.22(0.06)	0.28	134.8	210.00
16	341.86	10.07	2.717	0.22(0.06)	0.28	137.0	235.00
17	356.92	11.31	2.543	0.22(0.06)	0.28	152.9	300.00
18	374.28	23.92	1.656	0.22(0.06)	0.29	253.5	200.00
19	368.10	25.51	1.596	0.22(0.06)	0.29	259.3	100.00
20	218.27	59.67	0.981	0.22(0.06)	0.29	259.4	265.00

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 END OF RATIONAL METHOD ANALYSIS
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 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
 * DANA POINT COMMERCIAL CORE AREA *
 * RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 4 (LINE D) *
 * 10 YEAR STORM EVENT SR *

FILE NAME: 4P10R.DAT
 TIME/DATE OF STUDY: 12:38 11/12/2019

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 DATA BANK RAINFALL USED
 ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.50 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 FLOW PROCESS FROM NODE 400.00 TO NODE 405.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00
 ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1009.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.375
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.895
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.61	0.20	0.100	75	5.38

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.13
 TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 2.13

 FLOW PROCESS FROM NODE 405.00 TO NODE 420.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1005.42 DOWNSTREAM(FEET) = 1005.14
 FLOW LENGTH(FEET) = 56.39 MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.51
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.13
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 5.64
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 420.00 = 176.39 FEET.

 FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.64
 RAINFALL INTENSITY(INCH/HR) = 3.79
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.61
 TOTAL STREAM AREA(ACRES) = 0.61

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.13

*****
FLOW PROCESS FROM NODE  410.00 TO NODE  415.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  103.00
ELEVATION DATA: UPSTREAM(FEET) =  1010.10  DOWNSTREAM(FEET) =  1009.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.27    0.20   0.100  75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =      0.98
TOTAL AREA(ACRES) =      0.27  PEAK FLOW RATE(CFS) =      0.98

*****
FLOW PROCESS FROM NODE  415.00 TO NODE  420.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1005.69  DOWNSTREAM(FEET) =  1005.14
FLOW LENGTH(FEET) =  55.75  MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS  4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  3.71
ESTIMATED PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =      0.98
PIPE TRAVEL TIME(MIN.) =  0.25  Tc(MIN.) =  5.25
LONGEST FLOWPATH FROM NODE  410.00 TO NODE  420.00 =  158.75 FEET.

*****
FLOW PROCESS FROM NODE  420.00 TO NODE  420.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) =  5.25
RAINFALL INTENSITY(INCH/HR) =  3.95
AREA-AVERAGED Fm(INCH/HR) =  0.02

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AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =      0.27
TOTAL STREAM AREA(ACRES) =      0.27
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.98

** CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1           2.13  5.64   3.788  0.20( 0.02) 0.10    0.6  400.00
2           0.98  5.25   3.947  0.20( 0.02) 0.10    0.3  410.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)      Ap      Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR)  (ACRES)  NODE
1           3.04  5.25   3.947  0.20( 0.02) 0.10    0.8  410.00
2           3.07  5.64   3.788  0.20( 0.02) 0.10    0.9  400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      3.07  Tc(MIN.) =  5.64
EFFECTIVE AREA(ACRES) =      0.88  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      0.9
LONGEST FLOWPATH FROM NODE  400.00 TO NODE  420.00 =  176.39 FEET.

*****
FLOW PROCESS FROM NODE  420.00 TO NODE  465.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1005.14  DOWNSTREAM(FEET) =  1004.70
FLOW LENGTH(FEET) =  87.07  MANNING'S N =  0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS  9.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  3.85
GIVEN PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =      3.07
PIPE TRAVEL TIME(MIN.) =  0.38  Tc(MIN.) =  6.02
LONGEST FLOWPATH FROM NODE  400.00 TO NODE  465.00 =  263.46 FEET.

*****
FLOW PROCESS FROM NODE  465.00 TO NODE  465.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
=====
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FLOW PROCESS FROM NODE 425.00 TO NODE 450.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 1010.10 DOWNSTREAM(FEET) = 1008.70

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.355
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.025
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.86 0.20 0.100 75 8.35
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.33
TOTAL AREA(ACRES) = 0.86 PEAK FLOW RATE(CFS) = 2.33

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*****
FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1005.27 DOWNSTREAM(FEET) = 1004.96
FLOW LENGTH(FEET) = 59.71 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.53
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.33
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 8.64
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 460.00 = 339.71 FEET.

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*****
FLOW PROCESS FROM NODE 460.00 TO NODE 460.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.64
RAINFALL INTENSITY(INCH/HR) = 2.97
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.86
TOTAL STREAM AREA(ACRES) = 0.86
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.33

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*****
FLOW PROCESS FROM NODE 455.00 TO NODE 457.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 1009.70 DOWNSTREAM(FEET) = 1008.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.589
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.977
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.43 0.20 0.100 75 8.59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.14
TOTAL AREA(ACRES) = 0.43 PEAK FLOW RATE(CFS) = 1.14

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*****
FLOW PROCESS FROM NODE 457.00 TO NODE 460.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1005.00 DOWNSTREAM(FEET) = 1004.96
FLOW LENGTH(FEET) = 2.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.01
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.14
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.60
LONGEST FLOWPATH FROM NODE 455.00 TO NODE 460.00 = 302.00 FEET.

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*****
FLOW PROCESS FROM NODE 460.00 TO NODE 460.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.60
RAINFALL INTENSITY(INCH/HR) = 2.98
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

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AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.43
TOTAL STREAM AREA(ACRES) = 0.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.14

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.33	8.64	2.968	0.20(0.02)	0.10	0.9	425.00
2	1.14	8.60	2.976	0.20(0.02)	0.10	0.4	455.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.47	8.60	2.976	0.20(0.02)	0.10	1.3	455.00
2	3.47	8.64	2.968	0.20(0.02)	0.10	1.3	425.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.47 Tc(MIN.) = 8.64
EFFECTIVE AREA(ACRES) = 1.29 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.3
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 460.00 = 339.71 FEET.

FLOW PROCESS FROM NODE 460.00 TO NODE 465.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.96 DOWNSTREAM(FEET) = 1004.70
FLOW LENGTH(FEET) = 50.66 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.96
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.47
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 8.85
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

FLOW PROCESS FROM NODE 465.00 TO NODE 465.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	3.47	8.81	2.935	0.20(0.02)	0.10	1.3 455.00
2	3.47	8.85	2.927	0.20(0.02)	0.10	1.3 425.00

LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.04	5.63	3.793	0.20(0.02)	0.10	0.8	410.00
2	3.07	6.02	3.650	0.20(0.02)	0.10	0.9	400.00

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 465.00 = 263.46 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.91	5.63	3.793	0.20(0.02)	0.10	1.7	410.00
2	6.02	6.02	3.650	0.20(0.02)	0.10	1.8	400.00
3	5.93	8.81	2.935	0.20(0.02)	0.10	2.2	455.00
4	5.92	8.85	2.927	0.20(0.02)	0.10	2.2	425.00

TOTAL AREA(ACRES) = 2.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.02 Tc(MIN.) = 6.020
EFFECTIVE AREA(ACRES) = 1.76 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

FLOW PROCESS FROM NODE 465.00 TO NODE 495.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.70 DOWNSTREAM(FEET) = 1003.62
FLOW LENGTH(FEET) = 52.90 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.69
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.02
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 6.13
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

MEMORY BANK # 2 IS EMPTY - PROCESS IGNORED.

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*****
FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====
*****
FLOW PROCESS FROM NODE 475.00 TO NODE 477.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 134.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.41 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.41 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.49
TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.49

*****
FLOW PROCESS FROM NODE 477.00 TO NODE 490.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1004.85 DOWNSTREAM(FEET) = 1003.88
FLOW LENGTH(FEET) = 104.61 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.05
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.49
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 5.43
LONGEST FLOWPATH FROM NODE 475.00 TO NODE 490.00 = 238.61 FEET.

*****
FLOW PROCESS FROM NODE 490.00 TO NODE 490.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

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TIME OF CONCENTRATION(MIN.) = 5.43
RAINFALL INTENSITY(INCH/HR) = 3.87
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.41
TOTAL STREAM AREA(ACRES) = 0.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.49

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*****
FLOW PROCESS FROM NODE 478.00 TO NODE 480.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 119.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.44 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.60
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.60

*****
FLOW PROCESS FROM NODE 475.00 TO NODE 490.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1005.00 DOWNSTREAM(FEET) = 1003.88
FLOW LENGTH(FEET) = 25.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.34
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.60
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 5.06
LONGEST FLOWPATH FROM NODE 478.00 TO NODE 490.00 = 144.00 FEET.

*****
FLOW PROCESS FROM NODE 490.00 TO NODE 490.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

```

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.06
RAINFALL INTENSITY(INCH/HR) = 4.03
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.44
TOTAL STREAM AREA(ACRES) = 0.44
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.60

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.49	5.43	3.872	0.20(0.02)	0.10	0.4	475.00
2	1.60	5.06	4.033	0.20(0.02)	0.10	0.4	478.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.05	5.06	4.033	0.20(0.02)	0.10	0.8	478.00
2	3.03	5.43	3.872	0.20(0.02)	0.10	0.9	475.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.05 Tc(MIN.) = 5.06
EFFECTIVE AREA(ACRES) = 0.82 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.9
LONGEST FLOWPATH FROM NODE 475.00 TO NODE 490.00 = 238.61 FEET.

FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.05	5.13	4.000	0.20(0.02)	0.10	0.8	478.00
2	3.03	5.51	3.842	0.20(0.02)	0.10	0.9	475.00

LONGEST FLOWPATH FROM NODE 475.00 TO NODE 495.00 = 261.61 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.91	5.74	3.749	0.20(0.02)	0.10	1.7	410.00
2	6.02	6.13	3.611	0.20(0.02)	0.10	1.8	400.00
3	5.93	8.92	2.913	0.20(0.02)	0.10	2.2	455.00
4	5.92	8.96	2.905	0.20(0.02)	0.10	2.2	425.00

LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.68	5.13	4.000	0.20(0.02)	0.10	2.3	478.00
2	8.83	5.51	3.842	0.20(0.02)	0.10	2.4	475.00
3	8.86	5.74	3.749	0.20(0.02)	0.10	2.5	410.00
4	8.86	6.13	3.611	0.20(0.02)	0.10	2.6	400.00
5	8.22	8.92	2.913	0.20(0.02)	0.10	3.0	455.00
6	8.21	8.96	2.905	0.20(0.02)	0.10	3.0	425.00

TOTAL AREA(ACRES) = 3.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.86 Tc(MIN.) = 5.744
EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.0
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

FLOW PROCESS FROM NODE 495.00 TO NODE 497.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1003.62 DOWNSTREAM(FEET) = 1003.00
FLOW LENGTH(FEET) = 32.20 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/ SEC.) = 6.93

(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)

GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 8.86

PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.82

LONGEST FLOWPATH FROM NODE 425.00 TO NODE 497.00 = 475.47 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 3.0 TC(MIN.) = 5.82

EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 8.86

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.68	5.21	3.965	0.20(0.02)	0.10	2.3	478.00
2	8.83	5.58	3.811	0.20(0.02)	0.10	2.4	475.00
3	8.86	5.82	3.721	0.20(0.02)	0.10	2.5	410.00
4	8.86	6.21	3.585	0.20(0.02)	0.10	2.6	400.00
5	8.22	8.99	2.900	0.20(0.02)	0.10	3.0	455.00
6	8.21	9.03	2.893	0.20(0.02)	0.10	3.0	425.00

=====

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 5 (LINE E) *
* 10-YEAR STORM EVENT SR *

FILE NAME: 5P10R.DAT
TIME/DATE OF STUDY: 10:46 11/12/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 500.00 TO NODE 505.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 159.00
ELEVATION DATA: UPSTREAM(FEET) = 1023.02 DOWNSTREAM(FEET) = 1015.36

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.26	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.95
TOTAL AREA(ACRES) = 0.26 PEAK FLOW RATE(CFS) = 0.95

FLOW PROCESS FROM NODE 505.00 TO NODE 540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1010.36 DOWNSTREAM(FEET) = 1007.40
FLOW LENGTH(FEET) = 239.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.00
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.95
PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 6.00
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 540.00 = 398.00 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 540.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.00
RAINFALL INTENSITY(INCH/HR) = 3.66
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.26

TOTAL STREAM AREA(ACRES) = 0.26
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.95

FLOW PROCESS FROM NODE 530.00 TO NODE 535.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 151.00
ELEVATION DATA: UPSTREAM(FEET) = 1013.06 DOWNSTREAM(FEET) = 1011.72

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.819
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.722
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.57	0.20	0.100	75	5.82

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.90
TOTAL AREA(ACRES) = 0.57 PEAK FLOW RATE(CFS) = 1.90

FLOW PROCESS FROM NODE 535.00 TO NODE 540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.60 DOWNSTREAM(FEET) = 1007.40
FLOW LENGTH(FEET) = 18.24 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.58
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.90
PIPE TRAVEL TIME(MIN.) = 0.07 T_c (MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 530.00 TO NODE 540.00 = 169.24 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 540.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.89
RAINFALL INTENSITY(INCH/HR) = 3.70
AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.57
TOTAL STREAM AREA(ACRES) = 0.57
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.90

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.95	6.00	3.658	0.20(0.02)	0.10	0.3	500.00
2	1.90	5.89	3.698	0.20(0.02)	0.10	0.6	530.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.84	5.89	3.698	0.20(0.02)	0.10	0.8	530.00
2	2.82	6.00	3.658	0.20(0.02)	0.10	0.8	500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 2.84 T_c (MIN.) = 5.89
EFFECTIVE AREA(ACRES) = 0.83 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.8
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 540.00 = 398.00 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 560.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.40 DOWNSTREAM(FEET) = 1006.25
FLOW LENGTH(FEET) = 111.87 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.91
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.84
PIPE TRAVEL TIME(MIN.) = 0.38 T_c (MIN.) = 6.26
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 560.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
=====

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FLOW PROCESS FROM NODE 540.00 TO NODE 545.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 229.00
ELEVATION DATA: UPSTREAM(FEET) = 1015.36 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.471
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.855
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.34 0.20 0.100 75 5.47
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.17
TOTAL AREA(ACRES) = 0.34 PEAK FLOW RATE(CFS) = 1.17

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*****
FLOW PROCESS FROM NODE 545.00 TO NODE 555.00 IS CODE = 31
-----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1007.41 DOWNSTREAM(FEET) = 1006.75
FLOW LENGTH(FEET) = 82.37 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.61
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.17
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 5.85
LONGEST FLOWPATH FROM NODE 540.00 TO NODE 555.00 = 311.37 FEET.

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*****
FLOW PROCESS FROM NODE 555.00 TO NODE 555.00 IS CODE = 1
-----

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.85
RAINFALL INTENSITY(INCH/HR) = 3.71
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.34
TOTAL STREAM AREA(ACRES) = 0.34

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PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.17
*****
FLOW PROCESS FROM NODE 550.00 TO NODE 552.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 39.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1012.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.000
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.22 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.80
TOTAL AREA(ACRES) = 0.22 PEAK FLOW RATE(CFS) = 0.80

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*****
FLOW PROCESS FROM NODE 552.00 TO NODE 555.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1007.00 DOWNSTREAM(FEET) = 1006.75
FLOW LENGTH(FEET) = 18.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.97
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.80
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.08
LONGEST FLOWPATH FROM NODE 550.00 TO NODE 555.00 = 57.00 FEET.

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*****
FLOW PROCESS FROM NODE 555.00 TO NODE 555.00 IS CODE = 1
-----

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.08
RAINFALL INTENSITY(INCH/HR) = 4.02
AREA-AVERAGED Fm(INCH/HR) = 0.02

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AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.22
TOTAL STREAM AREA(ACRES) = 0.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.80

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.17	5.85	3.710	0.20(0.02)	0.10	0.3	540.00
2	0.80	5.08	4.025	0.20(0.02)	0.10	0.2	550.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.90	5.08	4.025	0.20(0.02)	0.10	0.5	550.00
2	1.91	5.85	3.710	0.20(0.02)	0.10	0.6	540.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1.91 Tc(MIN.) = 5.85
EFFECTIVE AREA(ACRES) = 0.56 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6
LONGEST FLOWPATH FROM NODE 540.00 TO NODE 555.00 = 311.37 FEET.

FLOW PROCESS FROM NODE 555.00 TO NODE 560.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.75 DOWNSTREAM(FEET) = 1006.25
FLOW LENGTH(FEET) = 51.74 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.38
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.91
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 6.05
LONGEST FLOWPATH FROM NODE 540.00 TO NODE 560.00 = 363.11 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 560.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.90	5.27	3.938	0.20(0.02)	0.10	0.5	550.00
2	1.91	6.05	3.640	0.20(0.02)	0.10	0.6	540.00

LONGEST FLOWPATH FROM NODE 540.00 TO NODE 560.00 = 363.11 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.84	6.26	3.567	0.20(0.02)	0.10	0.8	530.00
2	2.82	6.38	3.531	0.20(0.02)	0.10	0.8	500.00

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.54	5.27	3.938	0.20(0.02)	0.10	1.2	550.00
2	4.71	6.05	3.640	0.20(0.02)	0.10	1.4	540.00
3	4.71	6.26	3.567	0.20(0.02)	0.10	1.4	530.00
4	4.68	6.38	3.531	0.20(0.02)	0.10	1.4	500.00

TOTAL AREA(ACRES) = 1.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.71 Tc(MIN.) = 6.265
EFFECTIVE AREA(ACRES) = 1.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.4
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 580.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1006.25 DOWNSTREAM(FEET) = 1004.53
FLOW LENGTH(FEET) = 82.55 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.29
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.71
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 6.45
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 580.00 = 592.42 FEET.

FLOW PROCESS FROM NODE 580.00 TO NODE 580.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.45
 RAINFALL INTENSITY(INCH/HR) = 3.51
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.39
 TOTAL STREAM AREA(ACRES) = 1.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.71

FLOW PROCESS FROM NODE 565.00 TO NODE 570.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 84.00
 ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1011.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.41 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.49
 TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 1.49

FLOW PROCESS FROM NODE 570.00 TO NODE 580.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.96 DOWNSTREAM(FEET) = 1004.53
 FLOW LENGTH(FEET) = 49.77 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.96
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.49
 PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 5.21
 LONGEST FLOWPATH FROM NODE 565.00 TO NODE 580.00 = 133.77 FEET.

FLOW PROCESS FROM NODE 580.00 TO NODE 580.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.21
 RAINFALL INTENSITY(INCH/HR) = 3.97
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.41
 TOTAL STREAM AREA(ACRES) = 0.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.49

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.54	5.46	3.858	0.20(0.02)	0.10	1.2	550.00
1	4.71	6.24	3.576	0.20(0.02)	0.10	1.4	540.00
1	4.71	6.45	3.507	0.20(0.02)	0.10	1.4	530.00
1	4.68	6.57	3.473	0.20(0.02)	0.10	1.4	500.00
2	1.49	5.21	3.965	0.20(0.02)	0.10	0.4	565.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.94	5.21	3.965	0.20(0.02)	0.10	1.6	565.00
2	5.99	5.46	3.858	0.20(0.02)	0.10	1.6	550.00
3	6.05	6.24	3.576	0.20(0.02)	0.10	1.8	540.00
4	6.03	6.45	3.507	0.20(0.02)	0.10	1.8	530.00
5	5.98	6.57	3.473	0.20(0.02)	0.10	1.8	500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.05 Tc(MIN.) = 6.24
 EFFECTIVE AREA(ACRES) = 1.77 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.8
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 580.00 = 592.42 FEET.

FLOW PROCESS FROM NODE 580.00 TO NODE 590.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.46 DOWNSTREAM(FEET) = 1004.00
 FLOW LENGTH(FEET) = 22.90 MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.65
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.05
 PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 6.29
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 590.00 = 615.32 FEET.

=====
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 6.29
 EFFECTIVE AREA(ACRES) = 1.77 AREA-AVERAGED Fm(INCH/HR)= 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 6.05

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.94	5.26	3.943	0.20(0.02)	0.10	1.6	565.00
2	5.99	5.51	3.838	0.20(0.02)	0.10	1.6	550.00
3	6.05	6.29	3.560	0.20(0.02)	0.10	1.8	540.00
4	6.03	6.50	3.492	0.20(0.02)	0.10	1.8	530.00
5	5.98	6.62	3.458	0.20(0.02)	0.10	1.8	500.00

=====
 END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C1) *
* 100-YEAR STORM EVENT SR *

FILE NAME: 3P00RC1.DAT
TIME/DATE OF STUDY: 06:38 11/13/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 5.00 TO NODE 10.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 237.70
ELEVATION DATA: UPSTREAM(FEET) = 1024.36 DOWNSTREAM(FEET) = 1022.82

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.430
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.931
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.53	0.20	0.100	75	7.43

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.34
TOTAL AREA(ACRES) = 0.53 PEAK FLOW RATE(CFS) = 2.34

FLOW PROCESS FROM NODE 10.00 TO NODE 25.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1018.82 DOWNSTREAM(FEET) = 1013.21
FLOW LENGTH(FEET) = 128.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.08
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.34
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 7.70
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 25.00 = 366.20 FEET.

FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.70
RAINFALL INTENSITY(INCH/HR) = 4.83
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.53
TOTAL STREAM AREA(ACRES) = 0.53

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.34

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      20.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.12
ELEVATION DATA: UPSTREAM(FEET) = 1022.76 DOWNSTREAM(FEET) = 1020.33

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.484
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.910
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp   Ap   SCS Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.52   0.20  0.100 75  7.48
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.29
TOTAL AREA(ACRES) = 0.52 PEAK FLOW RATE(CFS) = 2.29

*****
FLOW PROCESS FROM NODE      20.00 TO NODE      25.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1016.33 DOWNSTREAM(FEET) = 1013.21
FLOW LENGTH(FEET) = 95.42 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.23
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.29
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 7.70
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 25.00 = 375.54 FEET.

*****
FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.70
RAINFALL INTENSITY(INCH/HR) = 4.83
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

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AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.29

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 2.34 7.70 4.833 0.20( 0.02) 0.10 0.5 5.00
2 2.29 7.70 4.830 0.20( 0.02) 0.10 0.5 15.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 4.63 7.70 4.833 0.20( 0.02) 0.10 1.0 5.00
2 4.63 7.70 4.830 0.20( 0.02) 0.10 1.0 15.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.63 Tc(MIN.) = 7.70
EFFECTIVE AREA(ACRES) = 1.05 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 25.00 = 375.54 FEET.

*****
FLOW PROCESS FROM NODE      25.00 TO NODE      50.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1013.21 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 93.26 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.24
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.63
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 7.99
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 50.00 = 468.80 FEET.

*****
FLOW PROCESS FROM NODE      50.00 TO NODE      50.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.99

```

RAINFALL INTENSITY(INCH/HR) = 4.73
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.05
TOTAL STREAM AREA(ACRES) = 1.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.63

FLOW PROCESS FROM NODE 30.00 TO NODE 35.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 290.76
ELEVATION DATA: UPSTREAM(FEET) = 1025.90 DOWNSTREAM(FEET) = 1022.84

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.309
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.978
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.66 0.20 0.100 75 7.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.94
TOTAL AREA(ACRES) = 0.66 PEAK FLOW RATE(CFS) = 2.94

FLOW PROCESS FROM NODE 35.00 TO NODE 50.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1018.84 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 96.14 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.12
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.94
PIPE TRAVEL TIME(MIN.) = 0.16 T_c (MIN.) = 7.47
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 50.00 = 386.90 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.47
RAINFALL INTENSITY(INCH/HR) = 4.92
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.66
TOTAL STREAM AREA(ACRES) = 0.66
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.94

FLOW PROCESS FROM NODE 40.00 TO NODE 45.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 254.54
ELEVATION DATA: UPSTREAM(FEET) = 1022.72 DOWNSTREAM(FEET) = 1020.22

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] * 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 7.027
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.091
SUBAREA T_c AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS T_c
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.45 0.20 0.100 75 7.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.05
TOTAL AREA(ACRES) = 0.45 PEAK FLOW RATE(CFS) = 2.05

FLOW PROCESS FROM NODE 45.00 TO NODE 50.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1016.22 DOWNSTREAM(FEET) = 1012.27
FLOW LENGTH(FEET) = 43.84 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.05
PIPE TRAVEL TIME(MIN.) = 0.07 T_c (MIN.) = 7.10
LONGEST FLOWPATH FROM NODE 40.00 TO NODE 50.00 = 298.38 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.10
RAINFALL INTENSITY(INCH/HR) = 5.06
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.45
TOTAL STREAM AREA(ACRES) = 0.45
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.05

** CONFLUENCE DATA **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-4.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.44 Tc(MIN.) = 7.47
EFFECTIVE AREA(ACRES) = 2.09 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 50.00 = 468.80 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 55.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.27 DOWNSTREAM(FEET) = 1011.60
FLOW LENGTH(FEET) = 67.04 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.43
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 9.44
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 7.64
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 55.00 = 535.84 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 60.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1011.60 DOWNSTREAM(FEET) = 1006.10
FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.99
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.44
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 7.70
LONGEST FLOWPATH FROM NODE 15.00 TO NODE 60.00 = 585.84 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.2 TC(MIN.) = 7.70
EFFECTIVE AREA(ACRES) = 2.09 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 9.44

** PEAK FLOW RATE TABLE **

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-4.

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C2) *
* 100-YEAR STORM EVENT SR *

FILE NAME: 3P00RC2.DAT
TIME/DATE OF STUDY: 06:40 11/13/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	38.0	33.0	0.017/0.017/0.017	0.50	2.00 0.0312 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 215.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 338.92
ELEVATION DATA: UPSTREAM(FEET) = 1016.94 DOWNSTREAM(FEET) = 1012.21

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.344
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.964
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.44 0.20 0.100 75 7.34
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.96
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 1.96

FLOW PROCESS FROM NODE 215.00 TO NODE 220.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.80 DOWNSTREAM(FEET) = 1009.20
FLOW LENGTH(FEET) = 116.40 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.44
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.96
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 7.91
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 220.00 = 455.32 FEET.

FLOW PROCESS FROM NODE 220.00 TO NODE 220.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 7.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.758
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.11 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.11 SUBAREA RUNOFF(CFS) = 0.47

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EFFECTIVE AREA(ACRES) = 0.55 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.35
*****
FLOW PROCESS FROM NODE 220.00 TO NODE 225.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.20 DOWNSTREAM(FEET) = 1009.04
FLOW LENGTH(FEET) = 30.22 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.56
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.35
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 8.05
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 225.00 = 485.54 FEET.
*****
FLOW PROCESS FROM NODE 225.00 TO NODE 230.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1009.04 DOWNSTREAM(FEET) = 1008.10
FLOW LENGTH(FEET) = 93.51 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.62
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.35
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 8.39
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 230.00 = 579.05 FEET.
*****
FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 8.39
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.600
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.39 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.39 SUBAREA RUNOFF(CFS) = 5.73
EFFECTIVE AREA(ACRES) = 1.94 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

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TOTAL AREA(ACRES) = 1.9 PEAK FLOW RATE(CFS) = 8.00
*****
FLOW PROCESS FROM NODE 230.00 TO NODE 310.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.10 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 211.44 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.26
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.00
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 8.95
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 310.00 = 790.49 FEET.
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1<<<<<
=====
FLOW PROCESS FROM NODE 235.00 TO NODE 240.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 327.34
ELEVATION DATA: UPSTREAM(FEET) = 1014.52 DOWNSTREAM(FEET) = 1013.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.026
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.411
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.56 0.20 0.100 75 9.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 6.16
TOTAL AREA(ACRES) = 1.56 PEAK FLOW RATE(CFS) = 6.16
*****
FLOW PROCESS FROM NODE 240.00 TO NODE 260.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 1010.00  DOWNSTREAM(FEET) = 1009.30
FLOW LENGTH(FEET) = 51.88  MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.85
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.16
PIPE TRAVEL TIME(MIN.) = 0.11  Tc(MIN.) = 9.14
LONGEST FLOWPATH FROM NODE 235.00 TO NODE 260.00 = 379.22 FEET.

*****
FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.14
RAINFALL INTENSITY(INCH/HR) = 4.38
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.56
TOTAL STREAM AREA(ACRES) = 1.56
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.16

*****
FLOW PROCESS FROM NODE 245.00 TO NODE 250.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.47
ELEVATION DATA: UPSTREAM(FEET) = 1028.80  DOWNSTREAM(FEET) = 1017.91

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.123
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.509
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.35   0.20  0.100  75   6.12
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.73
TOTAL AREA(ACRES) = 0.35  PEAK FLOW RATE(CFS) = 1.73

*****
FLOW PROCESS FROM NODE 250.00 TO NODE 255.00 IS CODE = 62
-----

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<
-----
UPSTREAM ELEVATION(FEET) = 1017.91  DOWNSTREAM ELEVATION(FEET) = 1012.98
STREET LENGTH(FEET) = 127.77  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 38.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 33.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.13
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.24
HALFSTREET FLOOD WIDTH(FEET) = 7.16
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.88
STREET FLOW TRAVEL TIME(MIN.) = 0.59  Tc(MIN.) = 6.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.226
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL         D      0.17   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.17  SUBAREA RUNOFF(CFS) = 0.80
EFFECTIVE AREA(ACRES) = 0.52  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.5  PEAK FLOW RATE(CFS) = 2.44

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.25  HALFSTREET FLOOD WIDTH(FEET) = 7.74
FLOW VELOCITY(FEET/SEC.) = 3.68  DEPTH*VELOCITY(FT*FT/SEC.) = 0.93
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 255.00 = 458.24 FEET.

*****
FLOW PROCESS FROM NODE 255.00 TO NODE 260.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1009.98  DOWNSTREAM(FEET) = 1009.30
FLOW LENGTH(FEET) = 11.80  MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03

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GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.44
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 6.73
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 260.00 = 470.04 FEET.

FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.73
RAINFALL INTENSITY(INCH/HR) = 5.22
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.52
TOTAL STREAM AREA(ACRES) = 0.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.44

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.16	9.14	4.380	0.20(0.02)	0.10	1.6	235.00
2	2.44	6.73	5.217	0.20(0.02)	0.10	0.5	245.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.85	6.73	5.217	0.20(0.02)	0.10	1.7	245.00
2	8.21	9.14	4.380	0.20(0.02)	0.10	2.1	235.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 8.21 Tc(MIN.) = 9.14
EFFECTIVE AREA(ACRES) = 2.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 260.00 = 470.04 FEET.

FLOW PROCESS FROM NODE 260.00 TO NODE 310.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1009.30 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 59.46 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.12
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.21
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.22
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 310.00 = 529.50 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

=====

FLOW PROCESS FROM NODE 265.00 TO NODE 270.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.82
ELEVATION DATA: UPSTREAM(FEET) = 1012.91 DOWNSTREAM(FEET) = 1012.03

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.29	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.61
TOTAL AREA(ACRES) = 0.29 PEAK FLOW RATE(CFS) = 1.61

FLOW PROCESS FROM NODE 270.00 TO NODE 305.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.17 DOWNSTREAM(FEET) = 1005.73
FLOW LENGTH(FEET) = 4306.00 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.05
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.61
PIPE TRAVEL TIME(MIN.) = 35.02 Tc(MIN.) = 40.02

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4386.82 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 40.02
RAINFALL INTENSITY(INCH/HR) = 1.88
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.29
TOTAL STREAM AREA(ACRES) = 0.29
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

FLOW PROCESS FROM NODE 275.00 TO NODE 280.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.91
ELEVATION DATA: UPSTREAM(FEET) = 1014.36 DOWNSTREAM(FEET) = 1012.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.35	0.20	0.100	75	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.94
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.94

FLOW PROCESS FROM NODE 280.00 TO NODE 285.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.17 DOWNSTREAM(FEET) = 1007.30
FLOW LENGTH(FEET) = 43.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.80
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 1.94
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.12
LONGEST FLOWPATH FROM NODE 275.00 TO NODE 285.00 = 143.97 FEET.

FLOW PROCESS FROM NODE 285.00 TO NODE 285.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.12
RAINFALL INTENSITY(INCH/HR) = 6.10
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.35
TOTAL STREAM AREA(ACRES) = 0.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.94

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.61	40.02	1.879	0.20(0.02)	0.10	0.3	265.00
2	1.94	5.12	6.101	0.20(0.02)	0.10	0.3	275.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.62	5.12	6.101	0.20(0.02)	0.10	0.4	275.00
2	2.20	40.02	1.879	0.20(0.02)	0.10	0.6	265.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.62 Tc(MIN.) = 5.12
EFFECTIVE AREA(ACRES) = 0.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 285.00 = 4386.82 FEET.

FLOW PROCESS FROM NODE 285.00 TO NODE 305.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.30 DOWNSTREAM(FEET) = 1006.51

```

FLOW LENGTH(FEET) = 39.74 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.22
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.62
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 5.23
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4426.56 FEET.

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FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.23
RAINFALL INTENSITY(INCH/HR) = 6.03
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.39
TOTAL STREAM AREA(ACRES) = 0.64
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.62

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FLOW PROCESS FROM NODE 290.00 TO NODE 295.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 1028.87 DOWNSTREAM(FEET) = 1018.79

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.213
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.463
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.35 0.20 0.100 75 6.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.71
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.71

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FLOW PROCESS FROM NODE 295.00 TO NODE 300.00 IS CODE = 62

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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

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>>>>(STREET TABLE SECTION # 3 USED)<<<<

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UPSTREAM ELEVATION(FEET) = 1018.79 DOWNSTREAM ELEVATION(FEET) = 1012.93
STREET LENGTH(FEET) = 145.27 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 38.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 33.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

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SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.34

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.25
HALFSTREET FLOOD WIDTH(FEET) = 7.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.72
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.93
STREET FLOW TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 6.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.160
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	D	0.27	0.20	0.100	75

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 1.25
EFFECTIVE AREA(ACRES) = 0.62 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 2.87

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```

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.26 HALFSTREET FLOOD WIDTH(FEET) = 8.32
FLOW VELOCITY(FEET/SEC.) = 3.87 DEPTH*VELOCITY(FT*FT/SEC.) = 1.02
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 300.00 = 475.27 FEET.

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FLOW PROCESS FROM NODE 300.00 TO NODE 305.00 IS CODE = 41

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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=====

```

ELEVATION DATA: UPSTREAM(FEET) = 1008.93 DOWNSTREAM(FEET) = 1006.51
FLOW LENGTH(FEET) = 77.81 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.52
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.87

```

PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 7.04
LONGEST FLOWPATH FROM NODE 290.00 TO NODE 305.00 = 553.08 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.04
RAINFALL INTENSITY(INCH/HR) = 5.09
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.62
TOTAL STREAM AREA(ACRES) = 0.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.87

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.62	5.23	6.030	0.20(0.02)	0.10	0.4	275.00
1	2.20	40.13	1.876	0.20(0.02)	0.10	0.6	265.00
2	2.87	7.04	5.087	0.20(0.02)	0.10	0.6	290.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.15	5.23	6.030	0.20(0.02)	0.10	0.8	275.00
2	5.46	7.04	5.087	0.20(0.02)	0.10	1.0	290.00
3	3.25	40.13	1.876	0.20(0.02)	0.10	1.3	265.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.46 Tc(MIN.) = 7.04
EFFECTIVE AREA(ACRES) = 1.02 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.3
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 305.00 = 4426.56 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.51 DOWNSTREAM(FEET) = 1005.99
FLOW LENGTH(FEET) = 25.97 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.96
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.46
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 7.10
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.15	5.30	5.986	0.20(0.02)	0.10	0.8	275.00
2	5.46	7.10	5.062	0.20(0.02)	0.10	1.0	290.00
3	3.25	40.19	1.874	0.20(0.02)	0.10	1.3	265.00

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.00	8.95	4.432	0.20(0.02)	0.10	1.9	210.00

LONGEST FLOWPATH FROM NODE 210.00 TO NODE 310.00 = 790.49 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.54	5.30	5.986	0.20(0.02)	0.10	2.0	275.00
2	12.71	7.10	5.062	0.20(0.02)	0.10	2.6	290.00
3	13.34	8.95	4.432	0.20(0.02)	0.10	3.0	210.00
4	6.61	40.19	1.874	0.20(0.02)	0.10	3.2	265.00

TOTAL AREA(ACRES) = 3.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 13.34 Tc(MIN.) = 8.950
EFFECTIVE AREA(ACRES) = 2.97 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.2
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

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=====
** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1           11.54  5.30  5.986  0.20( 0.02) 0.10  2.0  275.00
2           12.71  7.10  5.062  0.20( 0.02) 0.10  2.6  290.00
3           13.34  8.95  4.432  0.20( 0.02) 0.10  3.0  210.00
4            6.61 40.19  1.874  0.20( 0.02) 0.10  3.2  265.00
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1            7.85  6.82  5.180  0.20( 0.02) 0.10  1.7  245.00
2            8.21  9.22  4.358  0.20( 0.02) 0.10  2.1  235.00
LONGEST FLOWPATH FROM NODE 245.00 TO NODE 310.00 = 529.50 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap   Ae   HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES)  NODE
1           18.60  5.30  5.986  0.20( 0.02) 0.10  3.3  275.00
2           20.38  6.82  5.180  0.20( 0.02) 0.10  4.1  245.00
3           20.61  7.10  5.062  0.20( 0.02) 0.10  4.3  290.00
4           21.51  8.95  4.432  0.20( 0.02) 0.10  5.0  210.00
5           21.49  9.22  4.358  0.20( 0.02) 0.10  5.1  235.00
6           10.12 40.19  1.874  0.20( 0.02) 0.10  5.3  265.00
TOTAL AREA(ACRES) = 5.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 21.51 Tc(MIN.) = 8.950
EFFECTIVE AREA(ACRES) = 5.01 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.3
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 310.00 = 4452.53 FEET.

*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 2 <<<<<
-----
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 315.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1005.99 DOWNSTREAM(FEET) = 1005.73
FLOW LENGTH(FEET) = 26.46 MANNING'S N = 0.013

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ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.85
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.51
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 9.01
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 315.00 = 4478.99 FEET.

*****
FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 9.01
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.414
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.23 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 0.91
EFFECTIVE AREA(ACRES) = 5.24 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 5.5 PEAK FLOW RATE(CFS) = 21.51
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****
FLOW PROCESS FROM NODE 315.00 TO NODE 345.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1005.73 DOWNSTREAM(FEET) = 1004.92
FLOW LENGTH(FEET) = 80.73 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.85
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.51
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 9.21
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

*****
FLOW PROCESS FROM NODE 345.00 TO NODE 345.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
-----
*****

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FLOW PROCESS FROM NODE 320.00 TO NODE 325.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 194.49
ELEVATION DATA: UPSTREAM(FEET) = 1012.87 DOWNSTREAM(FEET) = 1010.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.209
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.465
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 1.11 0.20 0.100 75 6.21
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 5.44
TOTAL AREA(ACRES) = 1.11 PEAK FLOW RATE(CFS) = 5.44

```

```

*****
FLOW PROCESS FROM NODE 325.00 TO NODE 340.00 IS CODE = 41
-----

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.30 DOWNSTREAM(FEET) = 1005.32
FLOW LENGTH(FEET) = 211.93 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.93
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.44
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 6.72
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 406.42 FEET.

```

```

*****
FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 1
-----

```

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.72
RAINFALL INTENSITY(INCH/HR) = 5.22
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.11
TOTAL STREAM AREA(ACRES) = 1.11

```

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PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.44

```

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*****
FLOW PROCESS FROM NODE 330.00 TO NODE 335.00 IS CODE = 21
-----

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 115.56
ELEVATION DATA: UPSTREAM(FEET) = 1012.86 DOWNSTREAM(FEET) = 1011.03

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.57 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.16
TOTAL AREA(ACRES) = 0.57 PEAK FLOW RATE(CFS) = 3.16

```

```

*****
FLOW PROCESS FROM NODE 335.00 TO NODE 340.00 IS CODE = 41
-----

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.03 DOWNSTREAM(FEET) = 1005.32
FLOW LENGTH(FEET) = 16.08 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.30
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.16
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.02
LONGEST FLOWPATH FROM NODE 330.00 TO NODE 340.00 = 131.64 FEET.

```

```

*****
FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 1
-----

```

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.02
RAINFALL INTENSITY(INCH/HR) = 6.17
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

```

AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.57
TOTAL STREAM AREA(ACRES) = 0.57
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.16

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.44	6.72	5.224	0.20(0.02)	0.10	1.1	320.00
2	3.16	5.02	6.174	0.20(0.02)	0.10	0.6	330.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.97	5.02	6.174	0.20(0.02)	0.10	1.4	330.00
2	8.11	6.72	5.224	0.20(0.02)	0.10	1.7	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.11 Tc(MIN.) = 6.72
EFFECTIVE AREA(ACRES) = 1.68 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.7
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 406.42 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 345.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.32 DOWNSTREAM(FEET) = 1004.92
FLOW LENGTH(FEET) = 28.45 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.33
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.11
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 6.76
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 345.00 = 434.87 FEET.

FLOW PROCESS FROM NODE 345.00 TO NODE 345.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.97	5.07	6.141	0.20(0.02)	0.10	1.4	330.00
2	8.11	6.76	5.203	0.20(0.02)	0.10	1.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 345.00 = 434.87 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.80	5.53	5.841	0.20(0.02)	0.10	3.5	275.00
2	20.38	7.05	5.083	0.20(0.02)	0.10	4.4	245.00
3	20.61	7.33	4.970	0.20(0.02)	0.10	4.5	290.00
4	21.51	9.21	4.360	0.20(0.02)	0.10	5.2	210.00
5	21.49	9.46	4.295	0.20(0.02)	0.10	5.3	235.00
6	10.12	40.46	1.867	0.20(0.02)	0.10	5.5	265.00

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.08	5.07	6.141	0.20(0.02)	0.10	4.6	330.00
2	26.81	5.53	5.841	0.20(0.02)	0.10	5.0	275.00
3	28.20	6.76	5.203	0.20(0.02)	0.10	5.9	320.00
4	28.31	7.05	5.083	0.20(0.02)	0.10	6.1	245.00
5	28.35	7.33	4.970	0.20(0.02)	0.10	6.2	290.00
6	28.30	9.21	4.360	0.20(0.02)	0.10	6.9	210.00
7	28.18	9.46	4.295	0.20(0.02)	0.10	7.0	235.00
8	13.02	40.46	1.867	0.20(0.02)	0.10	7.2	265.00

TOTAL AREA(ACRES) = 7.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 28.35 Tc(MIN.) = 7.329
EFFECTIVE AREA(ACRES) = 6.19 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 7.2
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 345.00 = 4559.72 FEET.

FLOW PROCESS FROM NODE 345.00 TO NODE 350.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.92 DOWNSTREAM(FEET) = 1003.56
FLOW LENGTH(FEET) = 135.29 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.03
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.35

PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 7.58
 LONGEST FLOWPATH FROM NODE 265.00 TO NODE 350.00 = 4695.01 FEET.

FLOW PROCESS FROM NODE 350.00 TO NODE 350.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 7.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.875
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL D 0.41 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 1.79
 EFFECTIVE AREA(ACRES) = 6.60 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 7.6 PEAK FLOW RATE(CFS) = 28.83

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.93	5.34	5.960	0.20(0.02)	0.10	5.0	330.00
2	27.59	5.79	5.687	0.20(0.02)	0.10	5.4	275.00
3	28.79	7.02	5.096	0.20(0.02)	0.10	6.3	320.00
4	28.85	7.30	4.982	0.20(0.02)	0.10	6.5	245.00
5	28.83	7.58	4.875	0.20(0.02)	0.10	6.6	290.00
6	28.30	9.46	4.293	0.20(0.02)	0.10	7.3	210.00
7	28.18	9.71	4.231	0.20(0.02)	0.10	7.4	235.00
8	13.02	40.77	1.859	0.20(0.02)	0.10	7.6	265.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 28.85 Tc(MIN.) = 7.30
 AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 6.46

FLOW PROCESS FROM NODE 350.00 TO NODE 450.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.56 DOWNSTREAM(FEET) = 997.40
 FLOW LENGTH(FEET) = 169.48 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/ SEC.) = 14.01
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 28.85
 PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 7.50

LONGEST FLOWPATH FROM NODE 265.00 TO NODE 450.00 = 4864.49 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 7.6 Tc(MIN.) = 7.50
 EFFECTIVE AREA(ACRES) = 6.46 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 28.85

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.93	5.34	5.833	0.20(0.02)	0.10	5.0	330.00
2	27.59	6.00	5.575	0.20(0.02)	0.10	5.4	275.00
3	28.79	7.22	5.014	0.20(0.02)	0.10	6.3	320.00
4	28.85	7.50	4.905	0.20(0.02)	0.10	6.5	245.00
5	28.83	7.78	4.803	0.20(0.02)	0.10	6.6	290.00
6	28.30	9.66	4.241	0.20(0.02)	0.10	7.3	210.00
7	28.18	9.91	4.181	0.20(0.02)	0.10	7.4	235.00
8	13.02	41.03	1.852	0.20(0.02)	0.10	7.6	265.00

END OF RATIONAL METHOD ANALYSIS

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1334

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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C3) *
* 100-YEAR STORM EVENT SR *
*****

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FILE NAME: 3P00RC3.DAT
TIME/DATE OF STUDY: 08:06 11/13/2019

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=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
*DATA BANK RAINFALL USED*
*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

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NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER GEOMETRIES LIP (FT)	GUTTER GEOMETRIES HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE 70.00 TO NODE 75.00 IS CODE = 21

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 241.09
ELEVATION DATA: UPSTREAM(FEET) = 1023.41 DOWNSTREAM(FEET) = 1018.83

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.026
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.560
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.67   0.20 0.100 75   6.03
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.34
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 3.34

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*****
FLOW PROCESS FROM NODE 75.00 TO NODE 90.00 IS CODE = 41

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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 1014.83 DOWNSTREAM(FEET) = 1010.64
FLOW LENGTH(FEET) = 250.04 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.14
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.34
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 6.70
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 90.00 = 491.13 FEET.

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*****
FLOW PROCESS FROM NODE 90.00 TO NODE 90.00 IS CODE = 1

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```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

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```

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.70
RAINFALL INTENSITY(INCH/HR) = 5.23
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67

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```

PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.34

*****
FLOW PROCESS FROM NODE      80.00 TO NODE      85.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  186.71
ELEVATION DATA: UPSTREAM(FEET) =  1020.22  DOWNSTREAM(FEET) =  1018.15

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.059
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.542
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.36   0.20   0.100  75  6.06
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  1.79
TOTAL AREA(ACRES) =  0.36  PEAK FLOW RATE(CFS) =  1.79

*****
FLOW PROCESS FROM NODE      85.00 TO NODE      90.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1014.15  DOWNSTREAM(FEET) =  1010.64
FLOW LENGTH(FEET) =  24.11  MANNING'S N =  0.013
DEPTH OF FLOW IN  12.0 INCH PIPE IS  3.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.56
GIVEN PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  1.79
PIPE TRAVEL TIME(MIN.) =  0.03  Tc(MIN.) =  6.09
LONGEST FLOWPATH FROM NODE      80.00 TO NODE      90.00 =  210.82 FEET.

*****
FLOW PROCESS FROM NODE      90.00 TO NODE      90.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  6.09
RAINFALL INTENSITY(INCH/HR) =  5.52
AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20

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AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.36
TOTAL STREAM AREA(ACRES) =  0.36
PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.79

** CONFLUENCE DATA **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1        3.34  6.70  5.230  0.20( 0.02) 0.10  0.7   70.00
2        1.79  6.09  5.524  0.20( 0.02) 0.10  0.4   80.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM   Q      Tc  Intensity  Fp(Fm)   Ap   Ae   HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES)  NODE
1        5.00  6.09  5.524  0.20( 0.02) 0.10  1.0   80.00
2        5.03  6.70  5.230  0.20( 0.02) 0.10  1.0   70.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =  5.03  Tc(MIN.) =  6.70
EFFECTIVE AREA(ACRES) =  1.03  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =  1.0
LONGEST FLOWPATH FROM NODE      70.00 TO NODE      90.00 =  491.13 FEET.

*****
FLOW PROCESS FROM NODE      90.00 TO NODE      105.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1010.64  DOWNSTREAM(FEET) =  1009.86
FLOW LENGTH(FEET) =  155.14  MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  9.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  4.35
GIVEN PIPE DIAMETER(INCH) =  24.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  5.03
PIPE TRAVEL TIME(MIN.) =  0.59  Tc(MIN.) =  7.30
LONGEST FLOWPATH FROM NODE      70.00 TO NODE      105.00 =  646.27 FEET.

*****
FLOW PROCESS FROM NODE      105.00 TO NODE      105.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  7.30

```

RAINFALL INTENSITY(INCH/HR) = 4.98
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.03
 TOTAL STREAM AREA(ACRES) = 1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.03

FLOW PROCESS FROM NODE 95.00 TO NODE 100.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 155.14
 ELEVATION DATA: UPSTREAM(FEET) = 1020.24 DOWNSTREAM(FEET) = 1018.28

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.481
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.870
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS	Tc
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN	(MIN.)
COMMERCIAL	D	0.37	0.20	0.100	75	5.48

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 1.95
 TOTAL AREA(ACRES) = 0.37 PEAK FLOW RATE(CFS) = 1.95

FLOW PROCESS FROM NODE 100.00 TO NODE 105.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1014.28 DOWNSTREAM(FEET) = 1009.86
 FLOW LENGTH(FEET) = 24.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.86
 GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.95
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 5.51
 LONGEST FLOWPATH FROM NODE 95.00 TO NODE 105.00 = 179.25 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.51
 RAINFALL INTENSITY(INCH/HR) = 5.85
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.37
 TOTAL STREAM AREA(ACRES) = 0.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.95

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.00	6.69	5.237	0.20(0.02)	0.10	1.0	80.00
2	5.03	7.30	4.981	0.20(0.02)	0.10	1.0	70.00
2	1.95	5.51	5.851	0.20(0.02)	0.10	0.4	95.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.55	5.51	5.851	0.20(0.02)	0.10	1.2	95.00
2	6.74	6.69	5.237	0.20(0.02)	0.10	1.3	80.00
3	6.69	7.30	4.981	0.20(0.02)	0.10	1.4	70.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.74 Tc(MIN.) = 6.69
 EFFECTIVE AREA(ACRES) = 1.34 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 70.00 TO NODE 105.00 = 646.27 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 120.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.86 DOWNSTREAM(FEET) = 1009.61
 FLOW LENGTH(FEET) = 48.61 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 11.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.73
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.74
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 6.86
 LONGEST FLOWPATH FROM NODE 70.00 TO NODE 120.00 = 694.88 FEET.

FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 6.86

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.162

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.85	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 3.93

EFFECTIVE AREA(ACRES) = 2.19 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 10.13

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	10.41	5.68	5.749	0.20(0.02)	0.10	2.0	95.00
2	10.13	6.86	5.162	0.20(0.02)	0.10	2.2	80.00
3	9.91	7.47	4.916	0.20(0.02)	0.10	2.2	70.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 10.41 Tc(MIN.) = 5.68

AREA-AVERAGED Fm(INCH/HR) = 0.02 AREA-AVERAGED Fp(INCH/HR) = 0.20

AREA-AVERAGED Ap = 0.10 EFFECTIVE AREA(ACRES) = 2.02

FLOW PROCESS FROM NODE 120.00 TO NODE 125.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.61 DOWNSTREAM(FEET) = 1006.10

FLOW LENGTH(FEET) = 79.38 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 6.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.20

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 10.41

PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.80

LONGEST FLOWPATH FROM NODE 70.00 TO NODE 125.00 = 774.26 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.2 TC(MIN.) = 5.80

EFFECTIVE AREA(ACRES) = 2.02 AREA-AVERAGED Fm(INCH/HR) = 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 10.41

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	10.41	5.80	5.681	0.20(0.02)	0.10	2.0	95.00
2	10.13	6.98	5.111	0.20(0.02)	0.10	2.2	80.00
3	9.91	7.59	4.871	0.20(0.02)	0.10	2.2	70.00

END OF RATIONAL METHOD ANALYSIS

▲

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 3 (LINE C4) *
* 100-YEAR STORM EVENT SR *

FILE NAME: 3P00RC4.DAT
TIME/DATE OF STUDY: 08:08 11/13/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER GEOMETRIES LIP (FT)	MANNING HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50	0.0312	0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 150.00 TO NODE 155.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 179.74
ELEVATION DATA: UPSTREAM(FEET) = 1012.55 DOWNSTREAM(FEET) = 1011.74

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.144
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.043
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.48 0.20 0.100 75 7.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.17
TOTAL AREA(ACRES) = 0.48 PEAK FLOW RATE(CFS) = 2.17

FLOW PROCESS FROM NODE 155.00 TO NODE 170.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1008.74 DOWNSTREAM(FEET) = 1006.15
FLOW LENGTH(FEET) = 142.89 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.72
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.17
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 7.56
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 170.00 = 322.63 FEET.

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.56
RAINFALL INTENSITY(INCH/HR) = 4.88
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.48
TOTAL STREAM AREA(ACRES) = 0.48

```

PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.17

*****
FLOW PROCESS FROM NODE 160.00 TO NODE 165.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 159.96
ELEVATION DATA: UPSTREAM(FEET) = 1012.82 DOWNSTREAM(FEET) = 1011.69

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.233
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.453
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL AREA  Fp      Ap      SCS  Tc
LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL        D      0.49    0.20    0.100  75  6.23
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.40
TOTAL AREA(ACRES) = 0.49 PEAK FLOW RATE(CFS) = 2.40

*****
FLOW PROCESS FROM NODE 165.00 TO NODE 170.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1008.51 DOWNSTREAM(FEET) = 1006.15
FLOW LENGTH(FEET) = 150.95 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.55
GIVEN PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.40
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 6.69
LONGEST FLOWPATH FROM NODE 160.00 TO NODE 170.00 = 310.91 FEET.

*****
FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.69
RAINFALL INTENSITY(INCH/HR) = 5.24
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

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AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.49
TOTAL STREAM AREA(ACRES) = 0.49
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.40

** CONFLUENCE DATA **
STREAM  Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1      2.17  7.56  4.882  0.20( 0.02) 0.10  0.5  150.00
2      2.40  6.69  5.238  0.20( 0.02) 0.10  0.5  160.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM  Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER  (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1      4.46  6.69  5.238  0.20( 0.02) 0.10  0.9  160.00
2      4.40  7.56  4.882  0.20( 0.02) 0.10  1.0  150.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.46 Tc(MIN.) = 6.69
EFFECTIVE AREA(ACRES) = 0.91 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.0
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 170.00 = 322.63 FEET.

*****
FLOW PROCESS FROM NODE 170.00 TO NODE 175.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1006.15 DOWNSTREAM(FEET) = 1005.93
FLOW LENGTH(FEET) = 43.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 8.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.21
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.46
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 6.86
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 175.00 = 366.35 FEET.

*****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 6.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.162
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.50   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.50   SUBAREA RUNOFF(CFS) = 2.31
EFFECTIVE AREA(ACRES) = 1.41  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.5     PEAK FLOW RATE(CFS) = 6.55

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*****
FLOW PROCESS FROM NODE 175.00 TO NODE 180.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----

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ELEVATION DATA: UPSTREAM(FEET) = 1005.93 DOWNSTREAM(FEET) = 1005.30
FLOW LENGTH(FEET) = 126.36 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.65
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.55
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 7.31
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 180.00 = 492.71 FEET.

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*****
FLOW PROCESS FROM NODE 180.00 TO NODE 180.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) = 7.31
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.976
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.31   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.31   SUBAREA RUNOFF(CFS) = 1.38
EFFECTIVE AREA(ACRES) = 1.72  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.8     PEAK FLOW RATE(CFS) = 7.69

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*****
FLOW PROCESS FROM NODE 180.00 TO NODE 185.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1005.30 DOWNSTREAM(FEET) = 1004.75

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FLOW LENGTH(FEET) = 110.17 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 12.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.84
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.69
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 7.69
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 185.00 = 602.88 FEET.

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*****
FLOW PROCESS FROM NODE 185.00 TO NODE 185.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) = 7.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.834
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
  LAND USE          GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D      0.36   0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.36   SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 2.08  AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.1     PEAK FLOW RATE(CFS) = 9.03

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*****
FLOW PROCESS FROM NODE 185.00 TO NODE 450.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1004.75 DOWNSTREAM(FEET) = 997.40
FLOW LENGTH(FEET) = 67.82 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.72
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.03
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 7.77
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

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*****
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.1 TC(MIN.) = 7.77
EFFECTIVE AREA(ACRES) = 2.08 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 9.03

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** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap  Ae  HEADWATER
NUMBER      (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE

```

1	9.03	7.77	4.807	0.20(0.02)	0.10	2.1	160.00
2	8.71	8.65	4.519	0.20(0.02)	0.10	2.1	150.00

=====

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END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1334

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION OVERALL LINE C *
* 100-YEAR STORM EVENT SR *

FILE NAME: 3P00ROV.DAT
TIME/DATE OF STUDY: 08:20 11/13/2019

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 326.73
ELEVATION DATA: UPSTREAM(FEET) = 1332.32 DOWNSTREAM(FEET) = 1331.94

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.223
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.269
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.21	0.30	0.500	56	15.22
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	1.55	0.20	0.500	75	15.22

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 5.01
TOTAL AREA(ACRES) = 1.76 PEAK FLOW RATE(CFS) = 5.01

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1331.94 DOWNSTREAM ELEVATION(FEET) = 1328.22
STREET LENGTH(FEET) = 177.44 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 25.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 10.42
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.01
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.93
STREET FLOW TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 16.21

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.154
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.93 0.20 0.500 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 2.56
EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 7.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 11.10
FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH*VELOCITY(FT*FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 504.17 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1328.22 DOWNSTREAM(FEET) = 1260.18
FLOW LENGTH(FEET) = 960.76 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.86
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.38
PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 17.45
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1464.93 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 17.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.023
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 5.09 0.20 0.500 75
COMMERCIAL D 0.54 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.462
SUBAREA AREA(ACRES) = 5.63 SUBAREA RUNOFF(CFS) = 14.85
EFFECTIVE AREA(ACRES) = 8.32 AREA-AVERAGED Fm(INCH/HR) = 0.10

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 21.92

FLOW PROCESS FROM NODE 103.00 TO NODE 105.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1260.18 DOWNSTREAM(FEET) = 1245.52
FLOW LENGTH(FEET) = 775.08 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.40
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.92
PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 18.49
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2240.01 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 18.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.924
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 3.73 0.20 0.500 75
COMMERCIAL D 0.65 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.441
SUBAREA AREA(ACRES) = 4.38 SUBAREA RUNOFF(CFS) = 11.18
EFFECTIVE AREA(ACRES) = 12.70 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 12.7 PEAK FLOW RATE(CFS) = 32.36

FLOW PROCESS FROM NODE 105.00 TO NODE 107.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1245.52 DOWNSTREAM(FEET) = 1240.60
FLOW LENGTH(FEET) = 98.55 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.38
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 32.36
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 18.59
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 2338.56 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.59
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.20 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 1.16 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 12.06 0.20 0.500 75
COMMERCIAL C 0.60 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
PUBLIC PARK C 0.70 0.25 0.850 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.481
SUBAREA AREA(ACRES) = 19.69 SUBAREA RUNOFF(CFS) = 49.71
EFFECTIVE AREA(ACRES) = 32.39 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 81.97

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.59
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK D 0.53 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 1.31
EFFECTIVE AREA(ACRES) = 32.92 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 32.9 PEAK FLOW RATE(CFS) = 83.28

FLOW PROCESS FROM NODE 107.00 TO NODE 109.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1240.60 DOWNSTREAM(FEET) = 1239.01
FLOW LENGTH(FEET) = 81.43 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.51
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 83.28
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 18.64
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 2419.99 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.64
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.911
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.52 0.25 0.100 69
COMMERCIAL D 0.97 0.20 0.100 75
CONDOMINIUMS C 1.00 0.25 0.350 69
CONDOMINIUMS D 10.74 0.20 0.350 75
PUBLIC PARK D 0.07 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.325
SUBAREA AREA(ACRES) = 13.30 SUBAREA RUNOFF(CFS) = 34.05
EFFECTIVE AREA(ACRES) = 46.22 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 46.2 PEAK FLOW RATE(CFS) = 117.19

FLOW PROCESS FROM NODE 109.00 TO NODE 111.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1239.07 DOWNSTREAM(FEET) = 1210.33
FLOW LENGTH(FEET) = 407.01 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.32
GIVEN PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 117.19
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 18.91
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2827.00 FEET.

FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.91

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.887

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.69	0.20	0.100	75
CONDOMINIUMS	D	0.09	0.20	0.350	75
PUBLIC PARK	D	0.85	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505

SUBAREA AREA(ACRES) = 1.63 SUBAREA RUNOFF(CFS) = 4.09

EFFECTIVE AREA(ACRES) = 47.85 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44

TOTAL AREA(ACRES) = 47.8 PEAK FLOW RATE(CFS) = 120.29

FLOW PROCESS FROM NODE 111.00 TO NODE 113.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.33 DOWNSTREAM(FEET) = 1210.00

FLOW LENGTH(FEET) = 18.70 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 17.02

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 120.29

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 18.93

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 113.00 = 2845.70 FEET.

FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.93

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	13.30	0.20	0.350	75
PUBLIC PARK	D	3.90	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.463

SUBAREA AREA(ACRES) = 17.20 SUBAREA RUNOFF(CFS) = 43.23

EFFECTIVE AREA(ACRES) = 65.05 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.44

TOTAL AREA(ACRES) = 65.1 PEAK FLOW RATE(CFS) = 163.45

FLOW PROCESS FROM NODE 113.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1210.00 DOWNSTREAM(FEET) = 1159.95

FLOW LENGTH(FEET) = 1078.02 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 23.12

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 163.45

PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 19.71

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.71

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.51	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	5.27	0.20	0.200	75
COMMERCIAL	D	0.27	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196

SUBAREA AREA(ACRES) = 7.05 SUBAREA RUNOFF(CFS) = 17.63

EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.09

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.42

TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 177.23

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.71

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" C 1.27 0.25 0.200 69
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" D 3.23 0.20 0.200 75
 COMMERCIAL D 0.27 0.20 0.100 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.194
 SUBAREA AREA(ACRES) = 4.77 SUBAREA RUNOFF(CFS) = 11.93
 EFFECTIVE AREA(ACRES) = 76.87 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 76.9 PEAK FLOW RATE(CFS) = 189.15

 FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.71
 RAINFALL INTENSITY(INCH/HR) = 2.82
 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.21
 AREA-AVERAGED Ap = 0.41
 EFFECTIVE STREAM AREA(ACRES) = 76.87
 TOTAL STREAM AREA(ACRES) = 76.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 189.15

 FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 331.01
 ELEVATION DATA: UPSTREAM(FEET) = 1332.00 DOWNSTREAM(FEET) = 1330.74

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.172
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.903
 SUBAREA T_c AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS T_c
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 CONDOMINIUMS D 1.42 0.20 0.350 75 11.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350

SUBAREA RUNOFF(CFS) = 4.90
 TOTAL AREA(ACRES) = 1.42 PEAK FLOW RATE(CFS) = 4.90

 FLOW PROCESS FROM NODE 201.00 TO NODE 203.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 3 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1330.74 DOWNSTREAM ELEVATION(FEET) = 1308.01
 STREET LENGTH(FEET) = 789.61 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 50.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.41
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.48
 HALFSTREET FLOOD WIDTH(FEET) = 18.40
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.01
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.39
 STREET FLOW TRAVEL TIME(MIN.) = 2.63 T_c (MIN.) = 13.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.459

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" D 1.91 0.20 0.400 75
 CONDOMINIUMS D 4.97 0.20 0.350 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
 SUBAREA AREA(ACRES) = 6.88 SUBAREA RUNOFF(CFS) = 20.96
 EFFECTIVE AREA(ACRES) = 8.30 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 8.3 PEAK FLOW RATE(CFS) = 25.30

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 22.45
 FLOW VELOCITY(FEET/SEC.) = 5.65 DEPTH*VELOCITY(FT*FT/SEC.) = 3.08
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1120.62 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 205.00 IS CODE = 62

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-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 1308.01  DOWNSTREAM ELEVATION(FEET) = 1245.00
STREET LENGTH(FEET) = 901.07  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.00
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 9.09
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.14
STREET FLOW TRAVEL TIME(MIN.) = 1.65  Tc(MIN.) = 15.45
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.242
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"  D  0.07  0.20  0.400  75
COMMERCIAL  D  0.73  0.20  0.100  75
CONDOMINIUMS  D  11.58  0.20  0.350  75
PUBLIC PARK  D  0.01  0.20  0.850  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.336
SUBAREA AREA(ACRES) = 12.39  SUBAREA RUNOFF(CFS) = 35.40
EFFECTIVE AREA(ACRES) = 20.69  AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20  AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 20.7  PEAK FLOW RATE(CFS) = 59.07

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.62  HALFSTREET FLOOD WIDTH(FEET) = 25.51
FLOW VELOCITY(FEET/SEC.) = 9.84  DEPTH*VELOCITY(FT*FT/SEC.) = 6.08
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 2021.69 FEET.

*****
FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 1245.00  DOWNSTREAM(FEET) = 1229.65
FLOW LENGTH(FEET) = 135.30  MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.43
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 59.07
PIPE TRAVEL TIME(MIN.) = 0.07  Tc(MIN.) = 15.52
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 2156.99 FEET.

*****
FLOW PROCESS FROM NODE 206.00 TO NODE 210.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
-----
UPSTREAM ELEVATION(FEET) = 1229.65  DOWNSTREAM ELEVATION(FEET) = 1166.68
STREET LENGTH(FEET) = 1205.30  CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.57
HALFSTREET FLOOD WIDTH(FEET) = 22.77
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.90
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 4.50
STREET FLOW TRAVEL TIME(MIN.) = 2.54  Tc(MIN.) = 18.06
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.964
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA  Fp  Ap  SCS
LAND USE  GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"  C  3.38  0.25  0.200  69
RESIDENTIAL
"11+ DWELLINGS/ACRE"  D  9.23  0.20  0.200  75
COMMERCIAL  D  0.42  0.20  0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.197
SUBAREA AREA(ACRES) = 13.03  SUBAREA RUNOFF(CFS) = 34.27
EFFECTIVE AREA(ACRES) = 33.72  AREA-AVERAGED Fm(INCH/HR) = 0.06

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AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 33.7 PEAK FLOW RATE(CFS) = 88.17

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 24.10
 FLOW VELOCITY(FEET/SEC.) = 8.19 DEPTH*VELOCITY(FT*FT/SEC.) = 4.86
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 3362.29 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 119.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1166.68 DOWNSTREAM(FEET) = 1159.95
 FLOW LENGTH(FEET) = 307.60 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.07
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.17
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 18.24
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 119.00 = 3669.89 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 18.24
 RAINFALL INTENSITY(INCH/HR) = 2.95
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.29
 EFFECTIVE STREAM AREA(ACRES) = 33.72
 TOTAL STREAM AREA(ACRES) = 33.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 88.17

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	189.15	19.71	2.820	0.21(0.09)	0.41	76.9	100.00
2	88.17	18.24	2.947	0.20(0.06)	0.29	33.7	200.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	271.44	18.24	2.947	0.21(0.08)	0.37	104.9	200.00
2	273.44	19.71	2.820	0.21(0.08)	0.37	110.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 273.44 Tc(MIN.) = 19.71
 EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 110.6
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 119.00 = 3923.72 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 121.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1159.95 DOWNSTREAM(FEET) = 1150.00
 FLOW LENGTH(FEET) = 321.11 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 37.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.10
 GIVEN PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 273.44
 PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 19.94
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 121.00 = 4244.83 FEET.

FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.801
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.04	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	8.06	0.20	0.200	75
COMMERCIAL	C	0.97	0.25	0.100	69
COMMERCIAL	D	1.54	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.185
 SUBAREA AREA(ACRES) = 16.61 SUBAREA RUNOFF(CFS) = 41.26
 EFFECTIVE AREA(ACRES) = 127.20 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35
 TOTAL AREA(ACRES) = 127.2 PEAK FLOW RATE(CFS) = 312.33

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*****
FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1150.00 DOWNSTREAM(FEET) = 1140.00
FLOW LENGTH(FEET) = 798.79 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.91
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 312.33
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 20.78
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 5043.62 FEET.
*****
FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 20.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.736
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 6.79 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 17.92 0.20 0.200 75
APARTMENTS C 4.46 0.25 0.200 69
APARTMENTS D 0.69 0.20 0.200 75
COMMERCIAL C 0.78 0.25 0.100 69
COMMERCIAL D 1.88 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.192
SUBAREA AREA(ACRES) = 32.52 SUBAREA RUNOFF(CFS) = 78.84
EFFECTIVE AREA(ACRES) = 159.72 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 159.7 PEAK FLOW RATE(CFS) = 383.70

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 386.28 19.31 2.852 0.21( 0.07) 0.31 154.0 200.00
2 383.70 20.78 2.736 0.21( 0.07) 0.31 159.7 100.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 386.28 Tc(MIN.) = 19.31
AREA-AVERAGED Fm(INCH/HR) = 0.07 AREA-AVERAGED Fp(INCH/HR) = 0.21

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AREA-AVERAGED Ap = 0.31 EFFECTIVE AREA(ACRES) = 154.01

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*****
FLOW PROCESS FROM NODE 123.00 TO NODE 129.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1140.00 DOWNSTREAM(FEET) = 1122.00
FLOW LENGTH(FEET) = 579.78 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.23
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 386.28
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 19.67
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.
*****
FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 19.67
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.823
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.85 0.25 0.200 69
COMMERCIAL C 0.56 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.184
SUBAREA AREA(ACRES) = 3.41 SUBAREA RUNOFF(CFS) = 8.52
EFFECTIVE AREA(ACRES) = 157.42 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 163.1 PEAK FLOW RATE(CFS) = 390.70
*****
FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
MAINLINE Tc(MIN.) = 19.67
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.823
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 2.54 0.25 0.200 69

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COMMERCIAL          C          0.97    0.25    0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.172
SUBAREA AREA(ACRES) = 3.51    SUBAREA RUNOFF(CFS) = 8.78
EFFECTIVE AREA(ACRES) = 160.93    AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21    AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 166.6    PEAK FLOW RATE(CFS) = 399.48

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*****
FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.67
RAINFALL INTENSITY(INCH/HR) = 2.82
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 160.93
TOTAL STREAM AREA(ACRES) = 166.64
PEAK FLOW RATE(CFS) AT CONFLUENCE = 399.48

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*****
FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH(FEET) = 320.55
ELEVATION DATA: UPSTREAM(FEET) = 1163.74    DOWNSTREAM(FEET) = 1148.43

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.616
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.789
SUBAREA Tc AND LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.29	0.25	0.200	69	5.99
COMMERCIAL	C	1.36	0.25	0.100	69	5.62
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.118						
SUBAREA RUNOFF(CFS) = 8.55						
TOTAL AREA(ACRES) = 1.65 PEAK FLOW RATE(CFS) = 8.55						

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*****
FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 3 USED)<<<<
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UPSTREAM ELEVATION(FEET) = 1148.43    DOWNSTREAM ELEVATION(FEET) = 1141.94
STREET LENGTH(FEET) = 235.77    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 50.00

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DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 45.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.017
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.017

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SPECIFIED NUMBER OF HALfstREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.017
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 20.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.47
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.93
STREET FLOW TRAVEL TIME(MIN.) = 0.88    Tc(MIN.) = 6.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.326
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.47	0.25	0.200	69
COMMERCIAL	C	4.51	0.25	0.100	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.109					
SUBAREA AREA(ACRES) = 4.98 SUBAREA RUNOFF(CFS) = 23.75					
EFFECTIVE AREA(ACRES) = 6.63 AREA-AVERAGED Fm(INCH/HR) = 0.03					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.11					
TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 31.62					

```

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48    HALFSTREET FLOOD WIDTH(FEET) = 18.75
FLOW VELOCITY(FEET/SEC.) = 4.96    DEPTH*VELOCITY(FT*FT/SEC.) = 2.40
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 556.32 FEET.

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*****
FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1141.94    DOWNSTREAM(FEET) = 1122.13
FLOW LENGTH(FEET) = 643.31    MANNING'S N = 0.013

```

DEPTH OF FLOW IN 36.0 INCH PIPE IS 13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.54
 GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 31.62
 PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 7.29
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1199.63 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 7.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.986
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	2.51	0.25	0.200	69
COMMERCIAL	C	3.05	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
 SUBAREA AREA(ACRES) = 5.56 SUBAREA RUNOFF(CFS) = 24.77
 EFFECTIVE AREA(ACRES) = 12.19 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.13
 TOTAL AREA(ACRES) = 12.2 PEAK FLOW RATE(CFS) = 54.36

FLOW PROCESS FROM NODE 303.00 TO NODE 129.00 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1122.13 DOWNSTREAM(FEET) = 1122.00
 FLOW LENGTH(FEET) = 81.38 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 39.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.94
 GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 54.36
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 7.56
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 129.00 = 1281.01 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 7.56
 RAINFALL INTENSITY(INCH/HR) = 4.88
 AREA-AVERAGED Fm(INCH/HR) = 0.03
 AREA-AVERAGED Fp(INCH/HR) = 0.25
 AREA-AVERAGED Ap = 0.13
 EFFECTIVE STREAM AREA(ACRES) = 12.19
 TOTAL STREAM AREA(ACRES) = 12.19
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 54.36

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	399.48	19.67	2.823	0.21(0.06)	0.31	160.9	200.00
1	396.47	21.13	2.709	0.21(0.07)	0.31	166.6	100.00
2	54.36	7.56	4.882	0.25(0.03)	0.13	12.2	300.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	322.58	7.56	4.882	0.21(0.06)	0.28	74.1	300.00
2	430.76	19.67	2.823	0.21(0.06)	0.29	173.1	200.00
3	426.48	21.13	2.709	0.21(0.06)	0.30	178.8	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 430.76 Tc(MIN.) = 19.67
 EFFECTIVE AREA(ACRES) = 173.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 178.8
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 5623.40 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 131.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1105.04 DOWNSTREAM(FEET) = 1103.76
 FLOW LENGTH(FEET) = 35.44 MANNING'S N = 0.013
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 41.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.67
 GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 430.76
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 19.69
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 131.00 = 5658.84 FEET.

FLOW PROCESS FROM NODE 131.00 TO NODE 131.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.821
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.86 0.25 0.100 69
COMMERCIAL D 0.14 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 5.03
EFFECTIVE AREA(ACRES) = 175.12 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 180.8 PEAK FLOW RATE(CFS) = 434.86

FLOW PROCESS FROM NODE 131.00 TO NODE 133.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1103.76 DOWNSTREAM(FEET) = 1101.65
FLOW LENGTH(FEET) = 503.15 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 434.86
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 20.15
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 133.00 = 6161.99 FEET.

FLOW PROCESS FROM NODE 133.00 TO NODE 133.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.15
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.784
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.00 0.25 0.100 69
COMMERCIAL D 0.87 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.87 SUBAREA RUNOFF(CFS) = 4.65
EFFECTIVE AREA(ACRES) = 176.99 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29

TOTAL AREA(ACRES) = 182.7 PEAK FLOW RATE(CFS) = 434.86
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1101.65 DOWNSTREAM(FEET) = 1101.33
FLOW LENGTH(FEET) = 60.37 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 434.86
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 20.20
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 6222.36 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.20
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.780
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.36 0.25 0.100 69
COMMERCIAL D 0.44 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.80 SUBAREA RUNOFF(CFS) = 1.99
EFFECTIVE AREA(ACRES) = 177.79 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 183.5 PEAK FLOW RATE(CFS) = 434.98

FLOW PROCESS FROM NODE 135.00 TO NODE 137.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1101.33 DOWNSTREAM(FEET) = 1098.66
FLOW LENGTH(FEET) = 408.71 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.31
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 434.98
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 20.57
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 137.00 = 6631.07 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.57
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.751
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.06	0.25	0.100	69
COMMERCIAL	D	1.08	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.14 SUBAREA RUNOFF(CFS) = 12.61
EFFECTIVE AREA(ACRES) = 182.93 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 188.6 PEAK FLOW RATE(CFS) = 442.97

FLOW PROCESS FROM NODE 137.00 TO NODE 141.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1098.66 DOWNSTREAM(FEET) = 1093.99
FLOW LENGTH(FEET) = 318.57 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.64
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 442.97
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 20.86
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 141.00 = 6949.64 FEET.

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.729
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.78	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.78 SUBAREA RUNOFF(CFS) = 14.07
EFFECTIVE AREA(ACRES) = 188.71 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 194.4 PEAK FLOW RATE(CFS) = 453.48

FLOW PROCESS FROM NODE 141.00 TO NODE 141.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 20.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.729
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	0.87	0.25	0.400	69
COMMERCIAL	C	0.68	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.268
SUBAREA AREA(ACRES) = 1.55 SUBAREA RUNOFF(CFS) = 3.71
EFFECTIVE AREA(ACRES) = 190.26 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 196.0 PEAK FLOW RATE(CFS) = 457.20

FLOW PROCESS FROM NODE 141.00 TO NODE 145.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1093.99 DOWNSTREAM(FEET) = 1076.30
FLOW LENGTH(FEET) = 504.72 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.86
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 457.20
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 21.17
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 145.00 = 7454.36 FEET.

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      0.71   0.25   0.100  69
COMMERCIAL          D      0.32   0.20   0.100  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.03   SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 191.29   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 197.0   PEAK FLOW RATE(CFS) = 457.20
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 21.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS        C      1.02   0.25   0.350  69
CONDOMINIUMS        D      4.41   0.20   0.350  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 5.43   SUBAREA RUNOFF(CFS) = 12.87
EFFECTIVE AREA(ACRES) = 196.72   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 202.4   PEAK FLOW RATE(CFS) = 468.57

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*****
FLOW PROCESS FROM NODE 145.00 TO NODE 149.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1076.30   DOWNSTREAM(FEET) = 1053.58
FLOW LENGTH(FEET) = 289.89   MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 36.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.85
GIVEN PIPE DIAMETER(INCH) = 60.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 468.57
PIPE TRAVEL TIME(MIN.) = 0.13   Tc(MIN.) = 21.30
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 149.00 = 7744.25 FEET.

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*****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697

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SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
CONDOMINIUMS        C      4.75   0.25   0.350  69
CONDOMINIUMS        D      1.68   0.20   0.350  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 6.43   SUBAREA RUNOFF(CFS) = 15.13
EFFECTIVE AREA(ACRES) = 203.15   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 208.9   PEAK FLOW RATE(CFS) = 482.05

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*****
FLOW PROCESS FROM NODE 149.00 TO NODE 149.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 21.30
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.697
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C      0.40   0.25   0.100  69
PUBLIC PARK         C      0.62   0.25   0.850  69
PUBLIC PARK         D      0.03   0.20   0.850  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.564
SUBAREA AREA(ACRES) = 1.05   SUBAREA RUNOFF(CFS) = 2.42
EFFECTIVE AREA(ACRES) = 204.20   AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 209.9   PEAK FLOW RATE(CFS) = 484.47

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*****
FLOW PROCESS FROM NODE 149.00 TO NODE 151.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1053.58   DOWNSTREAM(FEET) = 1023.54
FLOW LENGTH(FEET) = 305.05   MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 41.66
GIVEN PIPE DIAMETER(INCH) = 60.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 484.47
PIPE TRAVEL TIME(MIN.) = 0.12   Tc(MIN.) = 21.42
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 151.00 = 8049.30 FEET.

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FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.42
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.688
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.41 0.25 0.100 69
COMMERCIAL D 1.11 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 3.65
EFFECTIVE AREA(ACRES) = 205.72 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 211.4 PEAK FLOW RATE(CFS) = 486.50

FLOW PROCESS FROM NODE 151.00 TO NODE 153.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1023.54 DOWNSTREAM(FEET) = 1007.62
FLOW LENGTH(FEET) = 210.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 37.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.63
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 486.50
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 21.52
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 153.00 = 8259.68 FEET.

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.85 0.20 0.100 75
PUBLIC PARK D 2.01 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.627
SUBAREA AREA(ACRES) = 2.86 SUBAREA RUNOFF(CFS) = 6.58
EFFECTIVE AREA(ACRES) = 208.58 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 214.3 PEAK FLOW RATE(CFS) = 491.84

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 0.27 0.20 0.100 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.65
EFFECTIVE AREA(ACRES) = 208.85 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 214.6 PEAK FLOW RATE(CFS) = 492.49

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 5.30 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.58 0.20 0.500 75
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 9.75 0.25 0.400 69
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D 1.01 0.20 0.400 75
APARTMENTS C 2.16 0.25 0.200 69
COMMERCIAL C 2.28 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.375
SUBAREA AREA(ACRES) = 21.08 SUBAREA RUNOFF(CFS) = 49.12
EFFECTIVE AREA(ACRES) = 229.93 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 235.6 PEAK FLOW RATE(CFS) = 541.61

FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 4.68 0.20 0.100 75
PUBLIC PARK C 4.30 0.25 0.850 69
PUBLIC PARK D 0.67 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 9.65 SUBAREA RUNOFF(CFS) = 22.28
EFFECTIVE AREA(ACRES) = 239.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 245.3 PEAK FLOW RATE(CFS) = 563.89

FLOW PROCESS FROM NODE 153.00 TO NODE 154.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1007.62 DOWNSTREAM(FEET) = 1006.10
FLOW LENGTH(FEET) = 446.62 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.72
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 563.89
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 21.77
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 1 <<<<<

PEAK FLOWRATE TABLE FILE NAME: 3P00RC1.DNA
MEMORY BANK # 1 DEFINED AS FOLLOWS:
STREAM Q Tc Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (ACRES) NODE
1 9.34 7.33 0.20(0.02) 0.10 2.0 40.00
2 9.44 7.70 0.20(0.02) 0.10 2.1 30.00
3 9.38 8.22 0.20(0.02) 0.10 2.2 5.00
4 9.38 8.23 0.20(0.02) 0.10 2.2 15.00
TOTAL AREA(ACRES) = 2.2

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	525.97	10.00	4.158	0.23(0.07)	0.30	140.5	300.00
2	563.89	21.77	2.663	0.22(0.07)	0.30	239.6	200.00
3	555.12	23.26	2.564	0.22(0.07)	0.30	245.3	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.34	7.33	4.970	0.20(0.02)	0.10	2.0	40.00
2	9.44	7.70	4.832	0.20(0.02)	0.10	2.1	30.00
3	9.38	8.22	4.653	0.20(0.02)	0.10	2.2	5.00
4	9.38	8.23	4.650	0.20(0.02)	0.10	2.2	15.00

LONGEST FLOWPATH FROM NODE 15.00 TO NODE 154.00 = 585.84 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	471.11	7.33	4.970	0.23(0.07)	0.29	105.0	40.00
2	480.78	7.70	4.832	0.23(0.07)	0.29	110.2	30.00
3	493.94	8.22	4.653	0.23(0.07)	0.29	117.7	5.00
4	494.16	8.23	4.650	0.23(0.07)	0.29	117.8	15.00
5	534.35	10.00	4.158	0.23(0.07)	0.29	142.7	300.00
6	569.24	21.77	2.663	0.22(0.07)	0.30	241.7	200.00
7	560.27	23.26	2.564	0.22(0.07)	0.30	247.4	100.00

TOTAL AREA(ACRES) = 247.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 569.24 Tc(MIN.) = 21.775
EFFECTIVE AREA(ACRES) = 241.74 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 247.4
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 154.00 = 8706.30 FEET.

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 154.00 TO NODE 155.00 IS CODE = 41

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1006.00 DOWNSTREAM(FEET) = 1004.60
FLOW LENGTH(FEET) = 122.27 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.99
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 569.24
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 21.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 15.1
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>>>>DEFINE MEMORY BANK # 1 <<<<
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PEAK FLOWRATE TABLE FILE NAME: 3P00RC3.DNA

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MEMORY BANK # 1 DEFINED AS FOLLOWS:

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.41	5.80	0.20(0.02)	0.10	2.0	95.00	
2	10.13	6.98	0.20(0.02)	0.10	2.2	80.00	
3	9.91	7.59	0.20(0.02)	0.10	2.2	70.00	
TOTAL AREA(ACRES) =							2.2

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 11
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>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
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** MAIN STREAM CONFLUENCE DATA **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE	
1	471.11	7.41	4.937	0.23(0.07)	0.29	105.0	40.00	
2	480.78	7.78	4.803	0.23(0.07)	0.29	110.2	30.00	
3	493.94	8.30	4.627	0.23(0.07)	0.29	117.7	5.00	
4	494.16	8.31	4.624	0.23(0.07)	0.29	117.8	15.00	
5	534.35	10.08	4.141	0.23(0.07)	0.29	142.7	300.00	
6	569.24	21.85	2.658	0.22(0.07)	0.30	241.7	200.00	
7	560.27	23.33	2.560	0.22(0.07)	0.30	247.4	100.00	
LONGEST FLOWPATH FROM NODE							100.00 TO NODE 155.00 =	8828.57 FEET.

```

** MEMORY BANK # 1 CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	10.41	5.80	5.681	0.20(0.02)	0.10	2.0	95.00
2	10.13	6.98	5.111	0.20(0.02)	0.10	2.2	80.00

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3 9.91 7.59 4.871 0.20( 0.02) 0.10 2.2 70.00
LONGEST FLOWPATH FROM NODE 70.00 TO NODE 155.00 = 774.26 FEET.

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** PEAK FLOW RATE TABLE **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	435.47	5.80	5.681	0.23(0.07)	0.29	84.2	95.00
2	469.46	6.98	5.111	0.23(0.07)	0.29	101.0	80.00
3	481.09	7.41	4.937	0.23(0.07)	0.29	107.2	40.00
4	485.69	7.59	4.871	0.23(0.07)	0.29	109.7	70.00
5	490.56	7.78	4.803	0.23(0.07)	0.29	112.5	30.00
6	503.35	8.30	4.627	0.23(0.07)	0.29	119.9	5.00
7	503.57	8.31	4.624	0.23(0.07)	0.29	120.0	15.00
8	542.77	10.08	4.141	0.23(0.07)	0.29	144.9	300.00
9	574.63	21.85	2.658	0.22(0.07)	0.30	244.0	200.00
10	565.46	23.33	2.560	0.22(0.07)	0.30	249.7	100.00
TOTAL AREA(ACRES) =							249.7

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

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PEAK FLOW RATE(CFS) = 574.63 Tc(MIN.) = 21.845
EFFECTIVE AREA(ACRES) = 243.99 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.29
TOTAL AREA(ACRES) = 249.7
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 155.00 = 8828.57 FEET.

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 158.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1004.60 DOWNSTREAM(FEET) = 1001.69
FLOW LENGTH(FEET) = 202.60 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.27
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 574.63
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 21.96
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 158.00 = 9031.17 FEET.

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*****
FLOW PROCESS FROM NODE 158.00 TO NODE 450.00 IS CODE = 41
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 1001.69 DOWNSTREAM(FEET) = 997.40
FLOW LENGTH(FEET) = 30.38 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 34.2 INCHES

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PIPE-FLOW VELOCITY(FEET/SEC.) = 49.78
 GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 574.63
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 21.97
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

 FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

*****MEMORY BANK # 2 IS EMPTY - PROCESS IGNORED.*****

 FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 2 <<<<<

PEAK FLOWRATE TABLE FILE NAME: 3P00RC2.DNA

MEMORY BANK # 2 DEFINED AS FOLLOWS:

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.93	5.54	0.20(0.02)	0.10	5.0	330.00
2	27.59	6.00	0.20(0.02)	0.10	5.4	275.00
3	28.79	7.22	0.20(0.02)	0.10	6.3	320.00
4	28.85	7.50	0.20(0.02)	0.10	6.5	245.00
5	28.83	7.78	0.20(0.02)	0.10	6.6	290.00
6	28.30	9.66	0.20(0.02)	0.10	7.3	210.00
7	28.18	9.91	0.20(0.02)	0.10	7.4	235.00
8	13.02	41.03	0.20(0.02)	0.10	7.6	265.00
TOTAL AREA(ACRES) =						7.6

 FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	435.47	5.97	5.592	0.23(0.07)	0.29	84.2	95.00
2	469.46	7.13	5.048	0.23(0.07)	0.29	101.0	80.00
3	481.09	7.56	4.881	0.23(0.07)	0.29	107.2	40.00
4	485.69	7.74	4.818	0.23(0.07)	0.29	109.7	70.00
5	490.56	7.93	4.752	0.23(0.07)	0.29	112.5	30.00
6	503.35	8.45	4.582	0.23(0.07)	0.29	119.9	5.00
7	503.57	8.45	4.579	0.23(0.07)	0.29	120.0	15.00
8	542.77	10.21	4.110	0.23(0.07)	0.29	144.9	300.00
9	574.63	21.97	2.649	0.22(0.07)	0.30	244.0	200.00

10 565.46 23.46 2.552 0.22(0.07) 0.30 249.7 100.00
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	26.93	5.54	5.833	0.20(0.02)	0.10	5.0	330.00
2	27.59	6.00	5.575	0.20(0.02)	0.10	5.4	275.00
3	28.79	7.22	5.014	0.20(0.02)	0.10	6.3	320.00
4	28.85	7.50	4.905	0.20(0.02)	0.10	6.5	245.00
5	28.83	7.78	4.803	0.20(0.02)	0.10	6.6	290.00
6	28.30	9.66	4.241	0.20(0.02)	0.10	7.3	210.00
7	28.18	9.91	4.181	0.20(0.02)	0.10	7.4	235.00
8	13.02	41.03	1.852	0.20(0.02)	0.10	7.6	265.00
LONGEST FLOWPATH FROM NODE 265.00 TO NODE 450.00 =							4864.49 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	449.14	5.54	5.833	0.22(0.06)	0.28	83.2	330.00
2	463.02	5.97	5.592	0.22(0.06)	0.28	89.6	95.00
3	463.97	6.00	5.575	0.22(0.06)	0.28	90.0	275.00
4	498.17	7.13	5.048	0.22(0.06)	0.28	107.2	80.00
5	500.59	7.22	5.014	0.22(0.06)	0.28	108.5	320.00
6	508.24	7.50	4.905	0.22(0.06)	0.28	112.7	245.00
7	509.93	7.56	4.881	0.22(0.06)	0.28	113.7	40.00
8	514.52	7.74	4.818	0.22(0.06)	0.28	116.3	70.00
9	515.62	7.78	4.803	0.22(0.06)	0.28	117.0	290.00
10	519.34	7.93	4.752	0.22(0.06)	0.28	119.1	30.00
11	531.99	8.45	4.582	0.22(0.06)	0.28	126.8	5.00
12	532.21	8.45	4.579	0.22(0.06)	0.28	126.9	15.00
13	558.88	9.66	4.241	0.22(0.06)	0.28	144.5	210.00
14	564.23	9.91	4.181	0.22(0.06)	0.28	148.0	235.00
15	570.80	10.21	4.110	0.22(0.06)	0.28	152.3	300.00
16	596.93	21.97	2.649	0.22(0.06)	0.29	251.5	200.00
17	587.04	23.46	2.552	0.22(0.06)	0.29	257.2	100.00
18	419.37	41.03	1.852	0.22(0.06)	0.29	257.3	265.00
TOTAL AREA(ACRES) =							257.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 596.93 Tc(MIN.) = 21.971
 EFFECTIVE AREA(ACRES) = 251.45 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
 TOTAL AREA(ACRES) = 257.3
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 3 <<<<<

MEMORY BANK # 3 IS EMPTY - PROCESS IGNORED.

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 15.1

>>>>DEFINE MEMORY BANK # 3 <<<<<

PEAK FLOWRATE TABLE FILE NAME: 3P00RC4.DNA
MEMORY BANK # 3 DEFINED AS FOLLOWS:
STREAM Q Tc Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 9.03 7.77 0.20(0.02) 0.10 2.1 160.00
2 8.71 8.65 0.20(0.02) 0.10 2.1 150.00
TOTAL AREA(ACRES) = 2.1

FLOW PROCESS FROM NODE 450.00 TO NODE 450.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 449.14 5.54 5.833 0.22(0.06) 0.28 83.2 330.00
2 463.02 5.97 5.592 0.22(0.06) 0.28 89.6 95.00
3 463.97 6.00 5.575 0.22(0.06) 0.28 90.0 275.00
4 498.17 7.13 5.048 0.22(0.06) 0.28 107.2 80.00
5 500.59 7.22 5.014 0.22(0.06) 0.28 108.5 320.00
6 508.24 7.50 4.905 0.22(0.06) 0.28 112.7 245.00
7 509.93 7.56 4.881 0.22(0.06) 0.28 113.7 40.00
8 514.52 7.74 4.818 0.22(0.06) 0.28 116.3 70.00
9 515.62 7.78 4.803 0.22(0.06) 0.28 117.0 290.00
10 519.34 7.93 4.752 0.22(0.06) 0.28 119.1 30.00
11 531.99 8.45 4.582 0.22(0.06) 0.28 126.8 5.00
12 532.21 8.45 4.579 0.22(0.06) 0.28 126.9 15.00
13 558.88 9.66 4.241 0.22(0.06) 0.28 144.5 210.00
14 564.23 9.91 4.181 0.22(0.06) 0.28 148.0 235.00
15 570.80 10.21 4.110 0.22(0.06) 0.28 152.3 300.00
16 596.93 21.97 2.649 0.22(0.06) 0.29 251.5 200.00
17 587.04 23.46 2.552 0.22(0.06) 0.29 257.2 100.00
18 419.37 41.03 1.852 0.22(0.06) 0.29 257.3 265.00
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 9.03 7.77 4.807 0.20(0.02) 0.10 2.1 160.00
2 8.71 8.65 4.519 0.20(0.02) 0.10 2.1 150.00

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 450.00 = 670.70 FEET.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 456.96 5.54 5.833 0.22(0.06) 0.27 84.7 330.00
2 471.09 5.97 5.592 0.22(0.06) 0.27 91.2 95.00
3 472.06 6.00 5.575 0.22(0.06) 0.27 91.6 275.00
4 506.88 7.13 5.048 0.22(0.06) 0.28 109.2 80.00
5 509.34 7.22 5.014 0.22(0.06) 0.28 110.5 320.00
6 517.13 7.50 4.905 0.22(0.06) 0.28 114.8 245.00
7 518.86 7.56 4.881 0.22(0.06) 0.28 115.7 40.00
8 523.54 7.74 4.818 0.22(0.06) 0.28 118.4 70.00
9 524.35 7.77 4.807 0.22(0.06) 0.28 118.9 160.00
10 524.65 7.78 4.803 0.22(0.06) 0.28 119.0 290.00
11 528.32 7.93 4.752 0.22(0.06) 0.28 121.2 30.00
12 540.78 8.45 4.582 0.22(0.06) 0.28 128.9 5.00
13 540.99 8.45 4.579 0.22(0.06) 0.28 129.0 15.00
14 545.25 8.65 4.519 0.22(0.06) 0.28 131.9 150.00
15 567.05 9.66 4.241 0.22(0.06) 0.28 146.7 210.00
16 572.28 9.91 4.181 0.22(0.06) 0.28 150.2 235.00
17 578.72 10.21 4.110 0.22(0.06) 0.28 154.4 300.00
18 602.02 21.97 2.649 0.22(0.06) 0.29 253.6 200.00
19 591.94 23.46 2.552 0.22(0.06) 0.29 259.3 100.00
20 422.91 41.03 1.852 0.22(0.06) 0.29 259.4 265.00
TOTAL AREA(ACRES) = 259.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 602.02 Tc(MIN.) = 21.971
EFFECTIVE AREA(ACRES) = 253.59 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 259.4
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 450.00 = 9061.55 FEET.

FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 997.40 DOWNSTREAM(FEET) = 992.80
FLOW LENGTH(FEET) = 47.05 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 39.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 43.50
GIVEN PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 602.02
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 21.99
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 460.00 = 9108.60 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 259.4 TC(MIN.) = 21.99
 EFFECTIVE AREA(ACRES) = 253.59 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.290
 PEAK FLOW RATE(CFS) = 602.02

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	456.96	5.56	5.821	0.22(0.06)	0.27	84.7	330.00
2	471.09	5.98	5.582	0.22(0.06)	0.27	91.2	95.00
3	472.06	6.02	5.565	0.22(0.06)	0.27	91.6	275.00
4	506.88	7.15	5.041	0.22(0.06)	0.28	109.2	80.00
5	509.34	7.24	5.006	0.22(0.06)	0.28	110.5	320.00
6	517.13	7.52	4.898	0.22(0.06)	0.28	114.8	245.00
7	518.86	7.58	4.875	0.22(0.06)	0.28	115.7	40.00
8	523.54	7.76	4.811	0.22(0.06)	0.28	118.4	70.00
9	524.35	7.79	4.800	0.22(0.06)	0.28	118.9	160.00
10	524.65	7.80	4.796	0.22(0.06)	0.28	119.0	290.00
11	528.32	7.94	4.746	0.22(0.06)	0.28	121.2	30.00
12	540.78	8.46	4.576	0.22(0.06)	0.28	128.9	5.00
13	540.99	8.47	4.574	0.22(0.06)	0.28	129.0	15.00
14	545.25	8.67	4.514	0.22(0.06)	0.28	131.9	150.00
15	567.05	9.68	4.237	0.22(0.06)	0.28	146.7	210.00
16	572.28	9.93	4.177	0.22(0.06)	0.28	150.2	235.00
17	578.72	10.23	4.106	0.22(0.06)	0.28	154.4	300.00
18	602.02	21.99	2.648	0.22(0.06)	0.29	253.6	200.00
19	591.94	23.47	2.551	0.22(0.06)	0.29	259.3	100.00
20	422.91	41.05	1.852	0.22(0.06)	0.29	259.4	265.00

=====
 END OF RATIONAL METHOD ANALYSIS
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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 4 (LINE D) *
* 100-YEAR STORM EVENT SR *

FILE NAME: 4P00R.DAT
TIME/DATE OF STUDY: 06:15 11/13/2019

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 400.00 TO NODE 405.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 120.00
ELEVATION DATA: UPSTREAM(FEET) = 1010.50 DOWNSTREAM(FEET) = 1009.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.375
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.936
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.61 0.20 0.100 75 5.38
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.25
TOTAL AREA(ACRES) = 0.61 PEAK FLOW RATE(CFS) = 3.25

FLOW PROCESS FROM NODE 405.00 TO NODE 420.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1005.42 DOWNSTREAM(FEET) = 1005.14
FLOW LENGTH(FEET) = 56.39 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.86
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.25
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 5.62
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 420.00 = 176.39 FEET.

FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.62
RAINFALL INTENSITY(INCH/HR) = 5.79
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.61
TOTAL STREAM AREA(ACRES) = 0.61

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PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.25

*****
FLOW PROCESS FROM NODE  410.00 TO NODE  415.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  103.00
ELEVATION DATA: UPSTREAM(FEET) =  1010.10  DOWNSTREAM(FEET) =  1009.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL AREA   Fp       Ap   SCS  Tc
LAND USE           GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL         D      0.27    0.20   0.100  75  5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =  1.50
TOTAL AREA(ACRES) =  0.27  PEAK FLOW RATE(CFS) =  1.50

*****
FLOW PROCESS FROM NODE  415.00 TO NODE  420.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1005.69  DOWNSTREAM(FEET) =  1005.14
FLOW LENGTH(FEET) =  55.75  MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS  5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  4.15
ESTIMATED PIPE DIAMETER(INCH) =  12.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  1.50
PIPE TRAVEL TIME(MIN.) =  0.22  Tc(MIN.) =  5.22
LONGEST FLOWPATH FROM NODE  410.00 TO NODE  420.00 =  158.75 FEET.

*****
FLOW PROCESS FROM NODE  420.00 TO NODE  420.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  5.22
RAINFALL INTENSITY(INCH/HR) =  6.03
AREA-AVERAGED Fm(INCH/HR) =  0.02

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AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =  0.27
TOTAL STREAM AREA(ACRES) =  0.27
PEAK FLOW RATE(CFS) AT CONFLUENCE =  1.50

** CONFLUENCE DATA **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1          3.25  5.62  5.787  0.20( 0.02) 0.10   0.6  400.00
2          1.50  5.22  6.034  0.20( 0.02) 0.10   0.3  410.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc  Intensity  Fp(Fm)  Ap      Ae  HEADWATER
NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1          4.65  5.22  6.034  0.20( 0.02) 0.10   0.8  410.00
2          4.69  5.62  5.787  0.20( 0.02) 0.10   0.9  400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =  4.69  Tc(MIN.) =  5.62
EFFECTIVE AREA(ACRES) =  0.88  AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =  0.9
LONGEST FLOWPATH FROM NODE  400.00 TO NODE  420.00 =  176.39 FEET.

*****
FLOW PROCESS FROM NODE  420.00 TO NODE  465.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  1005.14  DOWNSTREAM(FEET) =  1004.70
FLOW LENGTH(FEET) =  87.07  MANNING'S N =  0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  3.82
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =  15.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =  4.69
PIPE TRAVEL TIME(MIN.) =  0.38  Tc(MIN.) =  6.00
LONGEST FLOWPATH FROM NODE  400.00 TO NODE  465.00 =  263.46 FEET.

*****
FLOW PROCESS FROM NODE  465.00 TO NODE  465.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
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*****
FLOW PROCESS FROM NODE 425.00 TO NODE 450.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 280.00
ELEVATION DATA: UPSTREAM(FEET) = 1010.10 DOWNSTREAM(FEET) = 1008.70

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.355
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.610
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.86    0.20    0.100  75   8.35
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.55
TOTAL AREA(ACRES) = 0.86 PEAK FLOW RATE(CFS) = 3.55

*****
FLOW PROCESS FROM NODE 450.00 TO NODE 460.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1005.27 DOWNSTREAM(FEET) = 1004.96
FLOW LENGTH(FEET) = 59.71 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.00
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.55
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 8.60
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 460.00 = 339.71 FEET.

*****
FLOW PROCESS FROM NODE 460.00 TO NODE 460.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.60
RAINFALL INTENSITY(INCH/HR) = 4.53
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.86
TOTAL STREAM AREA(ACRES) = 0.86

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PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.55

*****
FLOW PROCESS FROM NODE 455.00 TO NODE 457.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 1009.70 DOWNSTREAM(FEET) = 1008.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.589
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.538
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS  Tc
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          D      0.43    0.20    0.100  75   8.59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.75
TOTAL AREA(ACRES) = 0.43 PEAK FLOW RATE(CFS) = 1.75

*****
FLOW PROCESS FROM NODE 457.00 TO NODE 460.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1005.00 DOWNSTREAM(FEET) = 1004.96
FLOW LENGTH(FEET) = 2.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.62
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.75
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.59
LONGEST FLOWPATH FROM NODE 455.00 TO NODE 460.00 = 302.00 FEET.

*****
FLOW PROCESS FROM NODE 460.00 TO NODE 460.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
-----
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.59
RAINFALL INTENSITY(INCH/HR) = 4.54
AREA-AVERAGED Fm(INCH/HR) = 0.02

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AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.43
TOTAL STREAM AREA(ACRES) = 0.43
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.75

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.55	8.60	4.534	0.20(0.02)	0.10	0.9	425.00
2	1.75	8.59	4.536	0.20(0.02)	0.10	0.4	455.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.30	8.59	4.536	0.20(0.02)	0.10	1.3	455.00
2	5.30	8.60	4.534	0.20(0.02)	0.10	1.3	425.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.30 Tc(MIN.) = 8.60
EFFECTIVE AREA(ACRES) = 1.29 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 1.3
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 460.00 = 339.71 FEET.

FLOW PROCESS FROM NODE 460.00 TO NODE 465.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.96 DOWNSTREAM(FEET) = 1004.70
FLOW LENGTH(FEET) = 50.66 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.32
PIPE FLOW VELOCITY = (TOTAL FLOW) / (PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.30
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 8.80
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

FLOW PROCESS FROM NODE 465.00 TO NODE 465.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.30	8.79	4.478	0.20(0.02)	0.10	1.3	455.00
2	5.30	8.80	4.476	0.20(0.02)	0.10	1.3	425.00

LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.65	5.61	5.794	0.20(0.02)	0.10	0.8	410.00
2	4.69	6.00	5.574	0.20(0.02)	0.10	0.9	400.00

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 465.00 = 263.46 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.03	5.61	5.794	0.20(0.02)	0.10	1.7	410.00
2	9.19	6.00	5.574	0.20(0.02)	0.10	1.8	400.00
3	9.06	8.79	4.478	0.20(0.02)	0.10	2.2	455.00
4	9.06	8.80	4.476	0.20(0.02)	0.10	2.2	425.00

TOTAL AREA(ACRES) = 2.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.19 Tc(MIN.) = 5.999
EFFECTIVE AREA(ACRES) = 1.76 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 2.2
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 465.00 = 390.37 FEET.

FLOW PROCESS FROM NODE 465.00 TO NODE 495.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1004.70 DOWNSTREAM(FEET) = 1003.62
FLOW LENGTH(FEET) = 52.90 MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.49
PIPE FLOW VELOCITY = (TOTAL FLOW) / (PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.19
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 6.12
LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

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=====
***MEMORY BANK # 2 IS EMPTY - PROCESS IGNORED.***
=====
*****
FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====
*****
FLOW PROCESS FROM NODE 475.00 TO NODE 477.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 134.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.41 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.41 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.28
TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 2.28

*****
FLOW PROCESS FROM NODE 477.00 TO NODE 490.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1004.85 DOWNSTREAM(FEET) = 1003.88
FLOW LENGTH(FEET) = 104.61 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.48
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.28
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 5.39
LONGEST FLOWPATH FROM NODE 475.00 TO NODE 490.00 = 238.61 FEET.

*****
FLOW PROCESS FROM NODE 490.00 TO NODE 490.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.39
RAINFALL INTENSITY(INCH/HR) = 5.93
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.41
TOTAL STREAM AREA(ACRES) = 0.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.28

*****
FLOW PROCESS FROM NODE 478.00 TO NODE 480.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 119.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.44 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.44
TOTAL AREA(ACRES) = 0.44 PEAK FLOW RATE(CFS) = 2.44

*****
FLOW PROCESS FROM NODE 475.00 TO NODE 490.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 1005.00 DOWNSTREAM(FEET) = 1003.88
FLOW LENGTH(FEET) = 25.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.24
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.44
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 5.05
LONGEST FLOWPATH FROM NODE 478.00 TO NODE 490.00 = 144.00 FEET.

*****
FLOW PROCESS FROM NODE 490.00 TO NODE 490.00 IS CODE = 1

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 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.05
 RAINFALL INTENSITY(INCH/HR) = 6.15
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.44
 TOTAL STREAM AREA(ACRES) = 0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.44

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.28	5.39	5.927	0.20(0.02)	0.10	0.4	475.00
2	2.44	5.05	6.152	0.20(0.02)	0.10	0.4	478.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.66	5.05	6.152	0.20(0.02)	0.10	0.8	478.00
2	4.63	5.39	5.927	0.20(0.02)	0.10	0.9	475.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 4.66 Tc(MIN.) = 5.05
 EFFECTIVE AREA(ACRES) = 0.82 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.9
 LONGEST FLOWPATH FROM NODE 475.00 TO NODE 490.00 = 238.61 FEET.

 FLOW PROCESS FROM NODE 490.00 TO NODE 495.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.88 DOWNSTREAM(FEET) = 1003.62
 FLOW LENGTH(FEET) = 23.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.77
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.66
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 5.12

LONGEST FLOWPATH FROM NODE 475.00 TO NODE 495.00 = 261.61 FEET.

 FLOW PROCESS FROM NODE 495.00 TO NODE 495.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.66	5.12	6.106	0.20(0.02)	0.10	0.8	478.00
2	4.63	5.46	5.886	0.20(0.02)	0.10	0.9	475.00

LONGEST FLOWPATH FROM NODE 475.00 TO NODE 495.00 = 261.61 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.03	5.73	5.724	0.20(0.02)	0.10	1.7	410.00
2	9.19	6.12	5.513	0.20(0.02)	0.10	1.8	400.00
3	9.06	8.91	4.444	0.20(0.02)	0.10	2.2	455.00
4	9.06	8.92	4.441	0.20(0.02)	0.10	2.2	425.00

LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.26	5.12	6.106	0.20(0.02)	0.10	2.3	478.00
2	13.47	5.46	5.886	0.20(0.02)	0.10	2.4	475.00
3	13.53	5.73	5.724	0.20(0.02)	0.10	2.5	410.00
4	13.53	6.12	5.513	0.20(0.02)	0.10	2.6	400.00
5	12.55	8.91	4.444	0.20(0.02)	0.10	3.0	455.00
6	12.55	8.92	4.441	0.20(0.02)	0.10	3.0	425.00

TOTAL AREA(ACRES) = 3.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 13.53 Tc(MIN.) = 5.727
 EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 3.0
 LONGEST FLOWPATH FROM NODE 425.00 TO NODE 495.00 = 443.27 FEET.

 FLOW PROCESS FROM NODE 495.00 TO NODE 497.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1003.62 DOWNSTREAM(FEET) = 1003.00
 FLOW LENGTH(FEET) = 32.20 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.93
 (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
 GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 13.53
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 5.80
 LONGEST FLOWPATH FROM NODE 425.00 TO NODE 497.00 = 475.47 FEET.

=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 3.0 TC(MIN.) = 5.80
 EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 13.53

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.26	5.19	6.053	0.20(0.02)	0.10	2.3	478.00
2	13.47	5.53	5.839	0.20(0.02)	0.10	2.4	475.00
3	13.53	5.80	5.680	0.20(0.02)	0.10	2.5	410.00
4	13.53	6.19	5.473	0.20(0.02)	0.10	2.6	400.00
5	12.55	8.99	4.422	0.20(0.02)	0.10	3.0	455.00
6	12.55	9.00	4.419	0.20(0.02)	0.10	3.0	425.00

=====
 END OF RATIONAL METHOD ANALYSIS

↑

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* DANA POINT HARBOR COMMERCIAL CORE AREA *
* RATIONAL METHOD PROPOSED CONDITION HYDROLOGY OUTLET 5 (LINE E) *
* 100-YEAR STORM EVENT SR *

FILE NAME: 5P00R.DAT
TIME/DATE OF STUDY: 06:19 11/13/2019

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312 0.167	0.0150
2	30.0	25.0	0.017/0.017/0.017	0.67	1.50 0.0312 0.125	0.0150
3	50.0	45.0	0.017/0.017/0.017	0.67	2.00 0.0312 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 500.00 TO NODE 505.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 159.00
ELEVATION DATA: UPSTREAM(FEET) = 1023.02 DOWNSTREAM(FEET) = 1015.36

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.26 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.44
TOTAL AREA(ACRES) = 0.26 PEAK FLOW RATE(CFS) = 1.44

FLOW PROCESS FROM NODE 505.00 TO NODE 540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1010.36 DOWNSTREAM(FEET) = 1007.40
FLOW LENGTH(FEET) = 239.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.48
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.44
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 5.89
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 540.00 = 398.00 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 540.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.89
RAINFALL INTENSITY(INCH/HR) = 5.63
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.26

TOTAL STREAM AREA(ACRES) = 0.26
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.44

FLOW PROCESS FROM NODE 530.00 TO NODE 535.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 151.00
ELEVATION DATA: UPSTREAM(FEET) = 1013.06 DOWNSTREAM(FEET) = 1011.72

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.819
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.672
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.57	0.20	0.100	75	5.82

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100
SUBAREA RUNOFF(CFS) = 2.90
TOTAL AREA(ACRES) = 0.57 PEAK FLOW RATE(CFS) = 2.90

FLOW PROCESS FROM NODE 535.00 TO NODE 540.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.60 DOWNSTREAM(FEET) = 1007.40
FLOW LENGTH(FEET) = 18.24 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.02
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.90
PIPE TRAVEL TIME(MIN.) = 0.06 T_c (MIN.) = 5.88
LONGEST FLOWPATH FROM NODE 530.00 TO NODE 540.00 = 169.24 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 540.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.88
RAINFALL INTENSITY(INCH/HR) = 5.64
AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED F_p (INCH/HR) = 0.20
AREA-AVERAGED A_p = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.57
TOTAL STREAM AREA(ACRES) = 0.57
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.90

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	1.44	5.89	5.634	0.20(0.02)	0.10	0.3	500.00
2	2.90	5.88	5.639	0.20(0.02)	0.10	0.6	530.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	T_c (MIN.)	Intensity (INCH/HR)	F_p (F_m) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	4.34	5.88	5.634	0.20(0.02)	0.10	0.8	530.00
2	4.34	5.89	5.639	0.20(0.02)	0.10	0.8	500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 4.34 T_c (MIN.) = 5.88
EFFECTIVE AREA(ACRES) = 0.83 AREA-AVERAGED F_m (INCH/HR) = 0.02
AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10
TOTAL AREA(ACRES) = 0.8
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 540.00 = 398.00 FEET.

FLOW PROCESS FROM NODE 540.00 TO NODE 560.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1007.40 DOWNSTREAM(FEET) = 1006.25
FLOW LENGTH(FEET) = 111.87 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.50
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.34
PIPE TRAVEL TIME(MIN.) = 0.34 T_c (MIN.) = 6.22
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 560.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
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FLOW PROCESS FROM NODE 540.00 TO NODE 545.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 229.00
ELEVATION DATA: UPSTREAM(FEET) = 1015.36 DOWNSTREAM(FEET) = 1009.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.471
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.876
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.34 0.20 0.100 75 5.47
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.79
TOTAL AREA(ACRES) = 0.34 PEAK FLOW RATE(CFS) = 1.79

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*****
FLOW PROCESS FROM NODE 545.00 TO NODE 555.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1007.41 DOWNSTREAM(FEET) = 1006.75
FLOW LENGTH(FEET) = 82.37 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.01
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.79
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 5.81
LONGEST FLOWPATH FROM NODE 540.00 TO NODE 555.00 = 311.37 FEET.

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*****
FLOW PROCESS FROM NODE 555.00 TO NODE 555.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.81
RAINFALL INTENSITY(INCH/HR) = 5.68
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.34
TOTAL STREAM AREA(ACRES) = 0.34
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.79

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*****
FLOW PROCESS FROM NODE 550.00 TO NODE 552.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 39.00
ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1012.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.22 0.20 0.100 75 5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.22
TOTAL AREA(ACRES) = 0.22 PEAK FLOW RATE(CFS) = 1.22

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*****
FLOW PROCESS FROM NODE 552.00 TO NODE 555.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1007.00 DOWNSTREAM(FEET) = 1006.75
FLOW LENGTH(FEET) = 18.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.47
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.22
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 5.07
LONGEST FLOWPATH FROM NODE 550.00 TO NODE 555.00 = 57.00 FEET.

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*****
FLOW PROCESS FROM NODE 555.00 TO NODE 555.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.07
RAINFALL INTENSITY(INCH/HR) = 6.14
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20

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AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.22
 TOTAL STREAM AREA(ACRES) = 0.22
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.22

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1.79	5.81	5.675	0.20(0.02)	0.10	0.3	540.00
2	1.22	5.07	6.140	0.20(0.02)	0.10	0.2	550.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.91	5.07	6.140	0.20(0.02)	0.10	0.5	550.00
2	2.92	5.81	5.675	0.20(0.02)	0.10	0.6	540.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.92 Tc(MIN.) = 5.81
 EFFECTIVE AREA(ACRES) = 0.56 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.6
 LONGEST FLOWPATH FROM NODE 540.00 TO NODE 555.00 = 311.37 FEET.

FLOW PROCESS FROM NODE 555.00 TO NODE 560.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.75 DOWNSTREAM(FEET) = 1006.25
 FLOW LENGTH(FEET) = 51.74 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.77
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.92
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 5.99
 LONGEST FLOWPATH FROM NODE 540.00 TO NODE 560.00 = 363.11 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 560.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	2.91	5.25	6.018	0.20(0.02)	0.10	0.5 550.00
2	2.92	5.99	5.576	0.20(0.02)	0.10	0.6 540.00

LONGEST FLOWPATH FROM NODE 540.00 TO NODE 560.00 = 363.11 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.34	6.22	5.460	0.20(0.02)	0.10	0.8	530.00
2	4.34	6.23	5.456	0.20(0.02)	0.10	0.8	500.00

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.95	5.25	6.018	0.20(0.02)	0.10	1.2	550.00
2	7.19	5.99	5.576	0.20(0.02)	0.10	1.4	540.00
3	7.20	6.22	5.460	0.20(0.02)	0.10	1.4	530.00
4	7.20	6.23	5.456	0.20(0.02)	0.10	1.4	500.00

TOTAL AREA(ACRES) = 1.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.20 Tc(MIN.) = 6.218
 EFFECTIVE AREA(ACRES) = 1.39 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.4
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 560.00 = 509.87 FEET.

FLOW PROCESS FROM NODE 560.00 TO NODE 580.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1006.25 DOWNSTREAM(FEET) = 1004.53
 FLOW LENGTH(FEET) = 82.55 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.14
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.20
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 6.39
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 580.00 = 592.42 FEET.

FLOW PROCESS FROM NODE 580.00 TO NODE 580.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 6.39
 RAINFALL INTENSITY(INCH/HR) = 5.38
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 1.39
 TOTAL STREAM AREA(ACRES) = 1.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.20

 FLOW PROCESS FROM NODE 565.00 TO NODE 570.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 84.00
 ELEVATION DATA: UPSTREAM(FEET) = 1012.50 DOWNSTREAM(FEET) = 1011.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187
 SUBAREA T_c AND LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS T_c
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL D 0.41 0.20 0.100 75 5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.28
 TOTAL AREA(ACRES) = 0.41 PEAK FLOW RATE(CFS) = 2.28

 FLOW PROCESS FROM NODE 570.00 TO NODE 580.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1004.96 DOWNSTREAM(FEET) = 1004.53
 FLOW LENGTH(FEET) = 49.77 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.36
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.28
 PIPE TRAVEL TIME(MIN.) = 0.19 T_c (MIN.) = 5.19
 LONGEST FLOWPATH FROM NODE 565.00 TO NODE 580.00 = 133.77 FEET.

 FLOW PROCESS FROM NODE 580.00 TO NODE 580.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.19
 RAINFALL INTENSITY(INCH/HR) = 6.06
 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.41
 TOTAL STREAM AREA(ACRES) = 0.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.28

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.95	5.42	5.909	0.20(0.02)	0.10	1.2	550.00
1	7.19	6.16	5.488	0.20(0.02)	0.10	1.4	540.00
1	7.20	6.39	5.377	0.20(0.02)	0.10	1.4	530.00
1	7.20	6.40	5.373	0.20(0.02)	0.10	1.4	500.00
2	2.28	5.19	6.056	0.20(0.02)	0.10	0.4	565.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.10	5.19	6.056	0.20(0.02)	0.10	1.6	565.00
2	9.17	5.42	5.909	0.20(0.02)	0.10	1.6	550.00
3	9.26	6.16	5.488	0.20(0.02)	0.10	1.8	540.00
4	9.22	6.39	5.377	0.20(0.02)	0.10	1.8	530.00
5	9.22	6.40	5.373	0.20(0.02)	0.10	1.8	500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 9.26 T_c (MIN.) = 6.16
 EFFECTIVE AREA(ACRES) = 1.77 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 1.8
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 580.00 = 592.42 FEET.

 FLOW PROCESS FROM NODE 580.00 TO NODE 590.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1004.46 DOWNSTREAM(FEET) = 1004.00
 FLOW LENGTH(FEET) = 22.90 MANNING'S N = 0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.07

(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)

GIVEN PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 9.26

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 6.22

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 590.00 = 615.32 FEET.

=====
END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.8 TC(MIN.) = 6.22

EFFECTIVE AREA(ACRES) = 1.77 AREA-AVERAGED Fm(INCH/HR)= 0.02

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 9.26

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.10	5.24	6.021	0.20(0.02)	0.10	1.6	565.00
2	9.17	5.47	5.875	0.20(0.02)	0.10	1.6	550.00
3	9.26	6.22	5.461	0.20(0.02)	0.10	1.8	540.00
4	9.22	6.44	5.351	0.20(0.02)	0.10	1.8	530.00
5	9.22	6.45	5.347	0.20(0.02)	0.10	1.8	500.00

=====
END OF RATIONAL METHOD ANALYSIS

↑

Appendix E – Environmental Impact Report Exhibit B

Mitigation Monitoring and Reporting Program
Dana Point Harbor Revitalization Project, Program Environmental Impact Report
SCH No. 2003101142

1. Project Design Features

Feature	Responsible Party	Time of Verification
PDF 4.1-1 – Construction Phasing for the Harbor Revitalization Plan has been designed to minimize the disruption of vehicular and pedestrian access routes and parking availability throughout the Harbor. In the event of temporary closures, alternate routes and clear directional signage will be provided.	County of Orange - Dana Point Harbor Department	In the event of temporary closures during construction activities
PDF 4.2-1 – The appearance of long, continuous row structures will be avoided through the provision of open spaces, varied roof treatments, staggered exterior building facades, and incorporation of a variety of building designs, materials and colors.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-2 – All signage shall be of a consistent architectural style. Commercial signage shall be externally illuminated and lighting sources shall be hidden by vegetation or installed flush with the grade. Signage shall be designed to complement the architecture of the building and shall emphasize natural materials.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-3 – Existing aboveground utilities will be removed and placed underground wherever and whenever possible.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
PDF 4.2-4 – All fences and walls within the Harbor will be designed to have a minimum impact on coastal and scenic views from public areas. Enclosures used to shelter outside eating areas will be designed using clear materials with awnings or covers that are integrated into the architectural design of the buildings.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-5 – Architectural and building articulation will have a form that complements the Harbor area and natural setting, when viewed from within the Harbor or the surrounding area (both from land and sea). High, uninterrupted wall planes are to be avoided.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits

Exhibit B

Dana Point Harbor Revitalization Project
Program EIR No. 557

Features	Responsible Party	Time of Verification
PDF 4.2-6 – All accessory buildings and structures will be consistent with the main structure in materials, color palette, roof pitch and form.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-7 – All roof-mounted mechanical equipment and communication devices that are visible from the Harbor will be hidden behind building parapets or screening materials from both ground level and elevated areas to the extent feasible. Ground-level mechanical equipment, storage tanks, and other similar facilities shall be screened from view with dense landscaping and/or walls of materials and finishes compatible with the adjacent areas. In addition, service, storage, maintenance, utilities, loading, and refuse collection areas would be located generally out of view of public right-of-ways and uses adjacent to the development area.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-8 – All new solid waste (refuse/fresh collection areas) will be screened from public view.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-9 – The design and layout of the future developments shall be consistent with the approved Dana Point Harbor Revitalization Plan and preserve views of the bluff area.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-10 – The Dana Point Harbor Revitalization Plan provides for the protection of the natural bluffs (PA 7) by restricting the siting of any structures adjacent to the bluffs with the exception of drainage control structures and recreational structures (e.g. Picnic areas) to be allowed in this area.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.2-11 – Textured paving will be used to identify lookouts, pathway crossings and edge treatments. All landscape areas will be planted consistent with the Revitalization Landscape Plan to preserve and enhance distant ocean views.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.2-12 – In areas that abut Planning Area 7, a landscape buffer will be maintained. All plant material will be native, non-invasive and drought tolerant species to provide a transition between natural and ornamental areas.	County of Orange - Dana Point Harbor Department	Coastal Development Permits

Exhibit B

Dana Point Harbor Revitalization Project
Program EIR No. 201

Feature	Responsible Party	Time of Verification
PDF 4.2-13 – The planting of trees within the Dana Point Harbor Revitalization Plan will provide a visually soft and natural backdrop while framing and protecting significant public view opportunities.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.2-14 – Vertical landscape elements and setbacks between buildings are incorporated into the Project design to break up building massing.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-15 – Street and parking lot lighting shall be positioned to enhance the vehicular and pedestrian safety. Lighting shall be concentrated on intersections and pedestrian crosswalks and shall be directed downward.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-16 – Architectural elements (including roof overhangs, awnings, dormers, etc.) will be integrated into the building design to shield windows from the sun and reduce the effects of glare.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-17 – The Project will utilize minimally reflective glass and other materials used on the exteriors of the buildings and structures will be selected with attention to minimizing reflective glare.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-18 – Roof-mounted solar panels, metal panels, and skylights should incorporate non-reflective materials and be designed to point away from roadways.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-19 – All exterior lighting will be designed and located to avoid intrusive effects on the adjacent uses atop the bluffs and DeHery State Beach. New light fixtures will be designed to direct light on-site and away from other areas.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.2-20 – The parking deck design shall include a light well that separates the upper deck area, allowing light and/or installation of landscaping elements to enhance its visual appearance.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.3-1 – Creation of the Festival Plaza and Pedestrian Promenade along the waterfront's edge also provides for extended structural setbacks from the bulkhead area.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits

Exhibit B

Features	Responsible Party	Time of Verification
PDF 4.3-2 – All new structures and the Commercial Core area parking deck will be supported with piles to provide adequate resistance to long-term settlement if recommended.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.3-3 – Foundation setback requirements will be implemented for proposed Project Improvements, as specified in the geotechnical report. Setback distances will reflect geologic and structural engineering evaluations of the site and recommendations included in the geotechnical report, subject to the review and approval of the Manager, RDM/Subdivision and Grading.	County of Orange - Dana Point Harbor Department	Building Permits
PDF 4.4-1 – New building design will include storm water collection systems.(e.g. roof-top drainage directed into storm sewer system)	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
PDF 4.4-2 – Parking areas will be designed to direct surface run-off away from the Harbor	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
PDF 4.5-1 – The construction phasing plan for the Commercial Core includes early construction of the parking deck and ramp, augmenting parking for Harbor visitors and boaters.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.5-2 – A seasonal water taxi service may be incorporated throughout the Harbor to reduce average daily trips (ADTs) during peak Harbor usage periods.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.5-3 – Dana Point Harbor Drive at the west end of the Harbor in front of Youth & Group Facility may be realigned in the future providing improved road circulation.	County of Orange - Dana Point Harbor Department	Coastal Development Permit for street improvements
PDF 4.5-4 – Dedicated boater drop-off areas and parking are provided in the Commercial Core.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.5-5 – Enhanced lighting for streets, parking lots, and pedestrian will be implemented with Revitalization Plan Improvements.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits

Exhibit B

Feature	Responsible Party	Time of Verification
PDF 4.5-8 – Existing surface parking may be restriped to improve efficiencies in parking staff configuration.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Building Permits
PDF 4.5-7 – The Dana Point Harbor Revitalization Signage Plan includes recommendations on signage throughout the Harbor to reduce pedestrian/vehicle conflicts (i.e., no crossing signs).	County of Orange - Dana Point Harbor Department	Master Sign Program, Coastal Development Permit
<p>PDF 4.6-1 – To reduce long-term operation emissions from area sources (by implementing energy conservation measures and by reducing motor vehicle emissions) the following measure shall be implemented:</p> <ul style="list-style-type: none"> ▪ Install energy-efficient street lighting on the site; and ▪ Landscape with native or drought-resistant species to reduce water consumption and provide passive solar benefits, where feasible. 	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.6-2 – The design of the dry stack boat storage buildings include covered areas for boat maintenance, where dust collection systems will be used to reduce the amount of particulates released into the atmosphere.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
<p>PDF 4.6-3 – Reduction of vehicle trips is achieved by implementing the Traffic Management Plan, including:</p> <ul style="list-style-type: none"> ▪ Shuttle service to off-site (remote) parking areas; ▪ Shuttle service to regional visitor attractions and for hotel guests; ▪ Seasonal water taxi service; ▪ Visitor boat slips and dingy docks located near restaurants and retail areas; and ▪ Phased construction of the Revitalization Plan improvements to minimize the size of areas subject to disruption from construction activities. 	County of Orange - Dana Point Harbor Department	Coastal Development Permit and Traffic Management Plan approval

Exhibit B

Dana Point Harbor Revitalization Project
Program EIR No. 551

Feature	Responsible Party	Time of Verification
PDF 4.7-1 – The landscape concept plan provides a design to minimize the loss of native trees within the Harbor. Trees that are removed during construction will be replanted on at least a 1:1 ratio. The landscape replanting program provides a preferential use of native species and vegetation.	County of Orange - Dana Point Harbor Department	Coastal Development Permits
PDF 4.8-1 – If asbestos-containing materials (ACMs) are located, abatement of asbestos shall be completed prior to any demolition activities that will disturb ACMs or create an airborne asbestos hazard.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Grading Permits (for demolition of site structures)
PDF 4.10-1 – The Project is not located within the very high fire hazard severity zone per the OCFA maps. However, exposed building construction shall meet all requirements for exposed sides, per OCFA requirements. Additionally, automatic sprinklers shall be provided in all applicable structures, per OCFA requirements.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.10-2 – New utilities will be located underground to the extent feasible as part of the Project development. Utility undergrounding activities will be coordinated with the utility providers to ensure that service to adjoining utility customers is not interrupted.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
PDF 4.10-3 – Interior and exterior water conservation measures will be incorporated into all Projects as development occurs. Measures will include (but not be limited to) low-flush toilets, low-flow faucets, and the installation of efficient irrigation systems to minimize runoff and evaporation.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
PDF 4.12-1 – Separate pedestrian sidewalks will be provided as part of the ramp design to minimize pedestrians using parking aisles to access the Commercial Core businesses.	County of Orange - Dana Point Harbor Department	Coastal Development Permits and Building Permits
PDF 4.12-2 – Pedestrian linkages will be created between Harbor amenities, such as the Pedestrian Promenade and Linear park.	County of Orange - Dana Point Harbor Department	Coastal Development Permits

Exhibit B

Dana Point Harbor Revitalization Project
Program EIR No. 581

Feature	Responsible Party	Time of Verification
PDF 4.12-3 – Various amenities will be provided to the waterside areas, including improved boater drop-off areas, dedicated boater parking, upgraded boater service buildings and restrooms, and convenient seasonal water bed drop-off and pick-up areas throughout the Harbor.	County of Orange - Dana Point Harbor Department	Coastal Development Permits

Exhibit B

2. Standard Conditions of Approval

Condition	Responsible Party	Time of Verification
SCA 4.1-1 – If the County proposes changes regarding the location or alteration of any use or structure, the County shall submit a revised plan to the Director of the County's Planning Division	County of Orange - Dana Point Harbor Department	Grading and Building Permits
SCA 4.1-2 – Provision for continuous maintenance of a Landscape Maintenance program shall be assured.	County of Orange - Dana Point Harbor Department	During operation
SCA 4.1-3 – Prior to the issuance of any precise grading permit, a site plan delineating the capacity, number, and location of all proposed solid waste and recyclable collection areas shall be approved.	Manager, ROMD/Curent Planning County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading Permits
<p>SCA 4.2-1 – The contractor shall install landscaping, equipment for irrigation, and improvements in all areas of the Harbor in accordance with an approved plan as stated below:</p> <p>a. Detailed Plan: Prior to the issuance of any building permit(s), a detailed landscape plan showing the detailed irrigation and landscaping design shall be submitted to the Harbor Review Board for approval, in consultation with the County of Orange - Dana Point Harbor Department. Plans shall show the detailed irrigation and landscaping design, the County Standard Plans for landscape areas, adopted plant palette guides, applicable scenic and specific plan requirements, water conservation measures contained in Board Resolution 90-457 (Water Conservation Measures), and Board Resolution 90-1341 (Water Conservation Implementation Plan).</p> <p>b. Installation Certification: Prior to the issuance of certificates of use and occupancy, said improvements shall be installed and shall be certified by a licensed landscape architect or licensed landscape contractor, as having been installed in accordance with the approved detailed plans. Said certification, including an</p>	<p>Harbor Review Board</p> <p>Manager, ROMD/Building Inspection Services</p> <p>Manager, ROMD/Construction</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building permits, Certificates of Use and Occupancy</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>irrigation management report for each landscape irrigation system, and any other required implementation report determined applicable, shall be submitted to the Manager, RDMD/Construction, and the Manager, RDMD/Building Inspection Services and the County of Orange - Dana Point Harbor Department, prior to the issuance of any certificates of use and occupancy.</p>		
<p>SCA 4.3-1 – Prior to the issuance of a grading permit, submit a geotechnical report shall be submitted to the Manager, RDMD/Subdivision and Grading, for approval. The report shall include the information and be in the form as required by the County Grading Code and Manual.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.4-1 – Prior to the issuance of any grading permits, the following drainage studies shall be submitted to and approved by the Manager, RDMD/Subdivision and Grading:</p> <ul style="list-style-type: none"> a. A drainage study of the Project including diversions, off-site areas that drain onto and/or through the Project, and justification of any diversions; and b. When applicable, a drainage study evidencing that proposed drainage patterns will not overload existing storm drains; and c. Detailed drainage studies indicating how the Project grading, in conjunction with the drainage conveyance systems including applicable swales, channels, street flows, catch basins, storm drains, and flood water retarding, will allow building pads to be safe from inundation from rainfall runoff which may be expected from all storms up to and including the theoretical 100-year flood. 	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>SCA 4.4-2 – Prior to the issuance of any grading permits, the County of Orange - Dana Point Harbor Department shall, in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading:</p> <ol style="list-style-type: none"> 1) Design provisions for surface drainage; and 2) Design all necessary storm drain facilities extending to a satisfactory point of disposal for the proper control and disposal of storm runoff; and 3) Dedicate the associated easements to the County of Orange, if determined necessary. 	<p>Manager, RDMD/Subdivision and Grading</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.4-3 – Prior to the issuance of any building permits, the County of Orange Dana Point Harbor Department shall participate in the applicable Master Plan of Drainage in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading, including construction of the necessary facilities.</p>	<p>Manager, RDMD/Subdivision and Grading</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>SCA 4.4-4 – The County of Orange Dana Point Harbor Department shall obtain coverage under the NPDES Statewide Stormwater Permit for General Construction Activities from the State Water Resources Control Board. Evidence of receipt of permit approval must be presented to the Manager, RDMD/Subdivision and Grading prior to the issuance of a Grading Permit.</p>	<p>Manager, RDMD/Subdivision and Grading</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.4-5 – Prior to the issuance of any grading or building permits, the County of Orange Dana Point Harbor Department shall demonstrate compliance under California's General Permit for Stormwater Discharges Associated with Construction Activity by providing a copy of the Notice of Intent (NOI) submitted to the State Water Resources Control Board and a copy of the subsequent notification of the issuance of a Waste Discharge Identification (WDIC) Number or other proof of filing in a manner meeting the satisfaction of the Manager, RDMD/Building Permit Services. Projects subject to this</p>	<p>Manager, RDMD/Building Permit Services</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>requirement shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP). A copy of the current SWPPP shall be kept at the Project site and be available for County review on request.</p>		
<p>SCA 4.4-6 – Prior to the issuance of any grading permits, County of Orange Dana Point Harbor Department shall submit a Runoff Management Plan (RMP) to the Manager, RDMD/Subdivision and Grading for review and approval.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.4-7 – Prior to the issuance of any grading or building permits, the County of Orange Dana Point Harbor Department shall submit an Erosion and Sediment Control Plan (ESCP) in a manner meeting approval of the Manager, RDMD/Building Permit Services, to demonstrate compliance with local and state water quality regulations for grading and construction activities. The ESCP shall identify how all construction materials, wastes, grading or demolition debris, and stockpiles of soil, aggregates, soil amendments, etc. shall be properly covered, stored, and secured to prevent transport into local drainages or coastal waters by wind, rain, tracking, tidal erosion or dispersion. The ESCP shall also describe how the County will ensure that all BMP's will be maintained during construction of any future public right-of-ways. A copy of the current ESCP shall be kept at the Project site and be available for County review on request.</p>	<p>Manager, RDMD/Building Permit Services County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>SCA 4.4-8 – Prior to the issuance of any grading or building permit (whichever comes first) and Coastal Development Permit, the County of Orange Dana Point Harbor Department shall submit for review and approval by the Manager, RDMD/Inspection Services Division, a Water Quality Management Plan (WQMP) specifically identifying Best Management Practices (BMPs) that will be used onsite to control predictable pollutant runoff. The WQMP shall follow the model WQMP as outlined in Exhibit 7.11 of the 2003 Drainage Area Master Plan, prepared by the County of Orange Flood Control District, July 1, 2003. This</p>	<p>Manager, RDMD/Inspection Services County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits, Grading and Building Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>WQMP shall identify, at a minimum, the routine structural and non-structural measures specified in the current Drainage Area Management Plan (DAMP). The WQMP may include one or more of the following:</p> <ul style="list-style-type: none"> • Discuss regional water quality and/or watershed programs (if available for the Project); • Address Site Design BMPs (as applicable) such as minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "zero discharge" areas, and conserving natural areas; • Include the applicable Routine Source Control BMPs as defined in the DAMP; • Demonstrate how surface runoff and subsurface drainage shall be managed and directed to the nearest acceptable drainage facility (as applicable), via sump pumps if necessary. 		
<p>SCA 4.4-6 – Prior to the issuance of any grading or building permit (whichever comes first) and Coastal Development Permit, the County of Orange Dana Point Harbor Department shall include in the WQMP the following additional Priority Project information in a manner meeting the approval of the Manager, Inspection Services Division:</p> <ul style="list-style-type: none"> • Include post-construction Structural Treatment Control BMP(s) as defined in the DAMP; • Include a conceptual Operation and Maintenance (O&M) Plan that (1) describes the long-term operation and maintenance requirements for the post-construction Treatment Control BMP(s); (2) identifies the entity that will be responsible for long-term operation and maintenance of the referenced Treatment Control BMP(s); and (3) describes the 	<p>Manager, RDMD/Inspection Services County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits, Grading and Building Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>proposed mechanism for funding the long-term operation and maintenance of the referenced Treatment Control BMP(s).</p>		
<p>SCA 4.4-10 – Prior to the issuance of certificates of use and occupancy, the County of Orange Dana Point Harbor Department shall demonstrate compliance with the WQMP in a manner meeting the satisfaction of the Manager, RDMD/Inspection Services, including:</p> <ul style="list-style-type: none"> • Demonstrate that all structural Best Management Practices (BMPs) described in the Project's WQMP have been implemented, constructed and installed in conformance with approved plans and specifications; • Demonstrate that the County of Orange Dana Point Harbor Department has complied with all non-structural BMPs described in the Project's WQMP; • Submit for review and approval an Operations and Maintenance (O&M) Plan for all structural BMPs for attachment to the WQMP; and • Demonstrate that copies of the Project's approved WQMP (with attached O&M Plan) are available for each of the incoming occupants; 	<p>Manager, RDMD/Inspection Services County of Orange - Dana Point Harbor Department</p>	<p>Certificates of Use and Occupancy</p>
<p>SCA 4.4-11 – Prior to the approval of a grading permit, the County of Orange Dana Point Harbor Department shall submit an Elevation Certificate to the Manager, RDMD/Current Planning Services, identifying the base flood elevation and certifying that the planned elevation of the lowest floor, including basements, is at least one (1) foot above the Base Flood Elevation (BFE). To eliminate FEMA requirements for flood insurance, the lowest elevation of any part of the structure, not only the lowest floor, must be above the BFE.</p>	<p>Manager, RDMD/Current Planning Services County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>



Exhibit B

Condition	Responsible Party	Time of Verification
<p>SCA 4.4-13 – Prior to the issuance of certificates of use and occupancy for any building, the County of Orange Dana Point Harbor Department shall complete Section “E” of the Elevation Certificate, identifying the Base Flood Elevation (BFE) and certifying the as-built lowest floor, including basements, as constructed, is at least one (1) foot above the BFE, in a manner meeting the approval of the Manager, RDMD/Building Inspection. To eliminate FEMA requirements for flood insurance, the lowest elevation of any part of the structure, not only the lowest floor, must be above the BFE.</p>	<p>Manager, RDMD/Building Inspection County of Orange - Dana Point Harbor Department</p>	<p>Certificates of Use and Occupancy</p>
<p>SCA 4.4-17 – Prior to the issuance of any grading permits, County of Orange Dana Point Harbor Department shall delineate on the grading plan the floodplain which affects the property, in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.5-1 – Prior to the approval of any grading permit, the County of Orange Dana Point Harbor Department shall prepare a Parking Management Plan (PMP) that ensures public access to the Selva Lot will be retained.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Grading Permits</p>
<p>SCA 4.5-2 – The County of Orange Dana Point Harbor Department shall prepare and process an encroachment permit for any Project work (e.g., street widening, emergency access improvements, storm drain construction, street connections, etc.) occurring in any City of Dana Point rights-of-way.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Grading Permits (for infrastructure construction)</p>
<p>SCA 4.5-3 – Prior to the issuance of any grading permits, the County shall provide adequate sight distance per Standard Plan 1117 at all street intersections, in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading. The County shall make all necessary revisions to the plan to meet the sight distance requirement such as removing slopes or other encroachments from the limited use area in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading Services.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Grading Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>SCA 4.5-4 – The County shall install all underground traffic signal conduits (e.g., signals, phones, power, loop detectors, etc.) and other appurtenances (e.g., pull boxes, etc.) needed for future traffic signal construction, and for future interconnection with adjacent intersections, all in accordance with plans and specifications meeting the approval of the Manager, RDMD/Subdivision and Grading.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.7-1 – The County of Orange Dana Point Harbor Department shall prepare a final landscape and irrigation plan for review by the Harbor Review Board. The plan shall be prepared by a State licensed landscape architect and shall include all proposed and existing plant materials (location, type, size, quantity), an irrigation plan, a grading plan, an approved site plan and a copy of the entitlement conditions of approval.</p>	<p>Harbor Review Board County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.8-1 – Prior to the issuance of any grading permits, the County of Orange Dana Point Harbor Department shall provide evidence to the Manager, RDMD/Subdivision and Grading, that the Vector Control District has surveyed the site to determine if vector control measures are warranted. If the District determines measures are warranted, the DPHD shall conduct such measures in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>SCA 4.8-2 – Prior to issuance of certificates of use and occupancy, the County of Orange Dana Point Harbor Department shall provide plans or identify measures to comply with standard County procedures for implementing the Uniform Fire Code in the use of any combustible and flammable liquids, aboveground or underground storage of such materials, welding and potential spark production, and building occupancy rating in a manner meeting the approval of the Fire Chief. Further, a copy of the approved "UFC Implementation Plan" shall be furnished to the Manager, RDMD/Building Inspection, prior to the issuance of any certificates of use and occupancy.</p>	<p>Fire Chief, OCFA Manager, RDMD/Building Inspection County of Orange - Dana Point Harbor Department</p>	<p>Certificates of Use and Occupancy</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>SCA 4.9-1 – Prior to approval of the Project plans and specifications by the DPHD, Chief Engineer, or his designee, in consultation with the Manager, RDMD/Environmental Planning, shall confirm that the plans and specifications stipulate that construction activities shall be limited to 7:00 a.m. to 8:00 p.m. on weekdays, including Saturdays, and no construction on Sundays and holidays. The County Inspector will be responsible for ensuring that contractors comply with this measure during construction.</p>	<p>DPHD, Chief Engineer Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>SCA 4.9-2 – Prior to the issuance of any building or grading permits, the County of Orange Dana Point Harbor Department shall prepare or obtain an acoustical analysis report and appropriate plans which demonstrate that the noise levels generated by this Project during its operation shall be controlled in compliance with the Orange County Codified Ordinance, Division 6 (Noise Control). The report shall be prepared under the supervision of a County-certified Acoustical Consultant and shall describe the noise generation potential of the Project during its operation and the noise Mitigation Measures, if needed, which shall be included in the plans and specifications of the Project to assure compliance with Orange County Codified Ordinance, Division 6 (Noise Control).</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>SCA 4.9-3 – Prior to approval of the Project plans and specifications by the DPHD, Chief Engineer, or his designee, in consultation with the Manager, RDMD/Environmental Planning and County of Orange Dana Point Harbor Department, shall confirm that the plans and specifications stipulate that stockpiling and vehicle staging areas shall be located as far as practical from noise-sensitive receptors during construction activities.</p>	<p>RDMD, Chief Engineer Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permit, Grading and Building Permits</p>
<p>SCA 4.9-4 – The County of Orange Dana Point Harbor Department shall submit a grading and drainage plan with a geotechnical soils report for review and approval by the Manager, RDMD/Subdivision and Grading. The following notes shall be included:</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

Exhibit B

Condition	Responsible Party	Time of Verification
<p>a. All construction vehicles and equipment, fixed or mobile operated within 1,000 feet of a dwelling, shall be equipped with properly operating and maintained mufflers.</p> <p>b. All operations shall comply with the County's Noise Ordinance.</p> <p>c. Stockpiling and/or vehicle staging areas shall be located as far as practicable from dwellings.</p>		
<p>SCA 4.10-1 – Prior to the issuance of a building permit, the County of Orange Dana Point Harbor Department shall submit evidence of the on-site fire hydrant system to the Fire Chief and indicate whether it is public or private. If the system is private, it shall be reviewed and approved by the Fire Chief prior to building permit issuance, and provisions shall be made for the repair and maintenance of the system in a manner meeting the approval of the Fire Chief.</p>	<p>Fire Chief, Orange County Fire Authority</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>SCA 4.10-2 – Prior to the issuance of any certificate of use and occupancy, all fire hydrants shall have a blue reflective pavement marker indicating the hydrant location on the street as approved by the Fire Chief, and must be maintained in good condition.</p>	<p>Fire Chief, Orange County Fire Authority</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Prior to the issuance of any Certificates of Use and Occupancy</p>
<p>SCA 4.10-3 – Prior to the issuance of a building permit, the County of Orange Dana Point Harbor Department shall submit plans for any required automatic fire sprinkler system in any structure to the Fire Chief for review and approval. Prior to the issuance of a certificate of use and occupancy, this system shall be operational in a manner meeting the approval of the Fire Chief.</p>	<p>Fire Chief, Orange County Fire Authority</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>SCA 4.10-4 – Prior to the issuance of any grading permits or the issuance of a building permit (whichever occurs first), the County of Orange Dana Point Harbor Department shall provide evidence of adequate fire flow. The "Orange County Fire Authority Water Availability for Fire Protection" form shall be stored by the applicable water district and</p>	<p>Fire Chief, Orange County Fire Authority</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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Condition	Responsible Party	Time of Verification
submitted to the Fire Chief for approval. If sufficient water to meet fire flow requirements is not available, an automatic fire extinguishing system may be required in each structure affected.		
SCA 4.10-5 – Prior to the issuance of any grading or building permits, the County of Orange Dana Point Harbor Department shall submit plans and obtain approval from the Fire Chief for fire lanes on required fire access roads that are less than 35 feet in width. The plans shall indicate the locations of red curbs and signage and include a detail of the proposed signage, including the height, style, and colors of the lettering and its contrasting background.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Grading and Building Permits
SCA 4.10-6 – Prior to the issuance of any certificate of use and occupancy, the fire lanes shall be installed in accordance with the approved fire lane plan.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Certificates of Use and Occupancy
SCA 4.10-7 – Prior to the issuance of any grading permits or the issuance of a building permit, whichever occurs first, the County of Orange Dana Point Harbor Department shall obtain approval of the Fire Chief for all fire protection access roads to within 150 feet of all portions of the exterior of every structure on site.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Grading and Building Permits
SCA 4.10-8 – Prior to the issuance of a grading permit or building permit, the County of Orange Dana Point Harbor Department shall submit and obtain approval of the Fire Chief and the Manager, RDMD/Subdivision and Grading Services, of plans for all public or private access roads, streets, and courts. The plans shall include plan and sectional views, and indicate the grade and width of the access road measured from flow-line to flow-line. When a dead end street exceeds 150 feet or when otherwise required, a clearly marked fire apparatus access turnaround must be provided and approved by the Fire Chief.	Fire Chief, Orange County Fire Authority Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department	Grading and Building Permits

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Condition	Responsible Party	Time of Verification
SCA 4.10-9 – A note shall be placed on the fire protection access easement plan indicating that all street/road signs shall be designed and maintained to be either internally or externally illuminated in a manner meeting the approval of the Fire Chief.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Building Permits
SCA 4.10-10 – Prior to the issuance of any grading permits, the County of Orange Dana Point Harbor Department shall obtain approval from the Fire Chief for the construction of any gate across required fire department access roads.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Grading Permits
SCA 4.10-11 – Prior to the issuance of a building permit for combustible construction, the County of Orange Dana Point Harbor Department shall submit a letter on company letterhead stating that water for firefighting purposes and all-weather fire protection access roads will be in place and operational before any combustible material is placed on site. Building permits will not be issued without Orange County Fire Authority approval, obtained as a result of an on-site inspection.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Building Permits
SCA 4.10-12 – Prior to the issuance of a grading or building permit, the County of Orange Dana Point Harbor Department shall submit to the Fire Chief a list of all hazardous, flammable, and combustible liquids, solids, or gases to be stored, used, or handled on site. These materials shall be classified according to the Uniform Fire Code and a document shall be submitted to the Fire Chief with a summary sheet listing the total amounts for storage and use for each hazard class.	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Grading and Building Permits
SCA 4.10-13 – Prior to the issuance of a building permit, the County of Orange Dana Point Harbor Department shall submit architectural plans for the review and approval of the Fire Chief, if required per the "Orange County Fire Authority Plan Submittal Criteria Form."	Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department	Building Permits

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Condition	Responsible Party	Time of Verification
<p>SCA 4.10-14 – Prior to the issuance of a building permit, plans for the fire alarm system shall be submitted to the Fire Chief for review and approval. This system shall be operational prior to the issuance of a certificate of use and occupancy. Additionally, a detailed ledger of intended use for each building on site shall be submitted to the Fire Chief for review and approval.</p>	<p>Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>SCA 4.10-15 – Prior to issuance of a certificate of use and occupancy, the County of Orange Dana Point Harbor Department shall provide plans or identity measures to comply with standard County procedures for implementing the Uniform Fire Code in the use of any combustible and flammable liquids, aboveground or underground storage of such materials, welding and potential spark production, and building occupancy rating in a manner meeting the approval of the Fire Chief. Further, a copy of the approved "UFC Implementation" shall be forwarded to the Manager, RDMD/Building Inspection Services, prior to the issuance of any certificates of use and occupancy.</p>	<p>Fire Chief, Orange County Fire Authority Manager, RDMD/Building Inspection County of Orange - Dana Point Harbor Department</p>	<p>Certificates of Use and Occupancy</p>
<p>SCA 4.11-1 – Prior to the issuance of any grading permit, the County of Orange Dana Point Harbor Department shall provide written evidence to the Manager, RDMD/Subdivision and Grading, that a County-certified archaeologist has been retained, to observe grading activities and salvage and catalogue archaeological resources as necessary. The archaeologist shall be present at the pre-grade conference, shall establish procedures for archaeological resource surveillance, and shall establish, in cooperation with the applicant, procedures for temporarily halting or redirecting work to permit the sampling, identification, and evaluation of the artifacts as appropriate. If the archaeological resources are found to be significant, the archaeological observer shall determine appropriate actions, in cooperation with the County of Orange Dana Point Harbor Department, for exploitation and/or salvage.</p>	<p>Manager, RDMD/Subdivision and Grading Manager, RDMD Harbors, Beaches & Parks (HBP/Coastal and Historical Facilities) County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

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Condition	Responsible Party	Time of Verification
<p>The County of Orange Dana Point Harbor Department shall obtain approval of the archaeologist's follow-up report from the Manager, Harbors, Beaches & Parks HBP/Coastal and Historical Facilities. The report shall include the period of inspection, an analysis of any artifacts found and the present repository of the artifacts. Excavated finds shall be made available for curatorial purposes to the County of Orange, or its designee, on a first refusal basis. These actions, as well as final mitigation and disposition of the resources, shall be subject to the approval of the Manager, HBP/Coastal and Historical Facilities.</p>		

3. Mitigation Measures

Measure	Responsible Party	Time of Verification
<p>MM 4.1-1a – The Project will require a Local Coastal Plan Amendment and subsequent Coastal Development Permits to ensure consistency with the California Coastal Act and Local Coastal Plan.</p>	<p>County of Orange - Dana Point Harbor Department City of Dana Point Community Development Department California Coastal Commission</p>	<p>Coastal Development Permits</p>
<p>MM 4.1-3a – Access to the Marina Service areas shall be maintained during all construction phases. A Construction Management Plan shall be prepared identifying the configuration of construction staging areas temporary access routes, and parking areas and will be submitted in conjunction with review of Coastal and/or Site Development Permits for each phase of development.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits</p>
<p>MM 4.1-3b – A comprehensive signage program for public access shall be implemented in conjunction with the construction of the Commercial Core Area and subsequent planning areas within the Harbor to inform the public of the availability of, and provide direction to, public parking areas, coastal access and on-site recreational amenities.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Sign Permits</p>
<p>MM 4.2-1 – Prior to issuance of grading permits, a Construction Staging Plan shall be provided to the Manager, RDMD/Subdivision and Grading, or his designee for review and approval. The contractor's construction equipment and supply staging areas shall be established away from existing marina operations, to the extent feasible. The Plan shall specify the following:</p> <ul style="list-style-type: none"> a. During construction and grading, the Contractor shall keep the site clear of all trash, weeds, and debris. b. The grading contractor shall not create large stockpiles of debris or soils, but shall seek to place smaller piles adjacent to each other to minimize visual impacts. 	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.2-2 – Prior to issuance of a grading permit for development within the Commercial Core, the Manager, RDMD/Subdivision and Grading, or his designee shall require the County of Orange Dana Point Harbor Department to provide screened construction fencing around construction area boundaries to temporarily screen views of construction activities.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.2-3 – All new landscaped areas in the Harbor shall be planted in accordance with the Revitalization Plan Master Landscape Plan and approved palette. The Master Landscape Plan shall be subject to review and approval by the County of Orange Dana Point Harbor Department and the Harbor Review Board.</p>	<p>Harbor Review Board County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits, Grading and Building Permits</p>
<p>MM 4.2-4 – Prior to the issuance of a building permit, an Exterior Lighting Plan (including outdoor recreation areas) for all proposed improvements shall be prepared. The lighting plan shall indicate the location, type, and wattage of all light fixtures and include catalog sheets for each fixture. The Lighting Plan shall demonstrate that all exterior lighting has been designed and located so that all direct rays are confined to the property. The Lighting Plan shall be subject to review and approval by the County of Orange Dana Point Harbor Department.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.2-6 – A comprehensive signage program for public access shall be implemented in conjunction with the construction of the Commercial Core within the Harbor, and shall inform the public of the availability of, and provide direction to, public parking areas, coastal access and on-site recreational amenities.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Sign Permits</p>
<p>MM 4.3-1 – The Project shall conduct site-specific subsurface investigations, to be verified by the Manager, RDMD/Subdivision and Grading, to quantify the potential for lateral spreading (because the variable fill soils appear to be predominantly clayey and may not be as susceptible to lateral spreading as the mapping of the Project area may indicate). If the potential for lateral spreading to occur is identified, SCA's shall be included to reduce impacts to a less than significant level.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.3-2 – Further sampling and testing during the design phase is recommended to confirm the preliminary geotechnical findings. If results from further testing indicate the possibility for soil erosion, expansive/collapse soils or subsidence, Mitigation Measures shall be included to reduce impacts to a less than significant level.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.3-3 – The County of Orange Dana Point Harbor Department shall submit erosion control plans for Project grading and site preparation for review and approval by the Manager, RDMD/Subdivision and Grading. The Dana Point Harbor Department shall exercise special care during the construction phase of the Project to prevent off-site siltation. The Dana Point Harbor Department shall provide erosion control measures as approved by the County of Orange, RDMD, RDMD/Subdivision and Grading. The erosion control measures shall be shown and specified on the grading plan and shall be construction to the satisfaction of the County of Orange, RDMD prior to the start of any other grading operations. Prior to the removal of any erosion control devices so constructed, the area served shall be protected by additional drainage facilities, slope erosion control measures, and other methods as may be required by the County of Orange, RDMD. The Dana Point Harbor Department shall maintain the erosion control devices shall remain in place until the County of Orange, RDMD approves of the removal of said facilities.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.3-4 – Site safety requirements shall address specifications of the Occupational Safety and Health Administration (OSHA). Applicable specifications prepared by OSHA related to earth resources consist of Section 29 CFR Part 1926, which are focused on worker safety in excavations.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.3-5 – Paved lot structural sections shall be constructed with a minimum of 3-inches of asphaltic concrete over a minimum of 6-inches of aggregate base in accordance with the recommendations of a soils engineer and as approved by the Manager, ROMD/Subdivision and Grading.</p>	<p>Manager, ROMD/Subdivision and Grading Manager, ROMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-6 – If cranes and pile-driving equipment are required, adequate setbacks shall be observed from bulkhead areas to prevent failures due to increased lateral loads.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits, Grading and Building Permits</p>
<p>MM 4.3-7 – The Project shall assess the likely extent of the potential for soil liquefaction at individual sites to be verified by the Manager, ROMD/Subdivision and Grading. If the potential for liquefaction to occur is identified, Project Design Features (PDFs) shall be included that reduce impacts to a less than significant level.</p>	<p>Manager, ROMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-8 – Additional ground-motion assessment of the Project area shall be conducted prior to Grading Permit approval. Possible alternative models of a system of faults consisting of the Newport-Inglewood, SCQZD, and Rose Canyon Fault Zones, the San Joaquin Hills Blind Thrust, and the Oceanside Blind Thrust shall be reflected within the analysis.</p>	<p>Manager, ROMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-9 – Conformance with the latest Uniform Building Code and County Ordinances can be expected to satisfactorily mitigate the effect of seismic groundshaking. Conformance with applicable codes and ordinances shall occur in conjunction with the issuance of building permits in order to insure that over excavation of soft, broken rock and clayey soils within sheared zones will be required where development is planned.</p>	<p>Manager, ROMD/Subdivision and Grading Manager, ROMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.3-10 – All grading and improvements on the subject property shall be made in accordance with the Orange County Grading Ordinance and to the satisfaction of the Manager, RDMD/Subdivision and Grading. Grading plans shall be in substantial conformance with the approved Dana Point Harbor Revitalization Plan.</p>	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.3-11 – Prior to issuance of a grading permit, the County of Orange Dana Point Harbor Department shall provide a plan showing the placement of applicable underground storage tanks for the approval of the County Manager, RDMD/Building Permits, in consultation with the Manager, RDMD/ Environmental Planning.</p>	<p>Manager, RDMD/Building Permits Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.3-12 – The potential damaging effects of regional earthquake activity shall be considered in the design of each structure. The preliminary seismic evaluation shall be based on basic data including the Uniform Building Code Seismic Parameters. Structural design criteria shall be determined in consideration of building types, occupancy category, seismic importance factors and possibly other factors.</p>	<p>Manager, RDMD/Subdivision and Grading Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-13 – The descriptions of proposed Project activities and governing measures described in this section refer to the requirements of the currently adopted Uniform Building Code (UBC) (ICBC, 1997, as updated by subsequent adoptions), and especially those sections of the UBC dealing with seismic design and construction requirements, site grading, site drainage, soils properties and soils removal and recompaction. Adherence to the requirements of the UBC is assumed in this analysis to render less than significant any potential environmental impacts related to geology and soils that will otherwise expose people or structures to potential substantial adverse effects, including risk of loss, injury or death.</p>	<p>Manager, RDMD/Subdivision and Grading Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.3-14 – Engineering design for all structures shall be based on the probability that the Project area will be subjected to strong ground motion during the lifetime of development. Construction plans shall be subject to the County of Orange Review and shall include applicable standards, which address seismic design parameters.</p>	<p>Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-15 – Mitigation of earthquake ground shaking shall be incorporated into design and construction in accordance with Uniform Building Code requirements and site-specific design.</p>	<p>Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.3-16 – Construction work performed within public roadways or public properties adjacent to the Project site will require compliance with specifications presented in the latest edition of Standard Specifications for Public Works Construction (the Greenbook).</p>	<p>Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.3-19 – Further investigation and detailed characterization of the existing fill conditions is required to identify the extent of the potential for liquefaction. Mitigation Measures shall include:</p> <ul style="list-style-type: none"> • Recommended new building setback distances from the quay wall ranging from 2 to 3 times the height of the bulkhead wall for localized liquefaction and lateral spreading failure to several times the height of the revetment slope and bulkhead system for global seismic instability, to be considered during the master planning and conceptual design phase of the Project; • Supporting proposed structures on deep foundations extending into bedrock; • Stiffened floor slab designs; • Total or partial removal of the potentially liquefiable soils and replacement with compacted fill; • Soil remediation and site improvement. 	<p>Manager, RDMD/Subdivision and Grading Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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Measure	Responsible Party	Time of Verification
<p>MM 4.3-20 – Further evaluation of lateral spreading potential is required. If it is found that the lateral spreading potential is high, then Mitigation Measures shall include:</p> <ul style="list-style-type: none"> ▪ New building setback distances from the quay wall ranging from 2 to 3 times the height of the bulkhead wall; ▪ Repair or replacement of existing seawall for site containment; ▪ Total/partial removal of the potentially liquefiable soils and replacement with compacted fill; and/or ▪ Soil remediation and site improvement. 	<p>Manager, RDMD/Subdivision and Grading Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.4-1 – During the design phase, the Project shall assess the potential impacts of inundation from a tsunami on the existing and proposed building structures along the seawall, and submit the assessment to the County of Orange RDMD, for verification.</p>	<p>Manager, RDMD/Current Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.4-2 – During the design phase, the Project shall assess the potential of wave run-up from a seiche or tsunami near the Harbor during a major seismic event, and submit the assessment to the County of Orange RDMD, for verification.</p>	<p>Manager, RDMD/Current Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.4-3 – During the design phase, the Project shall study the potential impacts of flooding of San Juan Creek on the existing or proposed structures along the seawall, and submit the study to the County of Orange RDMD, for verification.</p>	<p>Manager, RDMD/Current Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.4-5 – Should any structures be developed by the County of Orange on the South Coast Water District Lot as part of the Project, the County of Orange shall, during the design phase, assess the potential impacts of inundation from a seiche, tsunami, and flooding on the SCWD Lot.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permit, Grading and Building Permits</p>

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Measure	Responsible Party	Time of Verification
MM 4.5-1 – The County of Orange Dana Point Harbor Department shall prepare and process encroachment permits as required for all street and infrastructure improvements needed within the City of Dana Point public rights-of-way.	County of Orange - Dana Point Harbor Department	Grading Permits
MM 4.5-2 – The County of Orange Dana Point Harbor Department shall provide a construction sign program to direct Harbor visitors and boaters to available parking.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
MM 4.5-3 – The County of Orange Dana Point Harbor Department shall prepare a Construction Management Plan that includes the locations for shuttle drop-off areas, the relocations of public transit facilities and provisions for valet service (in the event construction activities do not allow for convenient parking adjacent to existing businesses). The Construction Management Plan shall also establish access locations for construction equipment, separate from those used by the general public.	County of Orange - Dana Point Harbor Department	Grading and Building Permits
MM 4.5-4 – Del Obispo Street/Pacific Coast Highway – Prior to issuance of the first building permit in Planning Areas 3 through 12 (subsequent to development of the Commercial Core), the County of Orange Dana Point Harbor Department shall enter into an agreement to conduct a study to and potentially fund (on a fair share basis) the re-stripping of the eastbound Pacific Coast Highway approach from one left-turn lane, two through lanes, and one de-facto right-turn lane to consist of one left-turn lane, two through lanes, and one shared through/right-turn lane; to widen the westbound Pacific Coast Highway approach from two left-turn lanes, one through lane, and one shared through/right-turn lane to consist of two left-turn lanes, two through lanes, and one shared through/right-turn lane.	County of Orange - Dana Point Harbor Department	First Building Permit (associated with the Revitalization Plan) in Planning Areas 3 through 12

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Measure	Responsible Party	Time of Verification
<p>MM 4.5-5 – Doherty Park Plaza/Pacific Coast Highway – Prior to issuance of the first building permit in Planning Areas 3 through 12 (subsequent to development of the Commercial Core), the County of Orange Dana Point Harbor Department shall enter into an agreement to conduct a study to and potentially fund (on a fair share basis) the widening of the eastbound Pacific Coast Highway approach from one left-turn lane and two through lanes to consist of one left-turn lane and three through lanes; and to widen the westbound Pacific Coast Highway approach from one left-turn lane, one through lane, and one shared through/right-turn lane to consist of one left-turn lane, two through lanes, and one shared through/right-turn lane.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>First Building Permit (associated with the Revitalization Plan) in Planning Areas 3 through 12</p>
<p>MM 4.5-6 – Puerto Place/Dana Point Harbor Drive – Six months following completion of the Commercial Core improvements (Planning Areas 1 and 2), the County of Orange Dana Point Harbor Department will initiate a traffic intersection study to determine if a traffic signal and/or other capacity improvements are needed at the intersection of Puerto Place and Dana Point Harbor Drive. If a traffic signal or capacity improvements are warranted, the County of Orange will be responsible for installing the signal or capacity improvements in a manner meeting the approval of the Manager, RDMD/Subdivision and Grading in consultation with the City of Dana Point Public Works Director.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Six months following the completion of the Commercial Core Improvements</p>
<p>MM 4.5-7 – The County of Orange Dana Point Harbor Department shall prepare a Traffic Management Plan (TMP) to include a provision for use of off-site locations for parking for peak Harbor use periods.</p>	<p>Manager, RDMD/Road Division County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.5-10 Street of the Golden Lantern/Dana Point Harbor Drive – During a typical summer weekday/weekend (at least 12 months following completion of the Commercial Core improvements (Planning Areas 1 and 2)), the County of Orange Dana Point Harbor Department will initiate a traffic intersection study to determine if capacity improvements are needed at the intersection of Street of the Golden Lantern and Dana Point Harbor Drive. The study shall investigate whether adequate queuing storage lengths are provided</p>	<p>Manager, RDMD/Road Division County of Orange - Dana Point Harbor Department</p>	<p>12 months following the completion of the Commercial Core Improvements</p>

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<p>(i.e., ensure that vehicles entering into a left turn movement do not spill out onto the through traffic lanes). If capacity improvements are warranted, the County of Orange/Dana Point Harbor Department will be responsible for implementing the improvements in a manner meeting the approval of the Manager, RDMD Road Division in consultation with the City of Dana Point Public Works Director.</p>		
<p>MM 4.5-12 – Upon final design of the Commercial Core improvements, the County of Orange Dana Point Harbor Department shall prepare a queuing analysis for the parking deck located at Street of the Golden Lantern and Dana Point Harbor Drive. The queuing analysis shall be based on the Cromwell Methodology and analyze all ingress/egress points to recommend the appropriate number of inbound/outbound lanes, lane storage requirements, and access controls.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Least Certificate of Use and Occupancy for Commercial Core area improvements (Planning Area 1 and 2)</p>

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<p>MM 4.5-1 – Prior to approval of the Project plans and specifications, the Chief Engineer or Director, DPHD, or his designee, in consultation with the Manager, RDMD/ Environmental Planning, shall confirm that the plans and specifications stipulate that, in compliance with SCAGMD Rule 403, excessive fugitive dust emissions shall be controlled by regular watering or other dust preventive measures, as specified in the South Coast Air Quality Management Districts Rules and Regulations. In addition, SCAGMD Rule 402 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off-site. Implementation of the following measures will reduce short-term fugitive dust impacts on nearby sensitive receptors:</p> <ul style="list-style-type: none"> • All active portions of the construction site shall be watered to prevent excessive amounts of dust; • On-site vehicles speed shall be limited to 15 miles per hour (mph); • All on-site roads shall be paved as soon as feasible or watered periodically or chemically stabilized; • All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust; watering, with complete coverage, shall occur at least twice daily, preferably in the late morning and after work is done for the day; • If dust is visibly generated that travels beyond the site boundaries, clearing, grading, earth moving, or excavation activities that are generating dust shall cease during periods of high winds (i.e., greater than 25 mph averaged over one hour) or during Stage 1 or Stage 2 episodes; and • All material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust. 	<p>Manager, RDMD/Environmental Planning</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

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<p>MM 4.6-2 – Prior to approval of the Project plans and specifications, the Chief Engineer or Director, DPHD, or his designee, in consultation with the Manager, RDMD/Environmental Planning, shall confirm that the plans and specifications stipulate that, in compliance with SCAQMD Rule 403, acute precursor emissions from construction equipment vehicles shall be controlled by maintaining equipment engines in good condition and in proper tune per manufacturer's specifications, to the satisfaction of the Resident Engineer. The County Inspector will be responsible for ensuring that contractors comply with this measure during construction.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.6-3 – Prior to issuance of grading permits, the County shall include in the construction contract standard specifications a written list of instructions to be carried out by the construction manager specifying measures to minimize emissions by heavy equipment for approval by the Manager, RDMD/Subdivision and Grading, in consultation with the Manager, RDMD/Environmental Planning. Measures shall include provisions for proper maintenance of equipment engines, measures to avoid equipment idling more than two minutes and avoidance of unnecessary delay of traffic on off-site access roads by heavy equipment blocking traffic.</p>	<p>Manager, RDMD/Environmental Planning Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>
<p>MM 4.6-4 – In compliance with SCAQMD Rule 1113, ROG emissions from architectural coatings will be reduced by using pre-coated/natural colored building materials, water-based or low-ROG coating and using coating transfer or spray equipment with high transfer efficiency.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.6-5 – Prior to the issuance of grading permits, the contractor shall include the following measures on construction plans, to the satisfaction of the Chief Engineer and the DPHD, or his designee, in consultation with the Manager, RDMD/Environmental Planning:</p> <ul style="list-style-type: none"> • The General Contractor shall organize construction activities so as not to interfere significantly with peak hour traffic and minimize obstruction of through traffic. 	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>lanes adjacent to the site; if necessary, a flag person shall be retained to maintain safety adjacent to existing roadways;</p> <ul style="list-style-type: none"> • The General Contractor shall provide ridesharing and transit incentives for the construction crew, such as free bus passes and preferred carpool parking; • The General Contractor shall utilize electric- or diesel-powered stationary equipment in lieu of gasoline powered engines where feasible; and • The General Contractor shall state in construction grading plans that work crews will shut off equipment when not in use. 		
<p>MM 4.5-8 – In order to reduce operational energy usage and reduce energy production air emissions, the Project is required to comply with Title 24 of the California Code of Regulations established by the California Energy Commission regarding energy conservation standards.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.5-7 – Prior to project plan approval, plans shall be submitted to the satisfaction of the Chief Engineer, OPHD, or his designee, in consultation with the Manager, ROMD/Environmental Planning, indicating the use of Traffic Management Plan (TMP) such as preferential parking for vanpooling/carpooling, subsidy for transit pass or vanpooling/carpooling, flextime work schedule, and bike racks shall be incorporated into the design of the Harbor. A TMP plan shall be prepared and reviewed for implementation prior to issuance of Building Permits.</p>	<p>OPHD, Chief Engineer Manager, ROMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permit and Building Permits</p>
<p>MM 4.5-9 – Should asbestos be determined to be present within the existing structures of the Commercial Core, the Project shall comply with SCAQMD Rule 1403, Asbestos Emissions From Demolition/ Renovation Activities, during the demolition process.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading Permits and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.7-1 – If Project construction activities within Planning Areas 3 and 5 are anticipated during the breeding season of the California gnatcatcher (March 1 to August 15), surveys of the area within 500 feet of the site by a qualified biologist shall be required prior to start of Project construction activities. If nesting gnatcatchers are identified, Project construction activities must cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that, with or without noise attenuation measures, Project activity noise levels would not exceed 60 decibels (dB) (hourly average) within gnatcatcher-occupied portions of the surveyed area. The qualified biologist shall monitor active nest sites. If the biologist notes that the nest fails, or the young fledge from the nest, then the noise restriction near the nest is no longer required.</p>	<p>Manager, RDM/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.7-2 – The following measures shall be utilized to protect the nesting habitat of the black-crowned night herons and snowy egrets:</p> <ul style="list-style-type: none"> • If construction activities are performed during the breeding season (February 1 through August 15), a preconstruction survey within 500 feet of the site for nests shall be performed by a qualified biologist to document the presence/absence of all these species; • If nesting black-crowned night herons or snowy egrets are identified, Project construction activities within 500 feet of the nest site must cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that with or without noise attenuation measures, construction noise levels would not exceed 60 dBA within 500 feet of the occupied nests. The qualified biologist shall monitor active nest sites on a weekly basis. If the biologist notes that all young have fledge from the nest, then the noise restriction near the nest is no longer required. 	<p>Manager, RDM/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits (for work being completed during the breeding season February 1 through August 15)</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.7-3 – The following measures shall be utilized to protect nesting habitat of the raptors (red tailed hawk, Cooper's hawk, osprey, etc):</p> <ul style="list-style-type: none"> • If work is scheduled to be performed during the breeding season of any raptor (February 1 through August 15), a preconstruction survey within 500 feet of the site for raptor nests shall be performed by a qualified biologist to document the presence/absence of all nesting raptors; and • If active raptor nests are found, a buffer of 500 feet in diameter should be established around the nest and no construction activity shall occur within that buffer until the young have fledged. 	<p>Manager, ROMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits (for work being completed during the breeding season February 1 through August 15)</p>
<p>MM 4.7-4 – In order to minimize indirect impacts on biological resources that may be related to noise and construction activity, the County of Orange Dana Point Harbor Department shall implement the following Best Management Practices (BMPs) prior to or during construction activities.</p> <ul style="list-style-type: none"> • Limit construction and all Project activities to a well-defined area; and • Construction limits shall be fenced or flagged adjacent to preserved trees and/or sensitive habitats to avoid direct impacts. 	<p>Manager, ROMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.7-5 – Future waterside improvements to the east and west breakwaters (Planning Areas 8, 11, and 12) shall be reconstructed within the seaward footprint of the existing structures except as necessary to provide for public safety or public access. Construction activities taking place below the mean higher high water (MHHW) mark shall prepare a focused marine biological survey to determine if sensitive species are present.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.7-6 – The County of Orange Dana Point Harbor Department shall require that standard BMPs be utilized in order to ensure impacts to water quality or the marina environment are minimized. Standard BMPs include:</p> <ul style="list-style-type: none"> • Erosion to be controlled by landscaping (leave existing vegetation in place where possible), paving and drainage structures; • Berms (sand bags) around all construction sites to catch run-off; • Roads of gravel to minimize dirt being tracked into and out of the Project site. • During wet weather, harbor basin inlets shall be protected by placing a wire mesh and gravel filter to intercept debris and soil runoff; and • Appropriate housekeeping activities to minimize the potential for pollutants from material storage or construction activities. 	<p>Manager, RDMD/Subdivision and Grading County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-1 – Prior to authorization of demolition permits, a qualified hazardous materials consultant with Phase II and Phase III assessment experience shall review groundwater documents regarding former subsurface releases on the Project site at 24501 Dana Drive and 24705 Dana Drive.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-2 – The interior of individual on-site structures within the Project area shall be visually inspected prior to demolition or renovation, with particular attention to all industrial uses. If hazardous materials are encountered at any on-site structure, the materials shall be tested and properly disposed of in accordance with State and Federal regulatory requirements. Any stained soils or surfaces underneath the removed materials shall be sampled and tested for contaminants. Based on the results of the analytical testing, the appropriate level of remediation shall be undertaken.</p>	<p>Manager, RDMD/Environmental Planning Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.8-3 – Hydraulic fluids associated with any hydraulic lifts on-site shall be tested to determine the presence or absence of PCBs. Additional samples shall be collected around the pistons to determine whether a subsurface release of hydraulic fluids has occurred. If found, appropriate remedial measures should be implemented to the satisfaction of the County.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-4 – Any transformers to be relocated during site construction/demolition should be conducted under the purview of the local utility purveyor to identify proper handling procedures regarding potential PCBs.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-5 – Any underground storage tanks to be removed/relocated during site construction/demolition should be conducted under the purview of the local regulatory agency to identify proper handling procedures. Also, due to the urbanized nature of the Project site, the presence of septic tanks is considered unlikely. However, Building Department Records should be reviewed to indicate any documented septic tanks and/or chemical storage tanks. If present, the tanks should be removed and properly disposed of at an approved landfill facility. Once the tank is removed, a visual inspection of the areas beneath and around the removed tank should be performed. Any stained soils observed underneath the septic tank should be sampled. Results of the sampling (if necessary) will indicate the level of remediation efforts that may be required.</p>	<p>Manager, RDMD/Environmental Planning Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-6 – Prior to demolition activities, Building Department Records shall be reviewed to verify the presence of septic tanks and/or chemical storage tanks on-site. If present, the tanks shall be removed and properly disposed of at an approved landfill facility. Once removed, exposed soils shall be visually observed to confirm the presence/absence of staining. In the event stained soils are observed, soils shall be tested to identify appropriate remedial activities.</p>	<p>Manager, RDMD/Environmental Planning Manager, RDMD/Building Permits County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.8-7 – Prior to the issuance of building permits for any tank or pipeline, the uses of said tank or pipeline shall be identified and the applicant shall submit a Chemical Management Plan in addition to a WQMP with all appropriate measures for chemical management (including, but not limited to, storage, emergency response, employee training, spill contingencies and disposal) in a manner meeting the satisfaction of the Manager, Building Permit Services, in consultation with the Resources and Development Management Department, the Orange County Fire Authority, the Orange County Health Care Agency and wastewater agencies, as appropriate, to ensure implementation of each agency's respective requirements. A copy of the approved "Chemical Management Plans" shall be furnished to the Manager, RDM/Inspection Services, prior to the issuance of any Certificates of Use and Occupancy.</p>	<p>Manager, RDM/Environmental Planning</p> <p>Manager, RDM/Building Permits</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-8 – All stained concrete/asphalt should be removed and disposed of to an appropriate permitted facility. Once removed, exposed soils should be visually observed to confirm the presence/absence of staining (an indication of contamination migration into the subsurface). If observed, stained soils should be tested to identify appropriate remedial activities (if necessary).</p>	<p>Manager, RDM/Environmental Planning</p> <p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-9 – If unknown wastes or suspect materials are discovered during construction that the contractor believes may be or contain hazardous waste or materials, the contractor shall:</p> <ul style="list-style-type: none"> • Immediately stop work in the vicinity of the suspected contaminant, and remove workers and the public from the area; • Notify the Project Engineer of the implementing agency; • Secure the area as directed by the Project Engineer; and • Notify the implementing agency's hazardous 	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>waste/materials coordinator.</p> <p>MM 4.8-10 – The County of Orange Dana Point Harbor Department or its designee shall store, manifest, transport, and dispose of all on-site generated waste that meets hazardous waste criteria in accordance with California Code of Regulations Title 22 and in a manner to the satisfaction of the Manager, HCA/Hazardous Materials Program. The County shall keep storage, transportation, and disposal records on site and open for inspection to any government agency upon request.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Ongoing Operations</p>
<p>MM 4.8-11 – During the design phase of the BMPs, the following methods shall be investigated to reduce odors and vectors: installing bypass litterbags with a fine mesh system and weights sewn on to prevent any gaps, drilling weep holes and a flap gate in the pipe upstream, or other currently proven technology.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permit, Grading and Building Permits</p>
<p>MM 4.8-12 – The National Emissions Standards for Hazardous Air Pollutants (NESHAP) mandates that building owners conduct an asbestos survey to determine the presence of asbestos containing materials (ACMs) prior to the commencement of any remedial work, including demolition. Prior to demolition work, it is recommended that areas be sampled as part of an asbestos survey. Any demolition of the existing buildings must comply with State law, which requires a contractor, where there is asbestos-related work involving 100 square feet or more of ACMs, to be certified and that certain procedures regarding the removal of asbestos to be followed.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-13 – Prior to demolition activities, an asbestos survey shall be required to determine the presence or absence of asbestos. The results of the survey shall be submitted to the Manager, RDMD/Environmental Planning.</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-14 – Asbestos removal shall be performed by a State-certified asbestos containment contractor in accordance with SCAGMD Rule 1403 and monitored by the County of Orange ROMD. Rule 1403 regulations require the</p>	<p>Manager, RDMD/Environmental Planning County of Orange - Dana Point</p>	<p>Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>following measures:</p> <ul style="list-style-type: none"> • A survey of the facility shall be conducted prior to issuance of a permit by SCAGMD; • SCAGMD shall be notified prior to construction activity; • ACMs shall be removed in accordance with prescribed procedures; • ACMs shall be placed in leaktight containers or wrapping; and • ACMs shall be properly disposed of. 	<p>Harbor Department</p>	
<p>NM 4.8-15 – If during demolition of the structures, paint is separated from the building material (e.g., chemically or physically), the paint waste should be evaluated independently from the building material to determine its proper management. According to the Department of Toxic Substances Control, if paint is not removed from the building material during demolition (and is not chipping or peeling), the material could be disposed of as construction debris (a non-hazardous waste). It is recommended that the landfill operator be contacted in advance to determine any specific requirements they may have regarding the disposal of lead-based paint materials.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-16 – Lead-based paint removal shall be performed in accordance with California Code of Regulation Title 8, Section 1532.1, which provides for exposure limits, exposure monitoring, and respiratory protection, and mandates good working practices by workers exposed to lead.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.8-17 – Contractors performing lead-based paint removal shall provide evidence of certified training for lead-related construction work.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
MM 4.8-18 - All finishing products used on site shall meet applicable SCAGMD regulations for solvent content, as required by SCAGMD Rules 1102 and 1171.	County of Orange - Dana Point Harbor Department	Grading and Building Permits
MM 4.8-19 - All uses of solvents shall be conducted in adherence to California OSHA regulations for exposure of workers during construction activities as required by CCR Title 8.	County of Orange - Dana Point Harbor Department	Grading and Building Permits
MM 4.9-1- Residences within 1,000 feet of a construction area shall be notified of the construction schedule in writing, prior to construction. The contractor shall designate a noise disturbance coordinator who would be responsible for responding to complaints regarding construction noise. The coordinator shall determine the cause of the complaint and ensure that reasonable measures are implemented to correct the problem. A contact number for the noise disturbance coordinator shall be conspicuously placed on construction site fences and written into the construction notification schedule sent to nearby residences.	County of Orange - Dana Point Harbor Department	Grading and Building Permits
MM 4.9-2 - For projects within 1,000 feet of sensitive receptors, impact equipment (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrical powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used.	County of Orange - Dana Point Harbor Department	Grading and Building Permits

Exhibit B

Measure	Responsible Party	Time of Verification
<p>MM 4.9-3 - For projects within 1,000 feet of sensitive receptors, sonic or vibratory pile drivers shall be used instead of impact pile drivers (sonic pile drivers are only effective in some soils) whenever possible. If sonic or vibratory pile drivers are not feasible, acoustical enclosures shall be provided as necessary to ensure that pile-driving noise does not exceed speech interference criterion at the closest sensitive receptor. Engine and pneumatic exhaust controls on pile drivers shall be required as necessary to ensure that exhaust noise from pile driver engines is minimized to the extent feasible. Where feasible, pile holes shall be pre-drilled to reduce potential noise and vibration impacts.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.10-1- Traffic signals in or adjacent to the Harbor shall be installed with an optical pre-emption device. If such a unit is installed with a system incompatible with OCFA vehicle emitters, a compatible emitter shall be provided to OCFA.</p>	<p>Fire Chief, Orange County Fire Authority Manager, RDMD/Road Division County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.10-2 - In Planning Area 1, the proposed dry stack boat storage buildings shall be equipped with sprinklers and in-rack sprinklers.</p>	<p>Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Building Permits</p>
<p>MM 4.10-3 - A Study of Life Safety and Evacuation shall be conducted for Planning Area 4 to ensure that adequate evacuation can occur should the island bridge become incapacitated.</p>	<p>Manager, RDMD Current Planning County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits and Building Permits</p>
<p>MM 4.10-4 - The following items shall be considered for inclusion into the Project design:</p> <ul style="list-style-type: none"> • All applicable building plans shall indicate by note that the interior fire sprinkler system is required for the structure(s). Plans for the fire sprinkler systems shall be submitted for review and approval by the Fire Chief. • A supervised fire alarm system with an annunciator, per the requirements of the California Fire Code, shall be 	<p>Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits, Grading and Building Permits</p>

Exhibit B

Measure	Responsible Party	Time of Verification
<p>installed in an accessible location.</p> <ul style="list-style-type: none"> ▪ Access to and around all structures shall meet the OCFA and California Fire Code requirements. ▪ A water supply system to supply fire hydrants and automatic fire sprinkler systems shall be installed. ▪ Turning radii and access in and around the Project site and buildings shall be designed to accommodate large fire department vehicles and their weight. ▪ Emergency access shall be maintained during construction. ▪ All service roads and fire lanes, as determined by the Fire Chief, shall be posted and marked accordingly. 		
<p>MM 4.10-5 – All fire hydrants shall have a "Blue Reflective Pavement Marker" indicating the location on the street or drive, per OCFA standards. Fire hydrant spacing shall be 300 feet between hydrants.</p>	<p>Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.10-6 – Prior to the issuance of a building permit, the County of Orange Dana Point Harbor Department shall submit a fire hydrant location plan to the Fire Chief for review and approval.</p>	<p>Fire Chief, Orange County Fire Authority County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>
<p>MM 4.10-7 – Construction shall not block the main navigational channels of Planning Areas 8 through 12.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Coastal Development Permits</p>
<p>MM 4.10-8 – The emergency alley behind the Harbor Patrol office shall not be blocked during construction activities.</p>	<p>Orange County Sheriff, Harbor Patrol County of Orange - Dana Point Harbor Department</p>	<p>Grading and Building Permits</p>
<p>MM 4.10-9 – The County of Orange shall continue to comply with the Building Code and Title 24 of the California Administrative Code relating to energy conservation.</p>	<p>County of Orange - Dana Point Harbor Department</p>	<p>Building Permits</p>

Exhibit B

*Dana Point Harbor Revitalization Project
Program EIR No. 681*

Measure	Responsible Party	Time of Verification
MM 4.10-10 – Electrical, natural gas, and cable television services and equipment locations shall be coordinated with the applicable utility providers.	County of Orange - Dana Point Harbor Department	Coastal Development Permits, Grading and Building Permits
MM4.11-1 – If human remains are encountered during earth removal or disturbance activities, the contractor shall cease all further earth disturbance until the County Coroner has made a determination of the origin and disposition pursuant to Public Resources Code Sections 5097.98 and 5097.99, relative to Native American remains. If the remains are determined to be prehistoric, the Coroner shall notify the Native American Heritage Commission.	County of Orange - Dana Point Harbor Department Orange County Sheriff, Coroner's Office	Grading Permits
MM 4.12-1- Parking stalls for the physically disabled to serve the visitor recreation facilities shall be provided to comply with the Uniform Building Code (latest adopted edition), the State of California Health and Safety Code, and State Building Code, including blue surface logo, blue paint stripes, signage, number, and locations so as to provide adequate safety and optimal proximity to building entrances.	County of Orange - Dana Point Harbor Department	Grading and Building Permits
MM 4.12-2 – Should the Selva Parking Lot be used as an overflow parking lot and boat storage facility, the County of Orange DPHD, shall establish a Parking Management Plan (PMP) to ensure that public access to the Selva Parking Lot is retained at its level of demand.	County of Orange - Dana Point Harbor Department	Coastal Development Permits

Appendix F – Hydraulic (WSPGW) Results

**EXISTING CONDITION
DRY STACK
LEASE AREA**

DANA POINT HARBOR HYDRAULIC HYDRAULIC LINE B EXISTING CONDITION MODEL								
STATION	INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) PER RM EX 10-YR	FLOW (CFS) PER RM EX 100-YR	DESCRIPTION
80.02	-6.6	-4.3	-	-4.3				
102.52			-	-2.05				Interpolated. JS assumed at this location
106.53			-	-1.65	22 to 24	12.69	20.01	Interpolated. JS assumed at this location
110.00	-3.6	-1.3	-	-1.3				
139.00			-	1.93				Elevation per profile from GB on asbuilts to connection of MH found on field. JS Per asbuilt. Not found at field visit.
143.00			-	2.38				Elevation per profile from GB on asbuilts to connection of MH found on field. JS Per asbuilt. Not found at field visit.
161.24			4.41	4.41				
165.79			4.61	4.61	20 to 22	25.42	39.98	
448.00			-	9.82				Interpolated. JS assumed at this location
452.00			-	9.88				Interpolated. JS assumed at this location
583.00	8.71	11.01	-	11.01				
604.72	18.2	20.5	17.56	17.56	18 to 20	10.35	16.16	Elevation per field data. Different from asbuilts information. Upstream control.

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT 1	BASE DIAMETER	ZL WIDTH	ZR WIDTH	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.500															
CD	3	4	1			1.250															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B EXISTING CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING											
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	4.410												
ELEMENT NO 2	IS	A	REACH	U/S DATA	102.520	-2.050	1	.013	RADIUS	ANGLE	ANG PT	MAN H								
ELEMENT NO 3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4						
ELEMENT NO 4	IS	A	REACH	U/S DATA	110.000	-1.300	1	.013	RADIUS	ANGLE	ANG PT	MAN H								
ELEMENT NO 5	IS	A	REACH	U/S DATA	139.000	1.930	1	.013	RADIUS	ANGLE	ANG PT	MAN H								
ELEMENT NO 6	IS	A	JUNCTION	U/S DATA	143.000	2.380	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4						
ELEMENT NO 7	IS	A	REACH	U/S DATA	161.240	4.410	1	.013	RADIUS	ANGLE	ANG PT	MAN H								
ELEMENT NO 8	IS	A	JUNCTION	U/S DATA	165.790	4.610	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4						

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 9	IS	A	REACH	U/S DATA	448.000	9.820	1	.013	RADIUS	ANGLE	ANG PT	MAN H								
ELEMENT NO 10	IS	A	JUNCTION	U/S DATA					Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4						

			452.000	9.880	1	0	BELOH 0 .013	.000	.000	.000	.000	.000	.000
										RADIUS .000	ANGLE .000		
ELEMENT NO	11	IS A REACH	*	*	*								
		U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H
			583.000	11.010	1		.013			.000	.000	.000	0
ELEMENT NO	12	IS A REACH	*	*	*								
		U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H
			604.720	17.560	1		.013			.000	.000	.000	0
ELEMENT NO	13	IS A SYSTEM HEADWORKS						*					
		U/S DATA	STATION	INVERT	SECT				W S ELEV				
			604.720	17.560	1				17.560				

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11- 1-2019 Time: 9:32:58

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
80.020	-4.300	8.710	4.410	48.46	27.42	11.68	16.09	.00	1.50	.00	1.500	.000	.00	1 .0
22.500	.1000					.2128	4.79	8.71	.00	1.50	.013	.00	.00	PIPE
102.520	-2.050	11.249	9.199	48.46	27.42	11.68	20.88	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0998					.1644	.66	11.25	.00		.013	.00	.00	PIPE
106.530	-1.650	22.138	20.488	35.77	20.24	6.36	26.85	.00	1.50	.00	1.500	.000	.00	1 .0
3.470	.1009					.1160	.40	22.14	.00	1.37	.013	.00	.00	PIPE
110.000	-1.300	22.190	20.890	35.77	20.24	6.36	27.25	.00	1.50	.00	1.500	.000	.00	1 .0
29.000	.1114					.1160	3.36	22.19	.00	1.26	.013	.00	.00	PIPE
139.000	1.930	22.323	24.253	35.77	20.24	6.36	30.62	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.1125					.1160	.46	22.32	.00		.013	.00	.00	PIPE
143.000	2.380	22.337	24.717	35.77	20.24	6.36	31.08	.00	1.50	.00	1.500	.000	.00	1 .0
18.240	.1113					.1160	2.12	22.34	.00	1.26	.013	.00	.00	PIPE
161.240	4.410	22.422	26.832	35.77	20.24	6.36	33.19	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0440					.0628	.29	22.42	.00		.013	.00	.00	PIPE
165.790	4.610	31.078	35.688	10.35	5.86	.53	36.22	.00	1.24	.00	1.500	.000	.00	1 .0
282.210	.0185					.0097	2.74	31.08	.00	.95	.013	.00	.00	PIPE
448.000	9.820	28.608	38.428	10.35	5.86	.53	38.96	.00	1.24	.00	1.500	.000	.00	1 .0
JUNCT STR	.0150					.0097	.04	28.61	.00		.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11- 1-2019 Time: 9:32:58

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
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Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	BE10H							ZL	Prs/Pip
							Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZR		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
452.000	9.880	28.586	38.466	10.35	5.86	.53	39.00	.00	1.24	.00	1.500	.000	.00	1 .0	
131.000	.0086					.0097	1.27	28.59	.00	1.34	.013	.00	.00	PIPE	
583.000	11.010	28.728	39.738	10.35	5.86	.53	40.27	.00	1.24	.00	1.500	.000	.00	1 .0	
21.720	.3016					.0097	.21	28.73	.00	.43	.013	.00	.00	PIPE	
604.720	17.560	22.389	39.949	10.35	5.86	.53	40.48	.00	1.24	.00	1.500	.000	.00	1 .0	

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CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.500														
CD	2	4	1			1.500														
CD	3	4	1			1.250														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B EXISTING CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	7.130
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING								
2	IS	A	REACH	U/S DATA	102.520	-2.050	1	.013
3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1	12.690
4	IS	A	REACH	U/S DATA	110.000	-1.300	1	.013
5	IS	A	REACH	U/S DATA	139.000	1.930	1	.013
6	IS	A	JUNCTION	U/S DATA	143.000	2.380	1	25.420
7	IS	A	REACH	U/S DATA	161.240	4.410	1	.013
8	IS	A	JUNCTION	U/S DATA	165.790	4.610	1	25.420

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	448.000	9.820	1	.013	.000	.000	.000
10	IS	A	JUNCTION	U/S DATA							

			452.000	9.880	1	0	BE10L 0 .013	.000	.000	.000	.000	.000	.000
										RADIUS .000	ANGLE .000		
ELEMENT NO	11	IS A REACH	*	*	*								
		U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H
			583.000	11.010	1		.013			.000	.000	.000	0
ELEMENT NO	12	IS A REACH	*	*	*								
		U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H
			604.720	17.560	1		.013			.000	.000	.000	0
ELEMENT NO	13	IS A SYSTEM HEADWORKS						*					
		U/S DATA	STATION	INVERT	SECT				W S ELEV				
			604.720	17.560	1				17.560				

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

Date:12- 2-2019 Time: 9: 9:43

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
80.020	-4.300	11.430	7.130	48.46	27.42	11.68	18.81	.00	1.50	.00	1.500	.000	.00	1 .0
22.500	.1000					.2128	4.79	11.43	.00	1.50	.013	.00	.00	PIPE
102.520	-2.050	13.969	11.919	48.46	27.42	11.68	23.60	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0998					.1644	.66	13.97	.00		.013	.00	.00	PIPE
106.530	-1.650	24.858	23.208	35.77	20.24	6.36	29.57	.00	1.50	.00	1.500	.000	.00	1 .0
3.470	.1009					.1160	.40	24.86	.00	1.37	.013	.00	.00	PIPE
110.000	-1.300	24.910	23.610	35.77	20.24	6.36	29.97	.00	1.50	.00	1.500	.000	.00	1 .0
29.000	.1114					.1160	3.36	24.91	.00	1.26	.013	.00	.00	PIPE
139.000	1.930	25.043	26.973	35.77	20.24	6.36	33.34	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.1125					.1160	.46	25.04	.00		.013	.00	.00	PIPE
143.000	2.380	25.057	27.437	35.77	20.24	6.36	33.80	.00	1.50	.00	1.500	.000	.00	1 .0
18.240	.1113					.1160	2.12	25.06	.00	1.26	.013	.00	.00	PIPE
161.240	4.410	25.142	29.552	35.77	20.24	6.36	35.91	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0440					.0628	.29	25.14	.00		.013	.00	.00	PIPE
165.790	4.610	33.798	38.408	10.35	5.86	.53	38.94	.00	1.24	.00	1.500	.000	.00	1 .0
282.210	.0185					.0097	2.74	33.80	.00	.95	.013	.00	.00	PIPE
448.000	9.820	31.328	41.148	10.35	5.86	.53	41.68	.00	1.24	.00	1.500	.000	.00	1 .0
JUNCT STR	.0150					.0097	.04	31.33	.00		.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

Date:12- 2-2019 Time: 9: 9:43

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
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Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	BE10L							ZL	Prs/Pip
							Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZR		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
452.000	9.880	31.306	41.186	10.35	5.86	.53	41.72	.00	1.24	.00	1.500	.000	.00	1 .0	
131.000	.0086					.0097	1.27	31.31	.00	1.34	.013	.00	.00	PIPE	
583.000	11.010	31.448	42.458	10.35	5.86	.53	42.99	.00	1.24	.00	1.500	.000	.00	1 .0	
21.720	.3016					.0097	.21	31.45	.00	.43	.013	.00	.00	PIPE	
604.720	17.560	25.109	42.669	10.35	5.86	.53	43.20	.00	1.24	.00	1.500	.000	.00	1 .0	

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CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.500															
CD	3	4	1			1.250															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B EXISTING CONDITION
 HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	4.410
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING								
2	IS	A	REACH	U/S DATA	102.520	-2.050	1	.013
3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1	2 0 .013
4	IS	A	REACH	U/S DATA	110.000	-1.300	1	.013
5	IS	A	REACH	U/S DATA	139.000	1.930	1	.013
6	IS	A	JUNCTION	U/S DATA	143.000	2.380	1	0 0 .013
7	IS	A	REACH	U/S DATA	161.240	4.410	1	.013
8	IS	A	JUNCTION	U/S DATA	165.790	4.610	1	3 0 .013

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N
9	IS	A	REACH	U/S DATA	448.000	9.820	1	.013
10	IS	A	JUNCTION	U/S DATA				Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4

		452.000	9.880	1	0	BE00H		.000	.000	.000	.000	.000	.000
						0	.013			RADIUS	ANGLE		
										.000	.000		
										.000	.000		
ELEMENT NO	11 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT		N				RADIUS	ANGLE	ANG PT	MAN H
		583.000	11.010	1		.013				.000	.000	.000	0
ELEMENT NO	12 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT		N				RADIUS	ANGLE	ANG PT	MAN H
		604.720	17.560	1		.013				.000	.000	.000	0
ELEMENT NO	13 IS A SYSTEM HEADWORKS							*					
	U/S DATA	STATION	INVERT	SECT						W S ELEV			
		604.720	17.560	1						17.560			

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11- 1-2019 Time:10:56:59

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
80.020	-4.300	8.710	4.410	76.15	43.09	28.83	33.24	.00	1.50	.00	1.500	.000	.00	1 .0
22.500	.1000					.5255	11.82	8.71	.00	1.50	.013	.00	.00	PIPE
102.520	-2.050	18.285	16.235	76.15	43.09	28.83	45.07	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0998					.4056	1.63	18.28	.00		.013	.00	.00	PIPE
106.530	-1.650	45.836	44.186	56.14	31.77	15.67	59.86	.00	1.50	.00	1.500	.000	.00	1 .0
3.470	.1009					.2856	.99	45.84	.00	1.50	.013	.00	.00	PIPE
110.000	-1.300	46.477	45.177	56.14	31.77	15.67	60.85	.00	1.50	.00	1.500	.000	.00	1 .0
29.000	.1114					.2856	8.28	46.48	.00	1.50	.013	.00	.00	PIPE
139.000	1.930	51.531	53.461	56.14	31.77	15.67	69.13	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.1125					.2856	1.14	51.53	.00		.013	.00	.00	PIPE
143.000	2.380	52.223	54.603	56.14	31.77	15.67	70.27	.00	1.50	.00	1.500	.000	.00	1 .0
18.240	.1113					.2856	5.21	52.22	.00	1.50	.013	.00	.00	PIPE
161.240	4.410	55.403	59.813	56.14	31.77	15.67	75.48	.00	1.50	.00	1.500	.000	.00	1 .0
JUNCT STR	.0440					.1546	.70	55.40	.00		.013	.00	.00	PIPE
165.790	4.610	77.012	81.622	16.16	9.14	1.30	82.92	.00	1.43	.00	1.500	.000	.00	1 .0
282.210	.0185					.0237	6.68	77.01	.00	1.50	.013	.00	.00	PIPE
448.000	9.820	78.481	88.301	16.16	9.14	1.30	89.60	.00	1.43	.00	1.500	.000	.00	1 .0
JUNCT STR	.0150					.0237	.09	78.48	.00		.013	.00	.00	PIPE

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B EXISTING CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11- 1-2019 Time:10:56:59

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
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BEO0H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
452.000	9.880	78.516	88.396	16.16	9.14	1.30	89.69	.00	1.43	.00	1.500	.000	.00	1 .0
131.000	.0086					.0237	3.10	78.52	.00	1.50	.013	.00	.00	PIPE
583.000	11.010	80.486	91.496	16.16	9.14	1.30	92.79	.00	1.43	.00	1.500	.000	.00	1 .0
21.720	.3016					.0237	.51	80.49	.00	.54	.013	.00	.00	PIPE
604.720	17.560	74.450	92.010	16.16	9.14	1.30	93.31	.00	1.43	.00	1.500	.000	.00	1 .0

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**EXISTING CONDITION
COMMERCIAL CORE
RETAIL AREA**

COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C EXISTING CONDITION MODEL

STATION	INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) PER RM EX 10-YR	FLOW (CFS) PER RM EX 100-YR	DESCRIPTION
138.73	-9.5	-7.20	-	-7.2	160			AS-built
175.48	-7.64	-5.34	-	-5.34				AS-built
217.70			1.69	1.69	158	1.16	1.87	Elevation per field data. Different from asbuilts information.
222.36			2.19	2.19				Elevation per field data. Different from asbuilts information.
242.25			-	2.43				Interpolated. JS assumed at this location
246.91			-	2.49	157	1.46	2.16	Interpolated. JS assumed at this location
300.28			-	3.13				Interpolated. JS assumed at this location
304.94			-	3.18	155	4.71	7.72	Interpolated. JS assumed at this location
423.65			-	4.61				Interpolated. JS assumed at this location
425.65			-	4.64				Interpolated. JS assumed at this location
544.95			6.07	6.07				Elevation per field data. Different from asbuilts information.
549.61			6.09	6.09				Elevation per field data. Different from asbuilts information.
549.80				6.09				
980.00			7.43	7.43	153	348.9	563.71	Elevation per field data. Different from asbuilts information. Upstream control.

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT	1 BASE DIAMETER	ZL WIDTH	ZR WIDTH	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			5.000														
CD	2	4	1			.500														
CD	3	4	1			1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE C EXISTING CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
1	IS	A	SYSTEM OUTLET	U/S DATA	138.730	-7.200	1	4.400								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																
ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H					
2	IS	A	REACH	U/S DATA	175.480	-5.340	1	.000	.000	.000	0					
ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H					
3	IS	A	REACH	U/S DATA	217.700	1.690	1	.000	.000	.000	0					
ELEMENT NO	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
4	IS	A	JUNCTION	U/S DATA	222.360	2.190	1	0	0	.013	.000	.000	.000	.000	.000	.000
ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H					
5	IS	A	REACH	U/S DATA	242.250	2.430	1	.000	.000	.000	0					
ELEMENT NO	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
6	IS	A	JUNCTION	U/S DATA	246.910	2.490	1	2	0	.013	1.160	.000	4.990	.088	.340	.000
ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H					
7	IS	A	REACH	U/S DATA	300.280	3.130	1	.000	.000	.000	0					
ELEMENT NO	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
8	IS	A	JUNCTION	U/S DATA	304.940	3.180	1	2	0	.013	1.460	.000	3.680	.048	.087	.000

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H					
9	IS	A	REACH	U/S DATA	423.650	4.510	1	.000	.000	.000	0					
ELEMENT NO	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
10	IS	A	JUNCTION	U/S DATA												

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-14-2019 Time: 3: 5:24

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
138.730	-7.200	11.600	4.400	356.23	18.14	5.11	9.51	.00	4.82	.00	5.000	.000	.00	1 .0
36.750	.0506					.0187	.69	11.60	.00	2.81	.013	.00	.00	PIPE
175.480	-5.340	10.428	5.088	356.23	18.14	5.11	10.20	.00	4.82	.00	5.000	.000	.00	1 .0
13.765	.1665					.0187	.26	10.43	.00	1.99	.013	.00	.00	PIPE
189.245	-3.048	8.393	5.345	356.23	18.14	5.11	10.46	.00	4.82	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
189.245	-3.048	3.189	.141	356.23	26.95	11.28	11.42	.00	4.82	4.81	5.000	.000	.00	1 .0
1.707	.1665					.0340	.06	3.19	2.86	1.99	.013	.00	.00	PIPE
190.952	-2.764	3.221	.457	356.23	26.64	11.02	11.48	.00	4.82	4.79	5.000	.000	.00	1 .0
6.409	.1665					.0317	.20	3.22	2.81	1.99	.013	.00	.00	PIPE
197.362	-1.696	3.359	1.662	356.23	25.40	10.02	11.68	.00	4.82	4.70	5.000	.000	.00	1 .0
5.517	.1665					.0282	.16	3.36	2.59	1.99	.013	.00	.00	PIPE
202.879	-.778	3.506	2.728	356.23	24.22	9.11	11.84	.00	4.82	4.58	5.000	.000	.00	1 .0
4.729	.1665					.0252	.12	3.51	2.38	1.99	.013	.00	.00	PIPE
207.608	.010	3.666	3.675	356.23	23.09	8.28	11.95	.00	4.82	4.42	5.000	.000	.00	1 .0
4.018	.1665					.0225	.09	3.67	2.18	1.99	.013	.00	.00	PIPE
211.626	.679	3.840	4.518	356.23	22.02	7.53	12.04	.00	4.82	4.22	5.000	.000	.00	1 .0
3.359	.1665					.0203	.07	3.84	1.98	1.99	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-14-2019 Time: 3: 5:24

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

CE10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
214.985	1.238	4.033	5.271	356.23	20.99	6.84	12.11	.00	4.82	3.95	5.000	.000	.00	1 .0
2.715	.1665					.0184	.05	4.03	1.78	1.99	.013	.00	.00	PIPE
217.700	1.690	4.253	5.943	356.23	20.01	6.22	12.16	.00	4.82	3.56	5.000	.000	.00	1 .0
JUNCT STR	.1073					.0170	.08	4.25	1.58		.013	.00	.00	PIPE
222.360	2.190	4.821	7.011	356.23	18.35	5.23	12.24	.00	4.82	1.86	5.000	.000	.00	1 .0
11.871	.0121					.0172	.20	4.82	1.00	5.00	.013	.00	.00	PIPE
234.231	2.333	5.000	7.333	356.23	18.14	5.11	12.44	.00	4.82	.00	5.000	.000	.00	1 .0
8.019	.0121					.0184	.15	5.00	.00	5.00	.013	.00	.00	PIPE
242.250	2.430	5.053	7.483	356.23	18.14	5.11	12.59	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0129					.0186	.09	5.05	.00		.013	.00	.00	PIPE
246.910	2.490	5.136	7.626	355.07	18.08	5.08	12.70	.00	4.82	.00	5.000	.000	.00	1 .0
53.370	.0120					.0186	.99	5.14	.00	5.00	.013	.00	.00	PIPE
300.280	3.130	5.488	8.618	355.07	18.08	5.08	13.70	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0107					.0185	.09	5.49	.00		.013	.00	.00	PIPE
304.940	3.180	5.590	8.770	353.61	18.01	5.04	13.81	.00	4.82	.00	5.000	.000	.00	1 .0
118.710	.0112					.0184	2.19	5.59	.00	5.00	.013	.00	.00	PIPE
423.650	4.510	6.449	10.959	353.61	18.01	5.04	15.99	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0650					.0182	.04	6.45	.00		.013	.00	.00	PIPE

FILE: CE10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-14-2019 Time: 3: 5:24

DANA POINT HARBOR COMMERCIAL CORE AREA
 STORM DRAIN LINE C EXISTING CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
425.650	4.640	6.443	11.083	348.90	17.77	4.90	15.99	.00	4.81	.00	5.000	.000	.00	1 .0
119.300	.0120					.0179	2.14	6.44	.00	5.00	.013	.00	.00	PIPE

															CE10H	
544.950	6.070	7.154	13.224	348.90	17.77	4.90	18.13	.00	4.81	.00	5.000	.000	.00	1	.0	
JUNCT STR	.0043					.0179	.08	7.15	.00		.013	.00	.00	PIPE		
549.610	6.090	7.217	13.307	348.90	17.77	4.90	18.21	.00	4.81	.00	5.000	.000	.00	1	.0	
.190	.0000					.0179	.00	7.22	.00	.00	.013	.00	.00	PIPE		
549.800	6.090	7.531	13.621	348.90	17.77	4.90	18.52	.00	4.81	.00	5.000	.000	.00	1	.0	
430.200	.0000					.0090	4.93	7.53	.00	.00	.013	.00	.00	PIPE		
980.000	7.430	7.531	14.961	348.90	17.77	4.90	19.86	.00	4.81	.00	5.000	.000	.00	1	.0	

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DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C EXISTING CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

138.73	.I		CH			W			E					.R	
155.90	.													.	
173.07	.													.	
190.24	.	I		CH		W			E					.R	
207.41	.		I		H	W			E					.R	
224.57	.		I		W	H			E					.R	
241.74	.		I		W	H			E					.R	
258.91	.			I		W	H		E					.R	
276.08	.			I		W	CH		E					.R	

CE10H

293.25	.	I	W	CH	E	.	R
310.42	.	I	W	CH	E	.	R
327.59	.	I	W	CH	E	.	R
344.76	.	I	W	CH	E	.	JX
361.92	.	I	WH	E	.	R	
379.09	.	I	H	E	.	R	
396.26	.	I	CH	E	.	JX	
413.43	.	I	CH	E	.	R	
430.60	.	I	CH	W	E	.	JX
447.77	.	I	H	W	E	.	R
464.94	.	I	H	W	E	.	JX
482.11	.	I	CH	W	E	.	R
499.27	.					.	
516.44	.					.	
533.61	.					.	
550.78	.	I	CH	W	E	.	JX
567.95	.	I	CH	W	E	.	R
585.12	.	I	CH	W	E	.	R
602.29	.					.	

CE10H

619.46	.	.
636.62	.	.
653.79	.	.
670.96	.	.
688.13	.	.
705.30	.	.
722.47	.	.
739.64	.	.
756.81	.	.
773.97	.	.
791.14	.	.
808.31	.	.
825.48	.	.
842.65	.	.
859.82	.	.
876.99	.	.
894.16	.	.
911.32	.	.

						CE10H						
928.49	.											.
945.66	.											.
962.83	.											.
980.00	.					I		CH	W			E. R
		-7.200	-4.494	-1.787	.919	3.625	6.332	9.038	11.744	14.450	17.157	19.863

N O T E S

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE ELEVATION
- S = SUPER-ELEVATION
- H = HEIGHT OF CHANNEL
- E = ENERGY GRADE LINE
- X = CURVES CROSSING OVER
- B = BRIDGE ENTRANCE OR EXIT
- Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT	1 BASE DIAMETER	ZL WIDTH	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			5.000															
CD	2	4	1			.500															
CD	3	4	1			1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE C EXISTING CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
1	IS	A	SYSTEM OUTLET	U/S DATA	138.730	-7.200	1	7.100
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING								
2	IS	A	REACH	U/S DATA	175.480	-5.340	1	.013
3	IS	A	REACH	U/S DATA	217.700	1.690	1	.013
4	IS	A	JUNCTION	U/S DATA	222.360	2.190	1	.013
5	IS	A	REACH	U/S DATA	242.250	2.430	1	.013
6	IS	A	JUNCTION	U/S DATA	246.910	2.490	1	.013
7	IS	A	REACH	U/S DATA	300.280	3.130	1	.013
8	IS	A	JUNCTION	U/S DATA	304.940	3.180	1	.013

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	423.650	4.510	1	.013	.000	.000	.000	0
10	IS	A	JUNCTION	U/S DATA								

			425.650	4.640	1	2	0	CE10L .013	4.710	.000	7.140	-.079	.564	.000
											RADIUS	ANGLE		
											.000	.000		
ELEMENT NO	11 IS A	REACH	*	*	*									
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			544.950	6.070	1			.013			.000	.000	.000	0
ELEMENT NO	12 IS A	JUNCTION	*	*	*	*	*		*	*	*	*	*	
		U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			549.610	6.090	1	0	0	.013	.000	.000	.000	.000	.000	.000
											RADIUS	ANGLE		
											.000	.000		
ELEMENT NO	13 IS A	REACH	*	*	*									
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			549.800	6.090	1			.013			.000	.000	-19.145	0
ELEMENT NO	14 IS A	SYSTEM HEADWORKS	*	*	*				*	*				
		U/S DATA	STATION	INVERT	SECT						W S ELEV			
			980.000	7.430	1						7.400			

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

Date:12- 3-2019 Time:11:56:40

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
138.730	-7.200	14.300	7.100	356.23	18.14	5.11	12.21	.00	4.82	.00	5.000	.000	.00	1 .0
36.750	.0506					.0187	.69	14.30	.00	2.81	.013	.00	.00	PIPE
175.480	-5.340	13.128	7.788	356.23	18.14	5.11	12.90	.00	4.82	.00	5.000	.000	.00	1 .0
42.220	.1665					.0187	.79	13.13	.00	1.99	.013	.00	.00	PIPE
217.700	1.690	6.887	8.577	356.23	18.14	5.11	13.69	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.1073					.0187	.09	6.89	.00		.013	.00	.00	PIPE
222.360	2.190	6.475	8.665	356.23	18.14	5.11	13.78	.00	4.82	.00	5.000	.000	.00	1 .0
19.890	.0121					.0187	.37	6.47	.00	5.00	.013	.00	.00	PIPE
242.250	2.430	6.607	9.037	356.23	18.14	5.11	14.15	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0129					.0186	.09	6.61	.00		.013	.00	.00	PIPE
246.910	2.490	6.689	9.179	355.07	18.08	5.08	14.26	.00	4.82	.00	5.000	.000	.00	1 .0
53.370	.0120					.0186	.99	6.69	.00	5.00	.013	.00	.00	PIPE
300.280	3.130	7.041	10.171	355.07	18.08	5.08	15.25	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0107					.0185	.09	7.04	.00		.013	.00	.00	PIPE
304.940	3.180	7.144	10.324	353.61	18.01	5.04	15.36	.00	4.82	.00	5.000	.000	.00	1 .0
118.710	.0112					.0184	2.19	7.14	.00	5.00	.013	.00	.00	PIPE
423.650	4.510	8.002	12.512	353.61	18.01	5.04	17.55	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0650					.0182	.04	8.00	.00		.013	.00	.00	PIPE

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 +2' RISE

Date:12- 3-2019 Time:11:56:40

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	CE10L							ZL	Prs/Pip
							Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZR		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
425.650	4.640	7.996	12.636	348.90	17.77	4.90	17.54	.00	4.81	.00	5.000	.000	.00	1 .0	
119.300	.0120					.0179	2.14	8.00	.00	5.00	.013	.00	.00	PIPE	
544.950	6.070	8.707	14.777	348.90	17.77	4.90	19.68	.00	4.81	.00	5.000	.000	.00	1 .0	
JUNCT STR	.0043					.0179	.08	8.71	.00		.013	.00	.00	PIPE	
549.610	6.090	8.771	14.861	348.90	17.77	4.90	19.76	.00	4.81	.00	5.000	.000	.00	1 .0	
.190	.0000					.0179	.00	8.77	.00	.00	.013	.00	.00	PIPE	
549.800	6.090	9.084	15.174	348.90	17.77	4.90	20.08	.00	4.81	.00	5.000	.000	.00	1 .0	
430.200	.0000					.0090	4.93	9.08	.00	.00	.013	.00	.00	PIPE	
980.000	7.430	9.084	16.514	348.90	17.77	4.90	21.42	.00	4.81	.00	5.000	.000	.00	1 .0	

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT	1 BASE DIAMETER	ZL WIDTH	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			5.000															
CD	2	4	1			.500															
CD	3	4	1			1.000															

W S P G W WATER SURFACE PROFILE - TITLE CARD LISTING PAGE NO 1

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE C EXISTING CONDITION
 HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W WATER SURFACE PROFILE - ELEMENT CARD LISTING PAGE NO 2

ELEMENT NO	IS	A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV	THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING												
1	IS	A	SYSTEM OUTLET	138.730	-7.200	1	4.400													
2	IS	A	REACH	175.480	-5.340	1	.013	RADIUS	ANGLE	ANG PT	MAN H									
3	IS	A	REACH	217.700	1.690	1	.013	.000	.000	.000	0									
4	IS	A	JUNCTION	222.360	2.190	1	.013	.000	.000	.000	.000	PHI 3	PHI 4							
5	IS	A	REACH	242.250	2.430	1	.013	.000	.000	.000	0									
6	IS	A	JUNCTION	246.910	2.490	1	.013	1.870	.000	4.990	.088	.340	.000							
7	IS	A	REACH	300.280	3.130	1	.013	.000	.000	.000	0									
8	IS	A	JUNCTION	304.940	3.180	1	.013	2.160	.000	3.680	.048	.087	.000							

W S P G W WATER SURFACE PROFILE - ELEMENT CARD LISTING PAGE NO 3

9	IS	A	REACH	423.650	4.510	1	.013	.000	.000	.000	0							
10	IS	A	JUNCTION									PHI 3	PHI 4					

		425.650	4.640	1	2	0	.013	7.720	.000	7.140	-.079	.564	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	11 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		544.950	6.070	1			.013			.000	.000	.000	0
ELEMENT NO	12 IS A JUNCTION	*	*	*	*			*		*		*	
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		549.610	6.090	1	0	0	.013	.000	.000	.000	.000	.000	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	13 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		549.800	6.090	1			.013			.000	.000	-19.145	0
ELEMENT NO	14 IS A SYSTEM HEADWORKS			*				*					
	U/S DATA	STATION	INVERT	SECT						W S ELEV			
		980.000	7.430	1						7.400			

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-14-2019 Time: 3: 6:24

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Prs/Pip	Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
138.730	-7.200	11.600	4.400	575.46	29.31	13.34	17.74	.00	4.97	.00	5.000	.000	.00	1	.0
36.750	.0506					.0488	1.79	11.60	.00	4.02	.013	.00	.00	PIPE	
175.480	-5.340	11.534	6.194	575.46	29.31	13.34	19.53	.00	4.97	.00	5.000	.000	.00	1	.0
42.220	.1665					.0488	2.06	11.53	.00	2.62	.013	.00	.00	PIPE	
217.700	1.690	6.565	8.255	575.46	29.31	13.34	21.59	.00	4.97	.00	5.000	.000	.00	1	.0
JUNCT STR	.1073					.0488	.23	6.57	.00		.013	.00	.00	PIPE	
222.360	2.190	6.293	8.483	575.46	29.31	13.34	21.82	.00	4.97	.00	5.000	.000	.00	1	.0
19.890	.0121					.0488	.97	6.29	.00	5.00	.013	.00	.00	PIPE	
242.250	2.430	7.024	9.454	575.46	29.31	13.34	22.79	.00	4.97	.00	5.000	.000	.00	1	.0
JUNCT STR	.0129					.0487	.23	7.02	.00		.013	.00	.00	PIPE	
246.910	2.490	7.336	9.826	573.59	29.21	13.25	23.08	.00	4.97	.00	5.000	.000	.00	1	.0
53.370	.0120					.0485	2.59	7.34	.00	5.00	.013	.00	.00	PIPE	
300.280	3.130	9.284	12.414	573.59	29.21	13.25	25.67	.00	4.97	.00	5.000	.000	.00	1	.0
JUNCT STR	.0107					.0483	.23	9.28	.00		.013	.00	.00	PIPE	
304.940	3.180	9.621	12.801	571.43	29.10	13.15	25.95	.00	4.97	.00	5.000	.000	.00	1	.0
118.710	.0112					.0481	5.71	9.62	.00	5.00	.013	.00	.00	PIPE	
423.650	4.510	14.006	18.516	571.43	29.10	13.15	31.67	.00	4.97	.00	5.000	.000	.00	1	.0
JUNCT STR	.0650					.0475	.09	14.01	.00		.013	.00	.00	PIPE	

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C EXISTING CONDITION
100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-14-2019 Time: 3: 6:24

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No	Wth
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Station L/Elem	Elev Ch Slope	(FT)	Elev	(CFS)	(FPS)	Head	CE00H		Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
							Grd.El.	Elev						
*****	*****	*****	*****	*****	*****	SF Ave	HF	*****	*****	*****	*****	*****	*****	*****
425.650	4.640	14.324	18.964	563.71	28.71	12.80	31.76	.00	4.97	.00	5.000	.000	.00	1 .0
119.300	.0120					.0468	5.59	14.32	.00	5.00	.013	.00	.00	PIPE
544.950	6.070	18.483	24.553	563.71	28.71	12.80	37.35	.00	4.97	.00	5.000	.000	.00	1 .0
JUNCT STR	.0043					.0468	.22	18.48	.00		.013	.00	.00	PIPE
549.610	6.090	18.681	24.771	563.71	28.71	12.80	37.57	.00	4.97	.00	5.000	.000	.00	1 .0
.190	.0000					.0468	.01	18.68	.00	.00	.013	.00	.00	PIPE
549.800	6.090	19.498	25.588	563.71	28.71	12.80	38.39	.00	4.97	.00	5.000	.000	.00	1 .0
430.200	.0000					.0234	12.88	19.50	.00	.00	.013	.00	.00	PIPE
980.000	7.430	19.498	26.928	563.71	28.71	12.80	39.73	.00	4.97	.00	5.000	.000	.00	1 .0

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DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C EXISTING CONDITION

100-YEAR STORM - MHW CONDITION WSE=4.41

138.73	.I	H	W	E	.	R
155.90	.				.	
173.07	.				.	
190.24	. I	H	W	E	.	R
207.41	.				.	
224.57	.	I	H W	E	.	JX

241.74	.	I	H	W	CE00H	E	.	R
258.91	.	I	H	W		E	.	JX
276.08	.	I	H	W		E	.	R
293.25	.						.	
310.42	.	I	H	W		E	.	JX
327.59	.	I	H	W		E	.	R
344.76	.						.	
361.92	.						.	
379.09	.						.	
396.26	.						.	
413.43	.						.	
430.60	.	I	H	W		E	.	JX
447.77	.	I	H	W		E	.	R
464.94	.						.	
482.11	.						.	
499.27	.						.	
516.44	.						.	
533.61	.						.	
550.78	.	I	H			W	E	JX

CE00H

567.95	.	I	H	W	E	.	R
585.12	.	I	H	W	E	.	R
602.29	.					.	
619.46	.					.	
636.62	.					.	
653.79	.					.	
670.96	.					.	
688.13	.					.	
705.30	.					.	
722.47	.					.	
739.64	.					.	
756.81	.					.	
773.97	.					.	
791.14	.					.	
808.31	.					.	
825.48	.					.	
842.65	.					.	
859.82	.					.	
876.99	.					.	

CE00H

894.16	.											.	
911.32	.											.	
928.49	.											.	
945.66	.											.	
962.83	.											.	
980.00	.		I	H				W				E.	R
		-7.200	-2.507	2.185	6.878	11.571	16.264	20.956	25.649	30.342	35.034	39.727	

N O T E S

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE ELEVATION
- S = SUPER-ELEVATION
- H = HEIGHT OF CHANNEL
- E = ENERGY GRADE LINE
- X = CURVES CROSSING OVER
- B = BRIDGE ENTRANCE OR EXIT
- Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

**PROPOSED CONDITION
DRY STACK
LEASE AREA**

DANA POINT HARBOR HYDRAULIC LINE B PROPOSED CONDITION MODEL								
STATION		INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) SAH PR 10-YR	FLOW (CFS) SAH 100-YR
EX	80.02	-6.6	-4.3	-	-4.3			
EX	102.52			-	-2.05			
EX	106.53			-	-1.65			
EX	110.00	-3.6	-1.3	-	-1.3			
PR	115.63							
PR	120.33					65 to 22 65 to 22	0.8 1.8	0.9 2.1
EX	139.00			-	1.93			
EX	143.00			-	2.38			
EX	161.24			4.41	4.41			
EX	165.79			4.61	4.61	20.1	0.5	1.2
PR	190.19							
PR	194.87					40 to 20 56 to 20	1.1 1.9	5.3 6.2
PR	368.64							
PR	373.32					18.2 to 20	1.1	6.5
EX	448.00			-	9.82			
EX	452.00			-	9.88			
EX	583.00	8.71	11.01	-	11.01			
PR	583.00							
PR	589.60					18.1	2.6	7.2
DIVERSION STRUCTURE - WSPG MODEL UPSSTREAM								
PR	591.30							
EX	604.72	18.2	20.5	17.56	17.56	18 to 20	10.35*	16.16*
SAH: SMALL AREA HYDROGRAPH. TAKEN FROM RATIONAL METHOD ANALYSIS.							*FLOW	

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT	1 BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.000															
CD	3	4	1			1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B PROPOSED CONDITION

HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	4.410
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING								
2	IS	A	REACH	U/S DATA	102.520	-2.050	1	.013
3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1	.013
4	IS	A	REACH	U/S DATA	110.000	-1.300	1	.013
5	IS	A	REACH	U/S DATA	115.630	-.670	1	.013
6	IS	A	JUNCTION	U/S DATA	120.330	-.150	1	.013
7	IS	A	REACH	U/S DATA	139.000	1.930	1	.013
8	IS	A	JUNCTION	U/S DATA	143.000	2.380	1	.013

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N
9	IS	A	REACH	U/S DATA	161.240	4.410	1	.013
10	IS	A	JUNCTION	U/S DATA				

		BP10H1											
		165.790	4.610	1	3	0	.013	.500	.000	5.800	.000	-70.500	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	11 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		190.190	5.060	1			.013			.000	.000	.000	0
ELEMENT NO	12 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		194.870	5.150	1	2	3	.013	1.100	1.900	5.400	5.400	-45.800	32.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	13 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		368.640	8.360	1			.013			.000	.000	.000	0
ELEMENT NO	14 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		373.320	8.440	1	3	0	.013	1.100	.000	8.690	.000	44.300	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	15 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		448.000	9.820	1			.013			.000	.000	.000	0
ELEMENT NO	16 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		452.000	9.880	1	0	0	.013	.000	.000	.000	.000	.000	.000
										RADIUS	ANGLE		
										.000	.000		
W S P G W													
WATER SURFACE PROFILE - ELEMENT CARD LISTING													
PAGE NO 4													
ELEMENT NO	17 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		583.000	11.010	1			.013			.000	.000	.000	0
ELEMENT NO	18 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		589.600	13.000	1			.013			.000	.000	.000	0
ELEMENT NO	19 IS A SYSTEM HEADWORKS	*	*	*				*					
	U/S DATA	STATION	INVERT	SECT						W S ELEV			
		589.600	13.000	1						13.000			

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-17-2019 Time:11:57:53

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
80.020	-4.300	8.710	4.410	9.80	5.55	.48	4.89	.00	1.21	.00	1.500	.000	.00	1 .0
22.500	.1000					.0087	.20	8.71	.00	.56	.013	.00	.00	PIPE
102.520	-2.050	6.656	4.606	9.80	5.55	.48	5.08	.00	1.21	.00	1.500	.000	.00	1 .0
JUNCT STR	.0998					.0087	.03	6.66	.00		.013	.00	.00	PIPE
106.530	-1.650	6.291	4.641	9.80	5.55	.48	5.12	.00	1.21	.00	1.500	.000	.00	1 .0
3.470	.1009					.0087	.03	6.29	.00	.56	.013	.00	.00	PIPE
110.000	-1.300	5.971	4.671	9.80	5.55	.48	5.15	.00	1.21	.00	1.500	.000	.00	1 .0
5.630	.1119					.0087	.05	5.97	.00	.54	.013	.00	.00	PIPE
115.630	-.670	5.390	4.720	9.80	5.55	.48	5.20	.00	1.21	.00	1.500	.000	.00	1 .0
JUNCT STR	.1106					.0067	.03	5.39	.00		.013	.00	.00	PIPE
120.330	-.150	5.313	5.163	7.20	4.07	.26	5.42	.00	1.04	.00	1.500	.000	.00	1 .0
18.670	.1114					.0047	.09	5.31	.00	.46	.013	.00	.00	PIPE
139.000	1.930	3.321	5.251	7.20	4.07	.26	5.51	.00	1.04	.00	1.500	.000	.00	1 .0
JUNCT STR	.1125					.0047	.02	3.32	.00		.013	.00	.00	PIPE
143.000	2.380	2.890	5.270	7.20	4.07	.26	5.53	.00	1.04	.00	1.500	.000	.00	1 .0
12.116	.1113					.0047	.06	2.89	.00	.46	.013	.00	.00	PIPE
155.116	3.728	1.597	5.326	7.20	4.07	.26	5.58	.00	1.04	.00	1.500	.000	.00	1 .0

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-17-2019 Time:11:57:53

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

BP10H1														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
155.116	3.728	.642	4.370	7.20	9.98	1.55	5.92	.00	1.04	1.48	1.500	.000	.00	1 .0
1.193	.1113					.0305	.04	.64	2.52	.46	.013	.00	.00	PIPE
156.309	3.861	.665	4.527	7.20	9.51	1.40	5.93	.00	1.04	1.49	1.500	.000	.00	1 .0
1.217	.1113					.0268	.03	.67	2.35	.46	.013	.00	.00	PIPE
157.526	3.997	.690	4.687	7.20	9.07	1.28	5.96	.00	1.04	1.50	1.500	.000	.00	1 .0
1.027	.1113					.0235	.02	.69	2.19	.46	.013	.00	.00	PIPE
158.553	4.111	.716	4.827	7.20	8.65	1.16	5.99	.00	1.04	1.50	1.500	.000	.00	1 .0
.866	.1113					.0207	.02	.72	2.04	.46	.013	.00	.00	PIPE
159.419	4.207	.743	4.951	7.20	8.24	1.06	6.01	.00	1.04	1.50	1.500	.000	.00	1 .0
.726	.1113					.0182	.01	.74	1.90	.46	.013	.00	.00	PIPE
160.145	4.288	.772	5.060	7.20	7.86	.96	6.02	.00	1.04	1.50	1.500	.000	.00	1 .0
.603	.1113					.0161	.01	.77	1.77	.46	.013	.00	.00	PIPE
160.748	4.355	.801	5.157	7.20	7.49	.87	6.03	.00	1.04	1.50	1.500	.000	.00	1 .0
.492	.1113					.0142	.01	.80	1.65	.46	.013	.00	.00	PIPE
161.240	4.410	.833	5.243	7.20	7.15	.79	6.04	.00	1.04	1.49	1.500	.000	.00	1 .0
JUNCT STR	.0440					.0140	.06	.83	1.53		.013	.00	.00	PIPE
165.790	4.610	.772	5.382	6.70	7.30	.83	6.21	.00	1.00	1.50	1.500	.000	.00	1 .0
6.026	.0184					.0143	.09	.77	1.65	.72	.013	.00	.00	PIPE

FILE: BP10H1.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:57:53

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
171.816	4.721	.788	5.509	6.70	7.12	.79	6.30	.00	1.00	1.50	1.500	.000	.00	1 .0
7.477	.0184					.0130	.10	.79	1.58	.72	.013	.00	.00	PIPE

BP10H1

179.293	4.859	.819	5.678	6.70	6.79	.72	6.39	.00	1.00	1.49	1.500	.000	.00	1	.0
4.689	.0184					.0114	.05	.82	1.47	.72	.013	.00	.00	PIPE	
183.982	4.946	.851	5.797	6.70	6.48	.65	6.45	.00	1.00	1.49	1.500	.000	.00	1	.0
3.012	.0184					.0101	.03	.85	1.37	.72	.013	.00	.00	PIPE	
186.994	5.001	.885	5.886	6.70	6.17	.59	6.48	.00	1.00	1.48	1.500	.000	.00	1	.0
1.864	.0184					.0089	.02	.89	1.27	.72	.013	.00	.00	PIPE	
188.858	5.035	.921	5.957	6.70	5.89	.54	6.49	.00	1.00	1.46	1.500	.000	.00	1	.0
1.019	.0184					.0079	.01	.92	1.18	.72	.013	.00	.00	PIPE	
189.877	5.054	.959	6.014	6.70	5.61	.49	6.50	.00	1.00	1.44	1.500	.000	.00	1	.0
.313	.0184					.0070	.00	.96	1.09	.72	.013	.00	.00	PIPE	
190.190	5.060	1.001	6.061	6.70	5.35	.44	6.51	.00	1.00	1.41	1.500	.000	.00	1	.0
JUNCT STR	.0192					.0038	.02	1.00	1.00		.013	.00	.00	PIPE	
194.870	5.150	1.402	6.552	3.70	2.15	.07	6.62	.00	.73	.74	1.500	.000	.00	1	.0
4.831	.0185					.0011	.01	1.40	.25	.52	.013	.00	.00	PIPE	
199.701	5.239	1.311	6.550	3.70	2.26	.08	6.63	.00	.73	1.00	1.500	.000	.00	1	.0
3.664	.0185					.0012	.00	1.31	.31	.52	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
203.365	5.307	1.240	6.547	3.70	2.37	.09	6.63	.00	.73	1.14	1.500	.000	.00	1 .0
3.060	.0185					.0013	.00	1.24	.36	.52	.013	.00	.00	PIPE
206.424	5.363	1.178	6.542	3.70	2.48	.10	6.64	.00	.73	1.23	1.500	.000	.00	1 .0
2.646	.0185					.0014	.00	1.18	.40	.52	.013	.00	.00	PIPE
209.070	5.412	1.124	6.536	3.70	2.61	.11	6.64	.00	.73	1.30	1.500	.000	.00	1 .0
2.324	.0185					.0016	.00	1.12	.44	.52	.013	.00	.00	PIPE

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211.395	5.455	1.074	6.529	3.70	2.73	.12	6.65	.00	.73	1.35	1.500	.000	.00	1	.0
2.054	.0185					.0018	.00	1.07	.48	.52	.013	.00	.00	PIPE	
213.449	5.493	1.028	6.521	3.70	2.87	.13	6.65	.00	.73	1.39	1.500	.000	.00	1	.0
.774	.0185					.0020	.00	1.03	.52	.52	.013	.00	.00	PIPE	
214.223	5.507	.985	6.493	3.70	3.01	.14	6.63	.00	.73	1.42	1.500	.000	.00	1	.0
HYDRAULIC JUMP															
214.223	5.507	.521	6.028	3.70	6.78	.71	6.74	.00	.73	1.43	1.500	.000	.00	1	.0
72.987	.0185					.0185	1.35	.52	1.93	.52	.013	.00	.00	PIPE	
287.210	6.856	.521	7.377	3.70	6.78	.71	8.09	.00	.73	1.43	1.500	.000	.00	1	.0
40.868	.0185					.0178	.73	.52	1.93	.52	.013	.00	.00	PIPE	
328.077	7.611	.531	8.142	3.70	6.61	.68	8.82	.00	.73	1.43	1.500	.000	.00	1	.0
18.465	.0185					.0162	.30	.53	1.87	.52	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
346.542	7.952	.550	8.502	3.70	6.30	.62	9.12	.00	.73	1.45	1.500	.000	.00	1 .0
8.428	.0185					.0142	.12	.55	1.74	.52	.013	.00	.00	PIPE
354.970	8.107	.570	8.677	3.70	6.01	.56	9.24	.00	.73	1.46	1.500	.000	.00	1 .0
5.044	.0185					.0124	.06	.57	1.63	.52	.013	.00	.00	PIPE
360.015	8.201	.590	8.791	3.70	5.73	.51	9.30	.00	.73	1.47	1.500	.000	.00	1 .0
3.286	.0185					.0109	.04	.59	1.52	.52	.013	.00	.00	PIPE
363.300	8.261	.612	8.873	3.70	5.46	.46	9.34	.00	.73	1.47	1.500	.000	.00	1 .0
2.231	.0185					.0096	.02	.61	1.42	.52	.013	.00	.00	PIPE
365.531	8.303	.634	8.936	3.70	5.21	.42	9.36	.00	.73	1.48	1.500	.000	.00	1 .0
1.483	.0185					.0084	.01	.63	1.33	.52	.013	.00	.00	PIPE

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367.014	8.330	.657	8.987	3.70	4.97	.38	9.37	.00	.73	1.49	1.500	.000	.00	1	.0
.951	.0185					.0074	.01	.66	1.24	.52	.013	.00	.00	PIPE	
367.964	8.348	.682	9.029	3.70	4.74	.35	9.38	.00	.73	1.49	1.500	.000	.00	1	.0
.515	.0185					.0065	.00	.68	1.15	.52	.013	.00	.00	PIPE	
368.480	8.357	.707	9.064	3.70	4.52	.32	9.38	.00	.73	1.50	1.500	.000	.00	1	.0
.160	.0185					.0057	.00	.71	1.08	.52	.013	.00	.00	PIPE	
368.640	8.360	.735	9.095	3.70	4.30	.29	9.38	.00	.73	1.50	1.500	.000	.00	1	.0
JUNCT STR	.0171					.0033	.02	.73	1.00		.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:57:53

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
373.320	8.440	.942	9.382	2.60	2.23	.08	9.46	.00	.61	1.45	1.500	.000	.00	1 .0	
1.720	.0185					.0013	.00	.94	.44	.43	.013	.00	.00	PIPE	
375.040	8.472	.904	9.376	2.60	2.33	.08	9.46	.00	.61	1.47	1.500	.000	.00	1 .0	
1.562	.0185					.0014	.00	.90	.47	.43	.013	.00	.00	PIPE	
376.601	8.501	.869	9.370	2.60	2.45	.09	9.46	.00	.61	1.48	1.500	.000	.00	1 .0	
1.340	.0185					.0016	.00	.87	.51	.43	.013	.00	.00	PIPE	
377.942	8.525	.836	9.361	2.60	2.57	.10	9.46	.00	.61	1.49	1.500	.000	.00	1 .0	
HYDRAULIC JUMP															
377.942	8.525	.433	8.959	2.60	6.14	.59	9.54	.00	.61	1.36	1.500	.000	.00	1 .0	
3.605	.0185					.0185	.07	.43	1.94	.43	.013	.00	.00	PIPE	
381.546	8.592	.433	9.025	2.60	6.14	.59	9.61	.00	.61	1.36	1.500	.000	.00	1 .0	
33.342	.0185					.0180	.60	.43	1.94	.43	.013	.00	.00	PIPE	
414.888	9.208	.439	9.647	2.60	6.04	.57	10.21	.00	.61	1.36	1.500	.000	.00	1 .0	
18.148	.0185					.0165	.30	.44	1.89	.43	.013	.00	.00	PIPE	

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433.037	9.543	.454	9.998	2.60	5.75	.51	10.51	.00	.61	1.38	1.500	.000	.00	1	.0
7.628	.0185					.0144	.11	.45	1.77	.43	.013	.00	.00	PIPE	
440.665	9.684	.470	10.155	2.60	5.49	.47	10.62	.00	.61	1.39	1.500	.000	.00	1	.0
4.452	.0185					.0126	.06	.47	1.66	.43	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
445.117	9.767	.487	10.253	2.60	5.23	.42	10.68	.00	.61	1.40	1.500	.000	.00	1 .0
2.883	.0185					.0111	.03	.49	1.55	.43	.013	.00	.00	PIPE
448.000	9.820	.504	10.324	2.60	4.99	.39	10.71	.00	.61	1.42	1.500	.000	.00	1 .0
JUNCT STR	.0150					.0095	.04	.50	1.45		.013	.00	.00	PIPE
452.000	9.880	.529	10.409	2.60	4.67	.34	10.75	.00	.61	1.43	1.500	.000	.00	1 .0
25.151	.0086					.0086	.22	.53	1.32	.53	.013	.00	.00	PIPE
477.151	10.097	.529	10.626	2.60	4.67	.34	10.96	.00	.61	1.43	1.500	.000	.00	1 .0
24.605	.0086					.0088	.22	.53	1.32	.53	.013	.00	.00	PIPE
501.756	10.309	.523	10.833	2.60	4.74	.35	11.18	.00	.61	1.43	1.500	.000	.00	1 .0
17.391	.0086					.0096	.17	.52	1.35	.53	.013	.00	.00	PIPE
519.147	10.459	.505	10.965	2.60	4.97	.38	11.35	.00	.61	1.42	1.500	.000	.00	1 .0
9.024	.0086					.0110	.10	.51	1.44	.53	.013	.00	.00	PIPE
528.171	10.537	.488	11.025	2.60	5.21	.42	11.45	.00	.61	1.41	1.500	.000	.00	1 .0
6.587	.0086					.0125	.08	.49	1.54	.53	.013	.00	.00	PIPE
534.758	10.594	.472	11.065	2.60	5.47	.46	11.53	.00	.61	1.39	1.500	.000	.00	1 .0
5.372	.0086					.0143	.08	.47	1.65	.53	.013	.00	.00	PIPE
540.130	10.640	.456	11.096	2.60	5.73	.51	11.61	.00	.61	1.38	1.500	.000	.00	1 .0
4.647	.0086					.0163	.08	.46	1.76	.53	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-17-2019 Time:11:57:53

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave		HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
544.778	10.680	.440	11.121	2.60	6.01	.56	11.68	.00	.61	1.37	1.500	.000	.00	1 .0
4.128	.0086					.0186	.08	.44	1.88	.53	.013	.00	.00	PIPE
548.906	10.716	.425	11.141	2.60	6.31	.62	11.76	.00	.61	1.35	1.500	.000	.00	1 .0
3.745	.0086					.0213	.08	.43	2.01	.53	.013	.00	.00	PIPE
552.650	10.748	.411	11.159	2.60	6.61	.68	11.84	.00	.61	1.34	1.500	.000	.00	1 .0
3.445	.0086					.0243	.08	.41	2.15	.53	.013	.00	.00	PIPE
556.095	10.778	.397	11.175	2.60	6.94	.75	11.92	.00	.61	1.32	1.500	.000	.00	1 .0
3.205	.0086					.0278	.09	.40	2.30	.53	.013	.00	.00	PIPE
559.299	10.806	.384	11.190	2.60	7.27	.82	12.01	.00	.61	1.31	1.500	.000	.00	1 .0
2.993	.0086					.0318	.10	.38	2.45	.53	.013	.00	.00	PIPE
562.293	10.831	.371	11.203	2.60	7.63	.90	12.11	.00	.61	1.29	1.500	.000	.00	1 .0
2.815	.0086					.0364	.10	.37	2.62	.53	.013	.00	.00	PIPE
565.108	10.856	.359	11.215	2.60	8.00	.99	12.21	.00	.61	1.28	1.500	.000	.00	1 .0
2.656	.0086					.0416	.11	.36	2.80	.53	.013	.00	.00	PIPE
567.764	10.879	.347	11.226	2.60	8.39	1.09	12.32	.00	.61	1.27	1.500	.000	.00	1 .0
2.516	.0086					.0476	.12	.35	2.99	.53	.013	.00	.00	PIPE
570.279	10.900	.336	11.236	2.60	8.80	1.20	12.44	.00	.61	1.25	1.500	.000	.00	1 .0
2.385	.0086					.0544	.13	.34	3.19	.53	.013	.00	.00	PIPE

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-17-2019 Time:11:57:53

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
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BP10H1														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
572.664	10.921	.325	11.245	2.60	9.23	1.32	12.57	.00	.61	1.24	1.500	.000	.00	1 .0
2.268	.0086					.0623	.14	.32	3.41	.53	.013	.00	.00	PIPE
574.932	10.940	.314	11.254	2.60	9.68	1.46	12.71	.00	.61	1.22	1.500	.000	.00	1 .0
2.161	.0086					.0712	.15	.31	3.64	.53	.013	.00	.00	PIPE
577.093	10.959	.304	11.263	2.60	10.15	1.60	12.86	.00	.61	1.21	1.500	.000	.00	1 .0
2.061	.0086					.0815	.17	.30	3.88	.53	.013	.00	.00	PIPE
579.154	10.977	.294	11.271	2.60	10.65	1.76	13.03	.00	.61	1.19	1.500	.000	.00	1 .0
1.967	.0086					.0933	.18	.29	4.14	.53	.013	.00	.00	PIPE
581.121	10.994	.284	11.278	2.60	11.17	1.94	13.22	.00	.61	1.18	1.500	.000	.00	1 .0
1.879	.0086					.1068	.20	.28	4.42	.53	.013	.00	.00	PIPE
583.000	11.010	.275	11.285	2.60	11.72	2.13	13.42	.00	.61	1.16	1.500	.000	.00	1 .0
.404	.3015					.1115	.05	.27	4.72	.22	.013	.00	.00	PIPE
583.404	11.132	.278	11.410	2.60	11.53	2.06	13.47	.00	.61	1.17	1.500	.000	.00	1 .0
.894	.3015					.1021	.09	.28	4.62	.22	.013	.00	.00	PIPE
584.297	11.401	.287	11.688	2.60	10.99	1.88	13.56	.00	.61	1.18	1.500	.000	.00	1 .0
.758	.3015					.0892	.07	.29	4.33	.22	.013	.00	.00	PIPE
585.055	11.630	.297	11.927	2.60	10.48	1.71	13.63	.00	.61	1.20	1.500	.000	.00	1 .0
.648	.3015					.0779	.05	.30	4.05	.22	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:57:53

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
585.703	11.825	.307	12.132	2.60	9.99	1.55	13.68	.00	.61	1.21	1.500	.000	.00	1 .0
.559	.3015					.0681	.04	.31	3.80	.22	.013	.00	.00	PIPE

BP10H1

586.263	11.994	.318	12.311	2.60	9.53	1.41	13.72	.00	.61	1.23	1.500	.000	.00	1	.0
.485	.3015					.0595	.03	.32	3.56	.22	.013	.00	.00	PIPE	
586.748	12.140	.328	12.468	2.60	9.08	1.28	13.75	.00	.61	1.24	1.500	.000	.00	1	.0
.422	.3015					.0520	.02	.33	3.33	.22	.013	.00	.00	PIPE	
587.170	12.267	.340	12.607	2.60	8.66	1.17	13.77	.00	.61	1.26	1.500	.000	.00	1	.0
.368	.3015					.0455	.02	.34	3.12	.22	.013	.00	.00	PIPE	
587.538	12.378	.351	12.729	2.60	8.26	1.06	13.79	.00	.61	1.27	1.500	.000	.00	1	.0
.322	.3015					.0398	.01	.35	2.92	.22	.013	.00	.00	PIPE	
587.860	12.475	.363	12.839	2.60	7.87	.96	13.80	.00	.61	1.29	1.500	.000	.00	1	.0
.281	.3015					.0348	.01	.36	2.74	.22	.013	.00	.00	PIPE	
588.141	12.560	.376	12.936	2.60	7.51	.88	13.81	.00	.61	1.30	1.500	.000	.00	1	.0
.246	.3015					.0304	.01	.38	2.56	.22	.013	.00	.00	PIPE	
588.387	12.634	.389	13.023	2.60	7.16	.80	13.82	.00	.61	1.31	1.500	.000	.00	1	.0
.214	.3015					.0266	.01	.39	2.40	.22	.013	.00	.00	PIPE	
588.602	12.699	.402	13.101	2.60	6.83	.72	13.82	.00	.61	1.33	1.500	.000	.00	1	.0
.186	.3015					.0233	.00	.40	2.25	.22	.013	.00	.00	PIPE	

FILE: BP10H1.WSW

W S P G W - CIVILDESIGN Version 14.07

PAGE 11

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:57:53

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
588.788	12.755	.416	13.171	2.60	6.51	.66	13.83	.00	.61	1.34	1.500	.000	.00	1 .0
.161	.3015					.0204	.00	.42	2.10	.22	.013	.00	.00	PIPE
588.949	12.804	.430	13.234	2.60	6.21	.60	13.83	.00	.61	1.36	1.500	.000	.00	1 .0
.139	.3015					.0178	.00	.43	1.97	.22	.013	.00	.00	PIPE
589.088	12.846	.445	13.291	2.60	5.92	.54	13.83	.00	.61	1.37	1.500	.000	.00	1 .0
.119	.3015					.0156	.00	.45	1.84	.22	.013	.00	.00	PIPE

BP10H1

589.207	12.881	.461	13.342	2.60	5.64	.49	13.84	.00	.61	1.38	1.500	.000	.00	1	.0
.100	.3015					.0137	.00	.46	1.72	.22	.013	.00	.00	PIPE	
589.306	12.911	.477	13.388	2.60	5.38	.45	13.84	.00	.61	1.40	1.500	.000	.00	1	.0
.083	.3015					.0120	.00	.48	1.61	.22	.013	.00	.00	PIPE	
589.389	12.936	.494	13.430	2.60	5.13	.41	13.84	.00	.61	1.41	1.500	.000	.00	1	.0
.067	.3015					.0105	.00	.49	1.51	.22	.013	.00	.00	PIPE	
589.457	12.957	.511	13.468	2.60	4.89	.37	13.84	.00	.61	1.42	1.500	.000	.00	1	.0
.053	.3015					.0092	.00	.51	1.41	.22	.013	.00	.00	PIPE	
589.510	12.973	.530	13.502	2.60	4.66	.34	13.84	.00	.61	1.43	1.500	.000	.00	1	.0
.040	.3015					.0080	.00	.53	1.32	.22	.013	.00	.00	PIPE	
589.550	12.985	.548	13.533	2.60	4.45	.31	13.84	.00	.61	1.44	1.500	.000	.00	1	.0
.028	.3015					.0071	.00	.55	1.23	.22	.013	.00	.00	PIPE	

FILE: BP10H1.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:57:53

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave		HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
589.578	12.993	.568	13.561	2.60	4.24	.28	13.84	.00	.61	1.46	1.500	.000	.00	1 .0
.016	.3015					.0062	.00	.57	1.15	.22	.013	.00	.00	PIPE
589.594	12.998	.589	13.587	2.60	4.04	.25	13.84	.00	.61	1.46	1.500	.000	.00	1 .0
.006	.3015					.0054	.00	.59	1.07	.22	.013	.00	.00	PIPE
589.600	13.000	.611	13.611	2.60	3.84	.23	13.84	.00	.61	1.47	1.500	.000	.00	1 .0

CD 1 4 1 1.500
 W S P G W
 WATER SURFACE PROFILE - TITLE CARD LISTING
 PAGE NO 1

HEADING LINE NO 1 IS -
 HEADING LINE NO 2 IS -
 HEADING LINE NO 3 IS -
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING
 PAGE NO 2

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
1	IS	A	SYSTEM	OUTLET	U/S DATA	589.600	13.000	1	13.587								
2	IS	A	REACH		U/S DATA	604.720	17.560	1		N	.013	RADIUS	ANGLE	ANG PT	MAN H		
												.000	.000	.000	0		
3	IS	A	SYSTEM	HEADWORKS	U/S DATA	604.720	17.560	1				W S ELEV					
												17.560					

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

Date:11-17-2019 Time:11:58:46

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 589.600 through 600.456.

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

Date:11-17-2019 Time:11:58:46

Table header for the second page, including columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth.

BP10H2														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
601.179	16.492	.747	17.239	10.35	11.77	2.15	19.39	.00	1.24	1.50	1.500	.000	.00	1 .0
.631	.3016					.0370	.02	.75	2.71	.43	.013	.00	.00	PIPE
601.810	16.682	.776	17.458	10.35	11.22	1.96	19.41	.00	1.24	1.50	1.500	.000	.00	1 .0
.549	.3016					.0326	.02	.78	2.52	.43	.013	.00	.00	PIPE
602.359	16.848	.806	17.654	10.35	10.70	1.78	19.43	.00	1.24	1.50	1.500	.000	.00	1 .0
.476	.3016					.0287	.01	.81	2.34	.43	.013	.00	.00	PIPE
602.835	16.992	.838	17.829	10.35	10.20	1.62	19.44	.00	1.24	1.49	1.500	.000	.00	1 .0
.411	.3016					.0254	.01	.84	2.18	.43	.013	.00	.00	PIPE
603.247	17.116	.871	17.986	10.35	9.73	1.47	19.46	.00	1.24	1.48	1.500	.000	.00	1 .0
.352	.3016					.0224	.01	.87	2.02	.43	.013	.00	.00	PIPE
603.598	17.222	.906	18.128	10.35	9.27	1.34	19.46	.00	1.24	1.47	1.500	.000	.00	1 .0
.299	.3016					.0199	.01	.91	1.87	.43	.013	.00	.00	PIPE
603.897	17.312	.943	18.255	10.35	8.84	1.21	19.47	.00	1.24	1.45	1.500	.000	.00	1 .0
.248	.3016					.0176	.00	.94	1.73	.43	.013	.00	.00	PIPE
604.145	17.387	.983	18.370	10.35	8.43	1.10	19.47	.00	1.24	1.43	1.500	.000	.00	1 .0
.203	.3016					.0157	.00	.98	1.60	.43	.013	.00	.00	PIPE
604.348	17.448	1.026	18.473	10.35	8.04	1.00	19.48	.00	1.24	1.40	1.500	.000	.00	1 .0
.158	.3016					.0139	.00	1.03	1.47	.43	.013	.00	.00	PIPE

FILE: BP10H2.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-17-2019 Time:11:58:46

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
604.506	17.496	1.071	18.567	10.35	7.66	.91	19.48	.00	1.24	1.36	1.500	.000	.00	1 .0
.115	.3016					.0125	.00	1.07	1.35	.43	.013	.00	.00	PIPE

															BF10H2	
604.622	17.530	1.121	18.651	10.35	7.31	.83	19.48	.00	1.24	1.30	1.500	.000	.00	1	.0	
.072	.3016					.0112	.00	1.12	1.24	.43	.013	.00	.00	PIPE		
604.694	17.552	1.175	18.727	10.35	6.97	.75	19.48	.00	1.24	1.24	1.500	.000	.00	1	.0	
.026	.3016					.0101	.00	1.18	1.12	.43	.013	.00	.00	PIPE		
604.720	17.560	1.237	18.797	10.35	6.64	.68	19.48	.00	1.24	1.14	1.500	.000	.00	1	.0	



CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.500														
CD	2	4	1			1.000														
CD	3	4	1			1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING												
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	7.130													
ELEMENT NO 2	IS	A	REACH	U/S DATA	102.520	-2.050	1		N	.013			RADIUS .000	ANGLE .000	ANG PT .000	MAN H 0					
ELEMENT NO 3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1		N	.013	Q3	Q4	INVERT-3 .000	INVERT-4 .000	PHI 3 .000	PHI 4 .000					
ELEMENT NO 4	IS	A	REACH	U/S DATA	110.000	-1.300	1		N	.013			RADIUS .000	ANGLE .000	ANG PT .000	MAN H 0					
ELEMENT NO 5	IS	A	REACH	U/S DATA	115.630	-.670	1		N	.013			RADIUS .000	ANGLE .000	ANG PT .000	MAN H 0					
ELEMENT NO 6	IS	A	JUNCTION	U/S DATA	120.330	-.150	1		N	.013	Q3	Q4	INVERT-3 .200	INVERT-4 .200	PHI 3 -41.200	PHI 4 76.500					
ELEMENT NO 7	IS	A	REACH	U/S DATA	139.000	1.930	1		N	.013			RADIUS .000	ANGLE .000	ANG PT .000	MAN H 0					
ELEMENT NO 8	IS	A	JUNCTION	U/S DATA	143.000	2.380	1		N	.013	Q3	Q4	INVERT-3 .000	INVERT-4 .000	PHI 3 .000	PHI 4 .000					

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N												
ELEMENT NO 9	IS	A	REACH	U/S DATA	161.240	4.410	1	.013												
ELEMENT NO 10	IS	A	JUNCTION	U/S DATA					N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					

		BP10L1												
		165.790	4.610	1	3	0	.013	.500	.000	5.800	.000	-70.500	.000	
										RADIUS	ANGLE			
										.000	.000			
ELEMENT NO	11 IS A REACH	*	*	*										
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H	
		190.190	5.060	1			.013			.000	.000	.000	0	
ELEMENT NO	12 IS A JUNCTION	*	*	*	*			*		*	*			
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	
		194.870	5.150	1	2	3	.013	1.100	1.900	5.400	5.400	-45.800	32.000	
										RADIUS	ANGLE			
										.000	.000			
ELEMENT NO	13 IS A REACH	*	*	*										
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H	
		368.640	8.360	1			.013			.000	.000	.000	0	
ELEMENT NO	14 IS A JUNCTION	*	*	*	*			*		*	*			
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	
		373.320	8.440	1	3	0	.013	1.100	.000	8.690	.000	44.300	.000	
										RADIUS	ANGLE			
										.000	.000			
ELEMENT NO	15 IS A REACH	*	*	*										
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H	
		448.000	9.820	1			.013			.000	.000	.000	0	
ELEMENT NO	16 IS A JUNCTION	*	*	*	*			*		*	*			
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4	
		452.000	9.880	1	0	0	.013	.000	.000	.000	.000	.000	.000	
										RADIUS	ANGLE			
										.000	.000			
												W S P G W	PAGE NO	4
WATER SURFACE PROFILE - ELEMENT CARD LISTING														
ELEMENT NO	17 IS A REACH	*	*	*										
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H	
		583.000	11.010	1			.013			.000	.000	.000	0	
ELEMENT NO	18 IS A REACH	*	*	*										
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H	
		589.600	13.000	1			.013			.000	.000	.000	0	
ELEMENT NO	19 IS A SYSTEM HEADWORKS	*		*				*						
	U/S DATA	STATION	INVERT	SECT						W S ELEV				
		589.600	13.000	1						13.000				

FILE: BP10L2.WSW
 W S P G W - EDIT LISTING - Version 14.07
 Date:11-23-2019 Time:11:27:48
 WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING
 PAGE 1
 CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)
 CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

CD 1 4 1 1.500
 W S P G W
 WATER SURFACE PROFILE - TITLE CARD LISTING
 PAGE NO 1

HEADING LINE NO 1 IS -
 HEADING LINE NO 2 IS -
 HEADING LINE NO 3 IS -
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION
 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13 U/S OF DIVERSION

W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING
 PAGE NO 2

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV						
1						589.600	13.000	1	13.587						
2			REACH			604.720	17.560	1		N	.013	RADIUS	ANGLE	ANG PT	MAN H
												.000	.000	.000	0
3			SYSTEM	HEADWORKS		604.720	17.560	1				W S ELEV			
												17.560			

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIP WIDTH	PIER WIDTH	HEIGHT	1 BASE DIAMETER	ZL WIDTH	ZR WIDTH	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.500														
CD	2	4	1			1.000														
CD	3	4	1			1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B PROPOSED CONDITION

HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
1	IS	A	SYSTEM OUTLET	U/S DATA	80.020	-4.300	1	4.410
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING								
2	IS	A	REACH	U/S DATA	102.520	-2.050	1	.013
3	IS	A	JUNCTION	U/S DATA	106.530	-1.650	1	.013
4	IS	A	REACH	U/S DATA	110.000	-1.300	1	.013
5	IS	A	REACH	U/S DATA	115.630	-.670	1	.013
6	IS	A	JUNCTION	U/S DATA	120.330	-.150	1	.013
7	IS	A	REACH	U/S DATA	139.000	1.930	1	.013
8	IS	A	JUNCTION	U/S DATA	143.000	2.380	1	.013

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N
9	IS	A	REACH	U/S DATA	161.240	4.410	1	.013
10	IS	A	JUNCTION	U/S DATA				

BP00H1

		165.790	4.610	1	3	0	.013	1.200	.000	5.800	.000	-70.500	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	11 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		190.190	5.060	1			.013			.000	.000	.000	0
ELEMENT NO	12 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		194.870	5.150	1	2	3	.013	5.300	6.200	5.400	5.400	-45.800	32.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	13 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		368.640	8.360	1			.013			.000	.000	.000	0
ELEMENT NO	14 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		373.320	8.440	1	3	0	.013	6.500	.000	8.690	.000	44.300	.000
										RADIUS	ANGLE		
										.000	.000		
ELEMENT NO	15 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		448.000	9.820	1			.013			.000	.000	.000	0
ELEMENT NO	16 IS A JUNCTION	*	*	*	*			*		*	*		
	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		452.000	9.880	1	0	0	.013	.000	.000	.000	.000	.000	.000
										RADIUS	ANGLE		
										.000	.000		

W S P G W

PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	17 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		583.000	11.010	1			.013			.000	.000	.000	0
ELEMENT NO	18 IS A REACH	*	*	*									
	U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
		589.600	13.000	1			.013			.000	.000	.000	0
ELEMENT NO	19 IS A SYSTEM HEADWORKS	*		*				*					
	U/S DATA	STATION	INVERT	SECT						W S ELEV			
		589.600	13.000	1						13.000			

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-22-2019 Time: 4:47:33

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Prs/Pip	Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
80.020	-4.300	8.710	4.410	33.10	18.73	5.45	9.86	.00	1.50	.00	1.500	.000	.00	1	.0
22.500	.1000					.0993	2.23	8.71	.00	1.22	.013	.00	.00	PIPE	
102.520	-2.050	8.694	6.644	33.10	18.73	5.45	12.09	.00	1.50	.00	1.500	.000	.00	1	.0
JUNCT STR	.0998					.0993	.40	8.69	.00		.013	.00	.00	PIPE	
106.530	-1.650	8.692	7.042	33.10	18.73	5.45	12.49	.00	1.50	.00	1.500	.000	.00	1	.0
3.470	.1009					.0993	.34	8.69	.00	1.22	.013	.00	.00	PIPE	
110.000	-1.300	8.687	7.387	33.10	18.73	5.45	12.83	.00	1.50	.00	1.500	.000	.00	1	.0
5.630	.1119					.0993	.56	8.69	.00	1.16	.013	.00	.00	PIPE	
115.630	-.670	8.616	7.946	33.10	18.73	5.45	13.39	.00	1.50	.00	1.500	.000	.00	1	.0
JUNCT STR	.1106					.0812	.38	8.62	.00		.013	.00	.00	PIPE	
120.330	-.150	12.259	12.109	26.40	14.94	3.47	15.57	.00	1.49	.00	1.500	.000	.00	1	.0
18.670	.1114					.0632	1.18	12.26	.00	.97	.013	.00	.00	PIPE	
139.000	1.930	11.359	13.289	26.40	14.94	3.47	16.75	.00	1.49	.00	1.500	.000	.00	1	.0
JUNCT STR	.1125					.0632	.25	11.36	.00		.013	.00	.00	PIPE	
143.000	2.380	11.161	13.541	26.40	14.94	3.47	17.01	.00	1.49	.00	1.500	.000	.00	1	.0
18.240	.1113					.0632	1.15	11.16	.00	.97	.013	.00	.00	PIPE	
161.240	4.410	10.283	14.693	26.40	14.94	3.47	18.16	.00	1.49	.00	1.500	.000	.00	1	.0
JUNCT STR	.0440					.0604	.27	10.28	.00		.013	.00	.00	PIPE	

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B PROPOSED CONDITION
100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-22-2019 Time: 4:47:33

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No	Wth
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BP00H1														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
165.790	4.610	10.963	15.573	25.20	14.26	3.16	18.73	.00	1.49	.00	1.500	.000	.00	1 .0
24.400	.0184					.0576	1.40	10.96	.00	1.50	.013	.00	.00	PIPE
190.190	5.060	11.917	16.977	25.20	14.26	3.16	20.14	.00	1.49	.00	1.500	.000	.00	1 .0
JUNCT STR	.0192					.0373	.17	11.92	.00		.013	.00	.00	PIPE
194.870	5.150	15.283	20.433	13.70	7.75	.93	21.37	.00	1.37	.00	1.500	.000	.00	1 .0
173.770	.0185					.0170	2.96	15.28	.00	1.18	.013	.00	.00	PIPE
368.640	8.360	15.029	23.389	13.70	7.75	.93	24.32	.00	1.37	.00	1.500	.000	.00	1 .0
JUNCT STR	.0171					.0109	.05	15.03	.00		.013	.00	.00	PIPE
373.320	8.440	15.674	24.114	7.20	4.07	.26	24.37	.00	1.04	.00	1.500	.000	.00	1 .0
74.680	.0185					.0047	.35	15.67	.00	.75	.013	.00	.00	PIPE
448.000	9.820	14.645	24.465	7.20	4.07	.26	24.72	.00	1.04	.00	1.500	.000	.00	1 .0
JUNCT STR	.0150					.0047	.02	14.64	.00		.013	.00	.00	PIPE
452.000	9.880	14.604	24.484	7.20	4.07	.26	24.74	.00	1.04	.00	1.500	.000	.00	1 .0
131.000	.0086					.0047	.62	14.60	.00	.96	.013	.00	.00	PIPE
583.000	11.010	14.089	25.099	7.20	4.07	.26	25.36	.00	1.04	.00	1.500	.000	.00	1 .0
6.600	.3015					.0047	.03	14.09	.00	.36	.013	.00	.00	PIPE
589.600	13.000	12.130	25.130	7.20	4.07	.26	25.39	.00	1.04	.00	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1 BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										

CD 1 4 1 1.500

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	*														
			U/S DATA	STATION	INVERT	SECT													
1			589.600	13.000	1														
			W S ELEV																
			25.100																
2			U/S DATA	STATION	INVERT	SECT													
2			604.720	17.560	1														
			N																
			.013																
			RADIUS																
			.000																
			ANGLE																
			.000																
			ANG PT																
			.000																
			MAN H																
			0																
3			U/S DATA	STATION	INVERT	SECT													
3			604.720	17.560	1														
			W S ELEV																
			17.560																

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B PROPOSED CONDITION

Date:11-23-2019 Time:11:35:11

100-YEAR STORM - MHW CONDITION WSE=4.41 U/S OF DIVERSION

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*****
Station  | Invert  | Depth  | Water  | Q       | Vel    | Vel   | Energy | Super | Critical | Flow Top | Height/ | Base Wt |      | No Wth
          | Elev   | (FT)   | Elev   | (CFS)  | (FPS) | Head  | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL   | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF     | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall  | ZR   | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
589.600  | 13.000  | 12.100  | 25.100  | 16.16  | 9.14  | 1.30  | 26.40  | .00    | 1.43    | .00    | 1.500  | .000  | .00  | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
15.120   | .3016   |         |         |         |         | .0237  | .36    | 12.10  | .00     | .54    | .013   | .00   | .00  | PIPE
604.720  | 17.560  | 7.898   | 25.458  | 16.16  | 9.14  | 1.30  | 26.76  | .00    | 1.43    | .00    | 1.500  | .000  | .00  | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
    
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CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT 1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										

CD 1 4 1 1.000

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B1 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHW CONDITION WSE=4.410

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN	H
1	IS	A	SYSTEM OUTLET	U/S DATA	102.280	.200	1	5.160					
2	IS	A	REACH	U/S DATA	121.450	3.100	1	.013	.000	.000	.000	0	
3	IS	A	REACH	U/S DATA	130.040	4.400	1	.013	22.502	-21.872	.000	0	
4	IS	A	REACH	U/S DATA	138.790	5.730	1	.013	22.921	-21.872	.000	0	
5	IS	A	REACH	U/S DATA	185.760	6.200	1	.013	.000	.000	.000	0	
6	IS	A	REACH	U/S DATA	204.200	6.380	1	.013	22.503	-46.951	.000	0	
7	IS	A	REACH	U/S DATA	214.070	6.480	1	.013	.000	.000	.000	0	
8	IS	A	SYSTEM HEADWORKS	U/S DATA	214.070	6.480	1	6.480					

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B1 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.410

Date:12- 2-2019 Time: 1:10:48

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*****
Station  | Invert  | Depth  | Water  | Q      | Vel    | Vel    | Energy | Super | Critical | Flow Top | Height/ | Base Wt | ZL  | No Wth
          | Elev   | (FT)   | Elev   | (CFS)  | (FPS)  | Head   | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. |     | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF      | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall  | ZR  | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
102.280  | .200   | 4.960  | 5.160  | 1.20   | 1.53   | .04    | 5.20   | .00    | .46     | .00    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
19.170   | .1513  |         |         |         |         | .0011  | .02    | 4.96   | .00     | .20    | .013    | .00    | .00 | PIPE
121.450  | 3.100  | 2.082  | 5.182  | 1.20   | 1.53   | .04    | 5.22   | .00    | .46     | .00    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
7.224    | .1513  |         |         |         |         | .0011  | .01    | .00    | .00     | .20    | .013    | .00    | .00 | PIPE
128.674  | 4.193  | 1.000  | 5.193  | 1.20   | 1.53   | .04    | 5.23   | 1.00   | .46     | .00    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
.587     | .1513  |         |         |         |         | .0010  | .00    | 1.00   | .00     | .20    | .013    | .00    | .00 | PIPE
129.260  | 4.282  | .907   | 5.189  | 1.20   | 1.60   | .04    | 5.23   | .00    | .46     | .58    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
.244     | .1513  |         |         |         |         | .0010  | .00    | .91    | .25     | .20    | .013    | .00    | .00 | PIPE
129.505  | 4.319  | .853   | 5.172  | 1.20   | 1.68   | .04    | 5.22   | .00    | .46     | .71    | 1.000   | .000   | .00 | 1 .0
HYDRAULIC JUMP
129.505  | 4.319  | .218   | 4.536  | 1.20   | 9.52   | 1.41   | 5.94   | .10    | .46     | .83    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
.535     | .1513  |         |         |         |         | .0988  | .05    | .32    | 4.29    | .20    | .013    | .00    | .00 | PIPE
130.040  | 4.400  | .225   | 4.625  | 1.20   | 9.08   | 1.28   | 5.90   | .09    | .46     | .84    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
1.214    | .1520  |         |         |         |         | .0879  | .11    | .32    | 4.02    | .20    | .013    | .00    | .00 | PIPE
131.254  | 4.585  | .230   | 4.815  | 1.20   | 8.77   | 1.20   | 6.01   | .09    | .46     | .84    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
1.370    | .1520  |         |         |         |         | .0785  | .11    | .32    | 3.84    | .20    | .013    | .00    | .00 | PIPE
132.625  | 4.793  | .238   | 5.031  | 1.20   | 8.37   | 1.09   | 6.12   | .08    | .46     | .85    | 1.000   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |         |
1.086    | .1520  |         |         |         |         | .0686  | .07    | .32    | 3.59    | .20    | .013    | .00    | .00 | PIPE
    
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WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B1 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.410

Date:12- 2-2019 Time: 1:10:48

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*****
| Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | No Wth
          |       |       |   |   |   |   |   |   |   |   |   |   |   |
    
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B1P10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
133.711	4.958	.246	5.204	1.20	7.98	.99	6.19	.07	.46	.86	1.000	.000	.00	1 .0
.885	.1520					.0600	.05	.32	3.36	.20	.013	.00	.00	PIPE
134.596	5.092	.255	5.347	1.20	7.60	.90	6.25	.07	.46	.87	1.000	.000	.00	1 .0
.732	.1520					.0525	.04	.32	3.15	.20	.013	.00	.00	PIPE
135.328	5.204	.264	5.467	1.20	7.25	.82	6.28	.06	.46	.88	1.000	.000	.00	1 .0
.614	.1520					.0459	.03	.33	2.95	.20	.013	.00	.00	PIPE
135.942	5.297	.273	5.570	1.20	6.91	.74	6.31	.06	.46	.89	1.000	.000	.00	1 .0
.518	.1520					.0402	.02	.33	2.76	.20	.013	.00	.00	PIPE
136.460	5.376	.282	5.658	1.20	6.59	.67	6.33	.05	.46	.90	1.000	.000	.00	1 .0
.441	.1520					.0352	.02	.34	2.58	.20	.013	.00	.00	PIPE
136.901	5.443	.292	5.735	1.20	6.29	.61	6.35	.05	.46	.91	1.000	.000	.00	1 .0
.376	.1520					.0308	.01	.34	2.42	.20	.013	.00	.00	PIPE
137.277	5.500	.302	5.802	1.20	5.99	.56	6.36	.04	.46	.92	1.000	.000	.00	1 .0
.321	.1520					.0269	.01	.35	2.26	.20	.013	.00	.00	PIPE
137.597	5.549	.313	5.862	1.20	5.71	.51	6.37	.04	.46	.93	1.000	.000	.00	1 .0
.273	.1520					.0236	.01	.35	2.12	.20	.013	.00	.00	PIPE
137.871	5.590	.324	5.914	1.20	5.45	.46	6.37	.04	.46	.94	1.000	.000	.00	1 .0
.232	.1520					.0207	.00	.36	1.98	.20	.013	.00	.00	PIPE

FILE: B1P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-2-2019 Time: 1:10:48

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B1 PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.410

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
138.103	5.626	.335	5.961	1.20	5.19	.42	6.38	.03	.46	.94	1.000	.000	.00	1 .0
.196	.1520					.0181	.00	.37	1.85	.20	.013	.00	.00	PIPE

B1P10H

138.298	5.655	.347	6.002	1.20	4.95	.38	6.38	.03	.46	.95	1.000	.000	.00	1	.0
.163	.1520					.0159	.00	.38	1.73	.20	.013	.00	.00	PIPE	
138.462	5.680	.360	6.040	1.20	4.72	.35	6.39	.03	.46	.96	1.000	.000	.00	1	.0
.135	.1520					.0139	.00	.39	1.62	.20	.013	.00	.00	PIPE	
138.596	5.701	.372	6.073	1.20	4.50	.31	6.39	.03	.46	.97	1.000	.000	.00	1	.0
.109	.1520					.0122	.00	.40	1.51	.20	.013	.00	.00	PIPE	
138.705	5.717	.386	6.103	1.20	4.29	.29	6.39	.02	.46	.97	1.000	.000	.00	1	.0
.085	.1520					.0107	.00	.41	1.41	.20	.013	.00	.00	PIPE	
138.790	5.730	.400	6.130	1.20	4.09	.26	6.39	.00	.46	.98	1.000	.000	.00	1	.0
31.004	.0100					.0100	.31	.40	1.32	.40	.013	.00	.00	PIPE	
169.794	6.040	.400	6.440	1.20	4.09	.26	6.70	.00	.46	.98	1.000	.000	.00	1	.0
15.966	.0100					.0099	.16	.40	1.32	.40	.013	.00	.00	PIPE	
185.760	6.200	.403	6.603	1.20	4.06	.26	6.86	.02	.46	.98	1.000	.000	.00	1	.0
3.020	.0098					.0098	.03	.42	1.30	.40	.013	.00	.00	PIPE	
188.780	6.229	.403	6.632	1.20	4.06	.26	6.89	.02	.46	.98	1.000	.000	.00	1	.0
15.420	.0098					.0096	.15	.42	1.30	.40	.013	.00	.00	PIPE	

FILE: B1P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-2-2019 Time: 1:10:48

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B1 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.410

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
204.200	6.380	.406	6.786	1.20	4.01	.25	7.04	.00	.46	.98	1.000	.000	.00	1 .0
4.558	.0101					.0092	.04	.41	1.28	.40	.013	.00	.00	PIPE
208.758	6.426	.413	6.840	1.20	3.91	.24	7.08	.00	.46	.98	1.000	.000	.00	1 .0
3.603	.0101					.0083	.03	.41	1.24	.40	.013	.00	.00	PIPE
212.361	6.463	.429	6.891	1.20	3.73	.22	7.11	.00	.46	.99	1.000	.000	.00	1 .0
1.368	.0101					.0073	.01	.43	1.15	.40	.013	.00	.00	PIPE

															B1P10H	
213.729	6.477	.444	6.921	1.20	3.56	.20	7.12	.00	.46	.99	1.000	.000	.00	1	.0	
.341	.0101					.0064	.00	.44	1.08	.40	.013	.00	.00	PIPE		
214.070	6.480	.462	6.942	1.20	3.38	.18	7.12	.00	.46	1.00	1.000	.000	.00	1	.0	

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD 1 4 1 1.000

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B1 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN	H
1	IS	A	SYSTEM OUTLET	U/S DATA	102.280	.200	1	7.883					
2	IS	A	REACH	U/S DATA	121.450	3.100	1	.013	.000	.000	.000	0	
3	IS	A	REACH	U/S DATA	130.040	4.400	1	.013	22.502	-21.872	.000	0	
4	IS	A	REACH	U/S DATA	138.790	5.730	1	.013	22.921	-21.872	.000	0	
5	IS	A	REACH	U/S DATA	185.760	6.200	1	.013	.000	.000	.000	0	
6	IS	A	REACH	U/S DATA	204.200	6.380	1	.013	22.503	-46.951	.000	0	
7	IS	A	REACH	U/S DATA	214.070	6.480	1	.013	.000	.000	.000	0	
8	IS	A	SYSTEM HEADWORKS	U/S DATA	214.070	6.480	1	6.480					

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B1 PROPOSED CONDITION
 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 2-2019 Time: 1:14:55

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*****
Station  Invert  Depth  Water  Q      Vel  Vel  Energy  Super  Critical  Flow Top  Height/  Base Wt  No Wth
          Elev   (FT)   Elev   (CFS) (FPS) Head  Grd.El. Elev   Depth  Width  Dia.-FT  or I.D.  ZL      Prs/Pip
L/Elem   Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope
*****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****
102.280  .200     7.683   7.883   1.20   1.53   .04     7.92   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
19.170   .1513    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
121.450  3.100    4.805   7.905   1.20   1.53   .04     7.94   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
8.590    .1513    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
130.040  4.400    3.518   7.918   1.20   1.53   .04     7.95   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
8.750    .1520    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
138.790  5.730    2.202   7.932   1.20   1.53   .04     7.97   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
46.970   .0100    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
185.760  6.200    1.785   7.985   1.20   1.53   .04     8.02   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
18.440   .0098    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
204.200  6.380    1.631   8.011   1.20   1.53   .04     8.05   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
9.870    .0101    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
214.070  6.480    1.542   8.022   1.20   1.53   .04     8.06   .00     .46     .00     1.000   .000     .00     1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
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WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B1 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=5.21

Date:12- 3-2019 Time: 2:48:58

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*****
Station  Invert  Depth  Water  Q  Vel  Vel  Energy  Super  Critical  Flow Top  Height/  Base Wt  No Wth
          Elev   (FT)   Elev   (CFS) (FPS) Head  Grd.El.  Elev   Depth  Width  Dia.-FT  or I.D.  ZL  Prs/Pip
L/Elem  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope  Ch Slope
*****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****  *****
102.280  .200    11.909  12.109  2.00  2.55  .10    12.21  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
19.170   .1513   -|-    -|-    -|-    -|-    -|-    .0032  .06    11.91  .00    .26    .013  .00    .00    PIPE
121.450  3.100   9.069  12.169  2.00  2.55  .10    12.27  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
8.590   .1513   -|-    -|-    -|-    -|-    -|-    .0032  .03    .00    .00    .26    .013  .00    .00    PIPE
130.040  4.400   7.806  12.206  2.00  2.55  .10    12.31  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
8.750   .1520   -|-    -|-    -|-    -|-    -|-    .0032  .03    .00    .00    .26    .013  .00    .00    PIPE
138.790  5.730   6.514  12.244  2.00  2.55  .10    12.34  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
46.970   .0100   -|-    -|-    -|-    -|-    -|-    .0032  .15    6.51  .00    .54    .013  .00    .00    PIPE
185.760  6.200   6.192  12.392  2.00  2.55  .10    12.49  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
18.440   .0098   -|-    -|-    -|-    -|-    -|-    .0032  .06    .00    .00    .54    .013  .00    .00    PIPE
204.200  6.380   6.085  12.465  2.00  2.55  .10    12.57  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
9.870   .0101   -|-    -|-    -|-    -|-    -|-    .0032  .03    6.08  .00    .53    .013  .00    .00    PIPE
214.070  6.480   6.016  12.496  2.00  2.55  .10    12.60  .00    .60    .00    1.000  .000  .00    1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
    
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WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B1 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=5.21

Date:12- 3-2019 Time: 2:48:58

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.280	.200	11.909	12.109	2.00	2.55	.10	12.21	.00	.60	.00	1.000	.000	.00	1 .0
19.170	.1513					.0032	.06	11.91	.00	.26	.013	.00	.00	PIPE
121.450	3.100	9.069	12.169	2.00	2.55	.10	12.27	.00	.60	.00	1.000	.000	.00	1 .0
8.590	.1513					.0032	.03	.00	.00	.26	.013	.00	.00	PIPE
130.040	4.400	7.806	12.206	2.00	2.55	.10	12.31	.00	.60	.00	1.000	.000	.00	1 .0
8.750	.1520					.0032	.03	.00	.00	.26	.013	.00	.00	PIPE
138.790	5.730	6.514	12.244	2.00	2.55	.10	12.34	.00	.60	.00	1.000	.000	.00	1 .0
46.970	.0100					.0032	.15	6.51	.00	.54	.013	.00	.00	PIPE
185.760	6.200	6.192	12.392	2.00	2.55	.10	12.49	.00	.60	.00	1.000	.000	.00	1 .0
18.440	.0098					.0032	.06	.00	.00	.54	.013	.00	.00	PIPE
204.200	6.380	6.085	12.465	2.00	2.55	.10	12.57	.00	.60	.00	1.000	.000	.00	1 .0
9.870	.0101					.0032	.03	6.08	.00	.53	.013	.00	.00	PIPE
214.070	6.480	6.016	12.496	2.00	2.55	.10	12.60	.00	.60	.00	1.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		1.000														
CD	2	4	1		1.000														
CD	3	4	1		1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B2 PROPOSED CONDITION

HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV				
					101.550	.200	1	5.160				
ELEMENT NO 2	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					106.420	2.140	1		.013	.000	.000	.000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS												
ELEMENT NO 3	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					112.430	4.520	3		.013	22.501	15.304	.000
ELEMENT NO 4	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT					
					117.460	5.690	3		.013	6.210	.000	-70.000
									.100	.000		.000
										22.500	12.809	
ELEMENT NO 5	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					123.790	5.790	3		.013	22.500	16.119	.000
ELEMENT NO 6	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					133.920	5.940	3		.013	.000	.000	.000
ELEMENT NO 7	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					151.110	6.200	3		.013	22.494	43.785	.000
ELEMENT NO 8	IS	A	REACH	U/S DATA	STATION	INVERT	SECT					
					169.860	6.480	3		.013	.000	.000	.000
ELEMENT NO 9	IS	A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT					
					169.860	6.480	3			W S ELEV		
										6.480		

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B2 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:10: 5: 7

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes rows for stations 101.550, 106.420, 110.996, 111.450, 111.975, 112.430, 117.460, 123.790, and 10.130.

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B2 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:10: 5: 7

Table with columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth

B2P10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
133.920	5.940	.477	6.417	2.00	5.41	.45	6.87	.04	.60	1.00	1.000	.000	.00	1 .0
17.190	.0151					.0142	.24	.52	1.57	.47	.013	.00	.00	PIPE
151.110	6.200	.488	6.688	2.00	5.25	.43	7.12	.00	.60	1.00	1.000	.000	.00	1 .0
6.169	.0149					.0133	.08	.49	1.50	.48	.013	.00	.00	PIPE
157.279	6.292	.497	6.789	2.00	5.13	.41	7.20	.00	.60	1.00	1.000	.000	.00	1 .0
6.442	.0149					.0121	.08	.50	1.45	.48	.013	.00	.00	PIPE
163.721	6.388	.516	6.904	2.00	4.89	.37	7.28	.00	.60	1.00	1.000	.000	.00	1 .0
3.242	.0149					.0107	.03	.52	1.35	.48	.013	.00	.00	PIPE
166.963	6.437	.536	6.973	2.00	4.67	.34	7.31	.00	.60	1.00	1.000	.000	.00	1 .0
1.765	.0149					.0094	.02	.54	1.25	.48	.013	.00	.00	PIPE
168.728	6.463	.557	7.020	2.00	4.45	.31	7.33	.00	.60	.99	1.000	.000	.00	1 .0
.868	.0149					.0083	.01	.56	1.17	.48	.013	.00	.00	PIPE
169.596	6.476	.579	7.055	2.00	4.24	.28	7.33	.00	.60	.99	1.000	.000	.00	1 .0
.264	.0149					.0073	.00	.58	1.08	.48	.013	.00	.00	PIPE
169.860	6.480	.603	7.083	2.00	4.04	.25	7.34	.00	.60	.98	1.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		1.000															
CD	2	4	1		1.000															
CD	3	4	1		1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B2 PROPOSED CONDITION

HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	101.550	.200	1	7.883					
ELEMENT NO 2	IS	A	REACH	U/S DATA	106.420	2.140	1		.013	.000	.000	.000	0
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS													
ELEMENT NO 3	IS	A	REACH	U/S DATA	112.430	4.520	3		.013	22.501	15.304	.000	0
ELEMENT NO 4	IS	A	JUNCTION	U/S DATA	117.460	5.690	3		.013	6.210	.000	-70.000	.000
ELEMENT NO 5	IS	A	REACH	U/S DATA	123.790	5.790	3		.013	22.500	12.809	.000	0
ELEMENT NO 6	IS	A	REACH	U/S DATA	133.920	5.940	3		.013	.000	.000	.000	0
ELEMENT NO 7	IS	A	REACH	U/S DATA	151.110	6.200	3		.013	22.494	43.785	.000	0
ELEMENT NO 8	IS	A	REACH	U/S DATA	169.860	6.480	3		.013	.000	.000	.000	0
ELEMENT NO 9	IS	A	SYSTEM HEADWORKS	U/S DATA	169.860	6.480	3		.013	6.480			

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-2-2019 Time: 11:37:16

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B2 PROPOSED CONDITION

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
101.550	.200	7.683	7.883	2.10	2.67	.11	7.99	.00	.62	.00	1.000	.000	.00	1 .0
4.870	.3984					.0035	.02	7.68	.00	.21	.013	.00	.00	PIPE
106.420	2.140	5.760	7.900	2.10	2.67	.11	8.01	.00	.62	.00	1.000	.000	.00	1 .0
6.010	.3960					.0035	.02	.00	.00	.21	.013	.00	.00	PIPE
112.430	4.520	3.410	7.930	2.10	2.67	.11	8.04	.00	.62	.00	1.000	.000	.00	1 .0
JUNCT STR	.2326					.0033	.02	.00	.00		.013	.00	.00	PIPE
117.460	5.690	2.277	7.967	2.00	2.55	.10	8.07	.00	.60	.00	1.000	.000	.00	1 .0
6.330	.0158					.0032	.02	.00	.00	.47	.013	.00	.00	PIPE
123.790	5.790	2.206	7.996	2.00	2.55	.10	8.10	.00	.60	.00	1.000	.000	.00	1 .0
10.130	.0148					.0032	.03	2.21	.00	.48	.013	.00	.00	PIPE
133.920	5.940	2.087	8.027	2.00	2.55	.10	8.13	.00	.60	.00	1.000	.000	.00	1 .0
17.190	.0151					.0032	.05	.00	.00	.47	.013	.00	.00	PIPE
151.110	6.200	1.896	8.096	2.00	2.55	.10	8.20	.00	.60	.00	1.000	.000	.00	1 .0
18.750	.0149					.0032	.06	1.90	.00	.48	.013	.00	.00	PIPE
169.860	6.480	1.675	8.155	2.00	2.55	.10	8.26	.00	.60	.00	1.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.000														
CD	2	4	1			1.000														
CD	3	4	1			1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B2 PROPOSED CONDITION

HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	101.550	.200	1	12.109					
ELEMENT NO 2	IS	A	REACH	U/S DATA	106.420	2.140	1		.013	.000	.000	.000	0
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS													
ELEMENT NO 3	IS	A	REACH	U/S DATA	112.430	4.520	3		.013	22.501	15.304	.000	0
ELEMENT NO 4	IS	A	JUNCTION	U/S DATA	117.460	5.690	3		.013	6.210	.000	-70.000	.000
INVERT-3 INVERT-4 PHI 3 PHI 4 RADIUS ANGLE 22.500 12.809													
ELEMENT NO 5	IS	A	REACH	U/S DATA	123.790	5.790	3		.013	22.500	16.119	.000	0
ELEMENT NO 6	IS	A	REACH	U/S DATA	133.920	5.940	3		.013	.000	.000	.000	0
ELEMENT NO 7	IS	A	REACH	U/S DATA	151.110	6.200	3		.013	22.494	43.785	.000	0
ELEMENT NO 8	IS	A	REACH	U/S DATA	169.860	6.480	3		.013	.000	.000	.000	0
ELEMENT NO 9	IS	A	SYSTEM HEADWORKS	U/S DATA	169.860	6.480	3			6.480			

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B2 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 2:51:55

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
101.550	.200	11.909	12.109	4.80	6.11	.58	12.69	.00	.91	.00	1.000	.000	.00	1 .0
4.870	.3984					.0182	.09	11.91	.00	.31	.013	.00	.00	PIPE
106.420	2.140	10.057	12.197	4.80	6.11	.58	12.78	.00	.91	.00	1.000	.000	.00	1 .0
6.010	.3960					.0182	.11	.00	.00	.31	.013	.00	.00	PIPE
112.430	4.520	7.834	12.354	4.80	6.11	.58	12.93	.00	.91	.00	1.000	.000	.00	1 .0
JUNCT STR	.2326					.0178	.09	.00	.00		.013	.00	.00	PIPE
117.460	5.690	6.801	12.491	4.70	5.98	.56	13.05	.00	.90	.00	1.000	.000	.00	1 .0
6.330	.0158					.0174	.11	.00	.00	.87	.013	.00	.00	PIPE
123.790	5.790	6.859	12.649	4.70	5.98	.56	13.20	.00	.90	.00	1.000	.000	.00	1 .0
10.130	.0148					.0174	.18	6.86	.00	1.00	.013	.00	.00	PIPE
133.920	5.940	6.885	12.825	4.70	5.98	.56	13.38	.00	.90	.00	1.000	.000	.00	1 .0
17.190	.0151					.0174	.30	.00	.00	.92	.013	.00	.00	PIPE
151.110	6.200	7.002	13.202	4.70	5.98	.56	13.76	.00	.90	.00	1.000	.000	.00	1 .0
18.750	.0149					.0174	.33	7.00	.00	1.00	.013	.00	.00	PIPE
169.860	6.480	7.048	13.528	4.70	5.98	.56	14.08	.00	.90	.00	1.000	.000	.00	1 .0

CD 1 4 1 1.250 W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B3 PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	*	*	*	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
			U/S DATA	STATION	INVERT	SECT		5.160				
				102.330	4.520	1						
ELEMENT NO	2	IS	A	REACH	*	*	*					
			U/S DATA	STATION	INVERT	SECT	N					
				358.950	6.290	1	.013		.000	.000	.000	0
ELEMENT NO	3	IS	A	SYSTEM HEADWORKS	*	*	*					
			U/S DATA	STATION	INVERT	SECT		6.290				
				358.950	6.290	1		6.290				

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-23-2019 Time:10:22:16

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B3 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.330	4.520	.668	5.188	3.00	4.49	.31	5.50	.00	.70	1.25	1.250	.000	.00	1 .0
237.992	.0069					.0069	1.64	.67	1.08	.67	.013	.00	.00	PIPE
340.322	6.162	.668	6.830	3.00	4.49	.31	7.14	.00	.70	1.25	1.250	.000	.00	1 .0
13.846	.0069					.0069	.10	.67	1.08	.67	.013	.00	.00	PIPE
354.168	6.257	.669	6.926	3.00	4.49	.31	7.24	.00	.70	1.25	1.250	.000	.00	1 .0
4.782	.0069					.0064	.03	.67	1.08	.67	.013	.00	.00	PIPE
358.950	6.290	.697	6.987	3.00	4.27	.28	7.27	.00	.70	1.24	1.250	.000	.00	1 .0

CD 1 4 1 1.250 W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B3 PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W PAGE NO 2
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	*	*	*	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
			U/S DATA	STATION	INVERT	SECT		8.163				
				102.330	4.520	1						
ELEMENT NO	2	IS	A	REACH	*	*	*					
			U/S DATA	STATION	INVERT	SECT	N		RADIUS	ANGLE	ANG PT	MAN H
				358.950	6.290	1	.013		.000	.000	.000	0
ELEMENT NO	3	IS	A	SYSTEM HEADWORKS	*	*	*					
			U/S DATA	STATION	INVERT	SECT		W S ELEV				
				358.950	6.290	1		6.290				

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 2-2019 Time:11:38:34

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B3 PROPOSED CONDITION

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

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*****
Station  | Invert  | Depth  | Water  | Q       | Vel    | Vel   | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev    | (FT)   | Elev   | (CFS)  | (FPS) | Head  | Grd.El. | Elev  | Depth    | Width    | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF      | SE Dpth | Froude N | Norm Dp  | "N"     | X-Fall  | ZR | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |     |     |     |
102.330  | 4.520  | 3.643  | 8.163  | 3.00   | 2.44  | .09   | 8.26   | .00    | .70     | .00     | 1.250   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |     |
256.620  | .0069  |         |         |         |         |         | .55    | 3.64   | .00     | .67     | .013    | .00     | .00 | PIPE
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |     |
358.950  | 6.290  | 2.426  | 8.716  | 3.00   | 2.44  | .09   | 8.81   | .00    | .70     | .00     | 1.250   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |     |
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FILE: B3P00H.WSW

B3P00H

W S P G W - EDIT LISTING - Version 14.07

Date:11-23-2019 Time:10:24:12

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP											

CD	1	4	1		1.250																	
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W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B3 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1	IS	A	SYSTEM	OUTLET	*	*	*														
				U/S DATA	STATION	INVERT	SECT															
					102.330	4.520	1															
ELEMENT NO	2	IS	A	REACH	*	*	*															
				U/S DATA	STATION	INVERT	SECT															
					358.950	6.290	1		N													
									.013													
ELEMENT NO	3	IS	A	SYSTEM	HEADWORKS	*	*															
				U/S DATA	STATION	INVERT	SECT															
					358.950	6.290	1															

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B3 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:10:24:15

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*****
Station  | Invert  | Depth  | Water  | Q      | Vel    | Vel    | Energy | Super | Critical | Flow Top | Height/ | Base Wt |      | No Wth
          | Elev   | (FT)   | Elev   | (CFS) | (FPS) | Head   | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL   | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF      | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall | ZR   | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
102.330  | 4.520  | 10.170 | 14.690 | 4.50   | 3.67  | .21   | 14.90  | .00   | .86    | .00    | 1.250  | .000  | .00  | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
256.620  | .0069  |         |         |         |         | .0049 | 1.25   | 10.17 | .00    | .88    | .013   | .00   | .00  | PIPE
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
358.950  | 6.290  | 9.645  | 15.935 | 4.50   | 3.67  | .21   | 16.14  | .00   | .86    | .00    | 1.250  | .000  | .00  | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
    
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CD 1 4 1 1.000 W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B4 PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	102.090	5.400	1	6.550				
2	IS	A	REACH		U/S DATA	111.390	5.480	1	.013	.000	.000	.000	0
3	IS	A	REACH		U/S DATA	129.400	5.630	1	.013	22.507	45.847	.000	0
4	IS	A	REACH		U/S DATA	185.530	6.090	1	.013	.000	.000	.000	0
5	IS	A	REACH		U/S DATA	209.340	6.290	1	.013	22.500	-60.632	.000	0
6	IS	A	REACH		U/S DATA	253.640	6.660	1	.013	.000	.000	.000	0
7	IS	A	SYSTEM	HEADWORKS	U/S DATA	253.640	6.660	1	6.660				

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 8:37:55

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B4 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.090	5.400	1.150	6.550	1.10	1.40	.03	6.58	.00	.44	.00	1.000	.000	.00	1 .0
9.300	.0086					.0010	.01	1.15	.00	.40	.013	.00	.00	PIPE
111.390	5.480	1.079	6.559	1.10	1.40	.03	6.59	.00	.44	.00	1.000	.000	.00	1 .0
11.157	.0083					.0009	.01	.00	.00	.40	.013	.00	.00	PIPE
122.547	5.573	1.000	6.573	1.10	1.40	.03	6.60	1.00	.44	.00	1.000	.000	.00	1 .0
6.853	.0083					.0009	.01	1.00	.00	.40	.013	.00	.00	PIPE
129.400	5.630	.947	6.577	1.10	1.43	.03	6.61	.00	.44	.45	1.000	.000	.00	1 .0
8.354	.0082					.0008	.01	.95	.19	.40	.013	.00	.00	PIPE
137.754	5.698	.883	6.581	1.10	1.50	.03	6.62	.00	.44	.64	1.000	.000	.00	1 .0
6.230	.0082					.0009	.01	.88	.25	.40	.013	.00	.00	PIPE
143.984	5.750	.834	6.583	1.10	1.57	.04	6.62	.00	.44	.75	1.000	.000	.00	1 .0
5.255	.0082					.0010	.01	.83	.29	.40	.013	.00	.00	PIPE
149.240	5.793	.792	6.584	1.10	1.65	.04	6.63	.00	.44	.81	1.000	.000	.00	1 .0
4.617	.0082					.0011	.00	.79	.32	.40	.013	.00	.00	PIPE
153.856	5.830	.755	6.585	1.10	1.73	.05	6.63	.00	.44	.86	1.000	.000	.00	1 .0
4.136	.0082					.0012	.00	.75	.35	.40	.013	.00	.00	PIPE
157.993	5.864	.721	6.585	1.10	1.81	.05	6.64	.00	.44	.90	1.000	.000	.00	1 .0
3.774	.0082					.0013	.01	.72	.39	.40	.013	.00	.00	PIPE

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 8:37:55

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B4 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

B4P10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
161.767	5.895	.690	6.585	1.10	1.90	.06	6.64	.00	.44	.92	1.000	.000	.00	1 .0
3.446	.0082					.0015	.01	.69	.42	.40	.013	.00	.00	PIPE
165.214	5.924	.661	6.585	1.10	2.00	.06	6.65	.00	.44	.95	1.000	.000	.00	1 .0
3.183	.0082					.0017	.01	.66	.46	.40	.013	.00	.00	PIPE
168.396	5.950	.634	6.584	1.10	2.09	.07	6.65	.00	.44	.96	1.000	.000	.00	1 .0
2.923	.0082					.0019	.01	.63	.50	.40	.013	.00	.00	PIPE
171.319	5.974	.609	6.583	1.10	2.20	.07	6.66	.00	.44	.98	1.000	.000	.00	1 .0
2.698	.0082					.0021	.01	.61	.54	.40	.013	.00	.00	PIPE
174.017	5.996	.585	6.581	1.10	2.30	.08	6.66	.00	.44	.99	1.000	.000	.00	1 .0
2.457	.0082					.0024	.01	.59	.58	.40	.013	.00	.00	PIPE
176.473	6.016	.563	6.579	1.10	2.41	.09	6.67	.00	.44	.99	1.000	.000	.00	1 .0
2.267	.0082					.0027	.01	.56	.63	.40	.013	.00	.00	PIPE
178.740	6.034	.542	6.576	1.10	2.53	.10	6.68	.00	.44	1.00	1.000	.000	.00	1 .0
2.016	.0082					.0031	.01	.54	.68	.40	.013	.00	.00	PIPE
180.756	6.051	.521	6.572	1.10	2.66	.11	6.68	.00	.44	1.00	1.000	.000	.00	1 .0
1.790	.0082					.0035	.01	.52	.73	.40	.013	.00	.00	PIPE
182.546	6.066	.502	6.568	1.10	2.79	.12	6.69	.00	.44	1.00	1.000	.000	.00	1 .0
1.394	.0082					.0040	.01	.50	.78	.40	.013	.00	.00	PIPE

FILE: B4P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

PAGE 3

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-3-2019 Time: 8:37:55

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B4 PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
183.940	6.077	.484	6.561	1.10	2.92	.13	6.69	.00	.44	1.00	1.000	.000	.00	1 .0

HYDRAULIC JUMP

B4P10H

183.940	6.077	.400	6.477	1.10	3.75	.22	6.70	.00	.44	.98	1.000	.000	.00	1	.0
1.590	.0082					.0084	.01	.40	1.21	.40	.013	.00	.00	PIPE	
185.530	6.090	.400	6.490	1.10	3.75	.22	6.71	.02	.44	.98	1.000	.000	.00	1	.0
11.783	.0084					.0084	.10	.42	1.21	.40	.013	.00	.00	PIPE	
197.313	6.189	.400	6.589	1.10	3.75	.22	6.81	.02	.44	.98	1.000	.000	.00	1	.0
12.027	.0084					.0084	.10	.42	1.21	.40	.013	.00	.00	PIPE	
209.340	6.290	.401	6.691	1.10	3.74	.22	6.91	.00	.44	.98	1.000	.000	.00	1	.0
29.530	.0084					.0084	.25	.40	1.20	.40	.013	.00	.00	PIPE	
238.870	6.537	.401	6.937	1.10	3.74	.22	7.15	.00	.44	.98	1.000	.000	.00	1	.0
10.930	.0084					.0080	.09	.40	1.20	.40	.013	.00	.00	PIPE	
249.800	6.628	.410	7.038	1.10	3.63	.20	7.24	.00	.44	.98	1.000	.000	.00	1	.0
3.216	.0084					.0072	.02	.41	1.15	.40	.013	.00	.00	PIPE	
253.016	6.655	.425	7.079	1.10	3.46	.19	7.27	.00	.44	.99	1.000	.000	.00	1	.0
.624	.0084					.0063	.00	.42	1.08	.40	.013	.00	.00	PIPE	
253.640	6.660	.441	7.101	1.10	3.29	.17	7.27	.00	.44	.99	1.000	.000	.00	1	.0



CD 1 4 1 1.000 W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS -
STORM DRAIN LINE B4 PROPOSED CONDITION
 HEADING LINE NO 3 IS -
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	102.090	5.400	1	8.497				
2	IS	A	REACH		U/S DATA	111.390	5.480	1	.013	.000	.000	.000	0
3	IS	A	REACH		U/S DATA	129.400	5.630	1	.013	22.507	45.847	.000	0
4	IS	A	REACH		U/S DATA	185.530	6.090	1	.013	.000	.000	.000	0
5	IS	A	REACH		U/S DATA	209.340	6.290	1	.013	22.500	-60.632	.000	0
6	IS	A	REACH		U/S DATA	253.640	6.660	1	.013	.000	.000	.000	0
7	IS	A	SYSTEM	HEADWORKS	U/S DATA	253.640	6.660	1	6.660				

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B4 PROPOSED CONDITION

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.090	5.400	3.097	8.497	1.10	1.40	.03	8.53	.00	.44	.00	1.000	.000	.00	1 .0
9.300	.0086					.0010	.01	3.10	.00	.40	.013	.00	.00	PIPE
111.390	5.480	3.026	8.506	1.10	1.40	.03	8.54	.00	.44	.00	1.000	.000	.00	1 .0
18.010	.0083					.0010	.02	.00	.00	.40	.013	.00	.00	PIPE
129.400	5.630	2.897	8.527	1.10	1.40	.03	8.56	.00	.44	.00	1.000	.000	.00	1 .0
56.130	.0082					.0010	.05	2.90	.00	.40	.013	.00	.00	PIPE
185.530	6.090	2.491	8.581	1.10	1.40	.03	8.61	.00	.44	.00	1.000	.000	.00	1 .0
23.810	.0084					.0010	.02	.00	.00	.40	.013	.00	.00	PIPE
209.340	6.290	2.319	8.609	1.10	1.40	.03	8.64	.00	.44	.00	1.000	.000	.00	1 .0
44.300	.0084					.0010	.04	2.32	.00	.40	.013	.00	.00	PIPE
253.640	6.660	1.991	8.651	1.10	1.40	.03	8.68	.00	.44	.00	1.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										

CD 1 4 1 1.000

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B4 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN	H
1	IS	A	SYSTEM	OUTLET	U/S DATA	102.090	5.400	1	16.980					
2	IS	A	REACH		U/S DATA	111.390	5.480	1	.013	.000	.000	.000	0	
3	IS	A	REACH		U/S DATA	129.400	5.630	1	.013	22.507	45.847	.000	0	
4	IS	A	REACH		U/S DATA	185.530	6.090	1	.013	.000	.000	.000	0	
5	IS	A	REACH		U/S DATA	209.340	6.290	1	.013	22.500	-60.632	.000	0	
6	IS	A	REACH		U/S DATA	253.640	6.660	1	.013	.000	.000	.000	0	
7	IS	A	SYSTEM	HEADWORKS	U/S DATA	253.640	6.660	1	6.660					

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B4 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:10:35:45

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Station   Invert   Depth   Water   Q       Vel   Vel   Energy   Super   Critical   Flow Top   Height/   Base Wt   No Wth
-         Elev     (FT)    Elev    (CFS)  (FPS) Head  Grd.El.  Elev    Depth     Width     Dia.-FT  or I.D.  ZL       Prs/Pip
L/Elem   Ch Slope
*****   *****
102.090   5.400   11.580   16.980   1.50    1.91   .06    17.04    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
9.300    .0086
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
111.390   5.480   11.516   16.996   1.50    1.91   .06    17.05    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
18.010    .0083
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
129.400   5.630   11.406   17.036   1.50    1.91   .06    17.09    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
56.130    .0082
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
185.530   6.090   11.046   17.136   1.50    1.91   .06    17.19    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
23.810    .0084
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
209.340   6.290   10.897   17.187   1.50    1.91   .06    17.24    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
44.300    .0084
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
253.640   6.660   10.606   17.266   1.50    1.91   .06    17.32    .00       .52      .00      1.000    .000     .00     1 .0
-         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -
    
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CD 1 4 1 1.500 W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B4.1 PROPOSED CONDITION

HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT											
1						100.000	7.220	1											
2						136.630	7.620	1	N	.013									
3						168.650	7.960	1	N	.013									
4						248.010	8.820	1	N	.013									
5						248.010	8.820	1											

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B4.1 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 1:44:54

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	7.220	1.144	8.364	10.20	7.06	.77	9.14	.00	1.23	1.28	1.500	.000	.00	1 .0
4.718	.0109					.0109	.05	1.14	1.17	1.14	.013	.00	.00	PIPE
104.718	7.272	1.144	8.415	10.20	7.06	.77	9.19	.00	1.23	1.28	1.500	.000	.00	1 .0
31.912	.0109					.0108	.34	1.14	1.17	1.14	.013	.00	.00	PIPE
136.630	7.620	1.158	8.778	10.20	6.97	.75	9.53	.08	1.23	1.26	1.500	.000	.00	1 .0
.741	.0106					.0106	.01	1.24	1.14	1.16	.013	.00	.00	PIPE
137.371	7.628	1.158	8.786	10.20	6.97	.75	9.54	.08	1.23	1.26	1.500	.000	.00	1 .0
31.279	.0106					.0107	.34	1.24	1.14	1.16	.013	.00	.00	PIPE
168.650	7.960	1.148	9.108	10.20	7.03	.77	9.88	.00	1.23	1.27	1.500	.000	.00	1 .0
41.515	.0108					.0108	.45	1.15	1.16	1.15	.013	.00	.00	PIPE
210.165	8.410	1.148	9.558	10.20	7.03	.77	10.33	.00	1.23	1.27	1.500	.000	.00	1 .0
29.737	.0108					.0106	.32	1.15	1.16	1.15	.013	.00	.00	PIPE
239.902	8.732	1.168	9.901	10.20	6.91	.74	10.64	.00	1.23	1.24	1.500	.000	.00	1 .0
8.108	.0108					.0099	.08	1.17	1.12	1.15	.013	.00	.00	PIPE
248.010	8.820	1.229	10.049	10.20	6.58	.67	10.72	.00	1.23	1.15	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD 1 4 1 1.500

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B4.1 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	8.651				
						100.000	7.220	1					
2	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						136.630	7.620	1					
3	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						168.650	7.960	1					
4	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						248.010	8.820	1					
5	IS	A	SYSTEM	HEADWORKS	U/S DATA	STATION	INVERT	SECT					
						248.010	8.820	1					

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 1:56: 9

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B4.1 PROPOSED CONDITION

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes a 'HYDRAULIC JUMP' section.

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 1:56: 9

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B4.1 PROPOSED CONDITION

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Table header for the second page, including columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth.

B41P10L														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
248.010	8.820	1.229	10.049	10.20	6.58	.67	10.72	.00	1.23	1.15	1.500	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD	1	4	1		1.500															
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W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B4.1 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV							
				100.000	7.220	1	17.270							
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				136.630	7.620	1		.000	.000	.000	0			
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				168.650	7.960	1		22.496	-81.554	.000	0			
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				248.010	8.820	1		.000	.000	.000	0			
ELEMENT NO	5 IS A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT		W S ELEV						
				248.010	8.820	1		8.820						

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 2:22:44

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B4.1 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=4.41

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
   | Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | | | | | | | | | | |
*****
100.000 | 7.220 | 10.050 | 17.270 | 15.90 | 9.00 | 1.26 | 18.53 | .00 | 1.42 | .00 | 1.500 | .000 | .00 | 1 .0
   | | | | | | | | | | | | | | | |
36.630 | .0109 | | | | | | | | | | | | | | | |
   | | | | | | | | | | | | | | | |
136.630 | 7.620 | 10.489 | 18.109 | 15.90 | 9.00 | 1.26 | 19.37 | .00 | 1.42 | .00 | 1.500 | .000 | .00 | 1 .0
   | | | | | | | | | | | | | | | |
32.020 | .0106 | | | | | | | | | | | | | | | |
   | | | | | | | | | | | | | | | |
168.650 | 7.960 | 11.122 | 19.082 | 15.90 | 9.00 | 1.26 | 20.34 | .00 | 1.42 | .00 | 1.500 | .000 | .00 | 1 .0
   | | | | | | | | | | | | | | | |
79.360 | .0108 | | | | | | | | | | | | | | | |
   | | | | | | | | | | | | | | | |
248.010 | 8.820 | 12.080 | 20.900 | 15.90 | 9.00 | 1.26 | 22.16 | .00 | 1.42 | .00 | 1.500 | .000 | .00 | 1 .0
   | | | | | | | | | | | | | | | |
*****
    
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CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B5 PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV													
ELEMENT NO	1	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV												
						102.680	5.400	1	6.550												
ELEMENT NO	2	IS	A	REACH	U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H					
						131.930	6.260	1		.013			.000	.000	.000	0					
ELEMENT NO	3	IS	A	REACH	U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H					
						141.110	6.530	1		.013			22.500	23.377	.000	0					
ELEMENT NO	4	IS	A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
						146.060	6.670	1	2	0	.013	.100	.000	6.530	.000	55.400	.000				
														RADIUS	ANGLE						
														22.500	12.605						
ELEMENT NO	5	IS	A	REACH	U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H					
						157.810	7.020	1		.013			22.500	29.921	.000	0					
ELEMENT NO	6	IS	A	REACH	U/S DATA	STATION	INVERT	SECT		N			RADIUS	ANGLE	ANG PT	MAN H					
						172.580	7.450	1		.013			.000	.000	.000	0					
ELEMENT NO	7	IS	A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT													
						172.580	7.450	1						W S ELEV							
														7.450							

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B5 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 2:27:26

Table with columns: Station, L/Elem, Invert Elev, Ch Slope, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, SF Ave, Energy Grd.El., HF, Super Elev, SE Dpth, Critical Depth, Froude N, Flow Top Width, Norm Dp, Height/Dia.-FT, "N", Base Wt or I.D., X-Fall, ZR, ZL, No Prs/Pip, Wth, Type Ch. Contains 15 rows of data for stations 102.680 to 112.787.

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B5 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 2:27:26

Table with columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth.

B5P10H															
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
112.967	5.702	.792	6.495	2.10	2.22	.08	6.57	.00	.55	1.50	1.500	.000	.00	1 .0	
HYDRAULIC JUMP															
112.967	5.702	.347	6.050	2.10	6.77	.71	6.76	.00	.55	1.27	1.500	.000	.00	1 .0	
2.460	.0294					.0285	.07	.35	2.41	.35	.013	.00	.00	PIPE	
115.427	5.775	.350	6.125	2.10	6.70	.70	6.82	.00	.55	1.27	1.500	.000	.00	1 .0	
16.503	.0294					.0263	.43	.35	2.38	.35	.013	.00	.00	PIPE	
131.930	6.260	.362	6.622	2.10	6.39	.63	7.26	.07	.55	1.28	1.500	.000	.00	1 .0	
3.625	.0294					.0239	.09	.43	2.23	.35	.013	.00	.00	PIPE	
135.555	6.367	.367	6.734	2.10	6.26	.61	7.34	.07	.55	1.29	1.500	.000	.00	1 .0	
5.555	.0294					.0217	.12	.44	2.17	.35	.013	.00	.00	PIPE	
141.110	6.530	.380	6.910	2.10	5.97	.55	7.46	.06	.55	1.30	1.500	.000	.00	1 .0	
JUNCT STR	.0283					.0233	.12	.44	2.03		.013	.00	.00	PIPE	
146.060	6.670	.347	7.017	2.00	6.46	.65	7.66	.07	.53	1.27	1.500	.000	.00	1 .0	
5.101	.0298					.0255	.13	.42	2.30	.34	.013	.00	.00	PIPE	
151.161	6.822	.353	7.174	2.00	6.32	.62	7.79	.07	.53	1.27	1.500	.000	.00	1 .0	
6.649	.0298					.0231	.15	.42	2.23	.34	.013	.00	.00	PIPE	
157.810	7.020	.365	7.385	2.00	6.02	.56	7.95	.00	.53	1.29	1.500	.000	.00	1 .0	
.132	.0291					.0216	.00	.36	2.09	.34	.013	.00	.00	PIPE	

FILE: B5P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 2:27:26

DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B5 PROPOSED CONDITION
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
157.942	7.024	.365	7.389	2.00	6.02	.56	7.95	.00	.53	1.29	1.500	.000	.00	1 .0
4.318	.0291					.0202	.09	.36	2.09	.34	.013	.00	.00	PIPE

B5P10H

162.260	7.150	.377	7.527	2.00	5.74	.51	8.04	.00	.53	1.30	1.500	.000	.00	1	.0
2.916	.0291					.0176	.05	.38	1.95	.34	.013	.00	.00	PIPE	
165.176	7.234	.390	7.625	2.00	5.47	.46	8.09	.00	.53	1.32	1.500	.000	.00	1	.0
2.100	.0291					.0154	.03	.39	1.83	.34	.013	.00	.00	PIPE	
167.276	7.296	.404	7.700	2.00	5.21	.42	8.12	.00	.53	1.33	1.500	.000	.00	1	.0
1.562	.0291					.0135	.02	.40	1.71	.34	.013	.00	.00	PIPE	
168.839	7.341	.418	7.759	2.00	4.97	.38	8.14	.00	.53	1.34	1.500	.000	.00	1	.0
1.179	.0291					.0118	.01	.42	1.60	.34	.013	.00	.00	PIPE	
170.018	7.375	.432	7.808	2.00	4.74	.35	8.16	.00	.53	1.36	1.500	.000	.00	1	.0
.886	.0291					.0103	.01	.43	1.50	.34	.013	.00	.00	PIPE	
170.904	7.401	.448	7.849	2.00	4.52	.32	8.17	.00	.53	1.37	1.500	.000	.00	1	.0
.660	.0291					.0091	.01	.45	1.40	.34	.013	.00	.00	PIPE	
171.564	7.420	.463	7.884	2.00	4.31	.29	8.17	.00	.53	1.39	1.500	.000	.00	1	.0
.468	.0291					.0079	.00	.46	1.31	.34	.013	.00	.00	PIPE	
172.032	7.434	.479	7.913	2.00	4.11	.26	8.18	.00	.53	1.40	1.500	.000	.00	1	.0
.313	.0291					.0069	.00	.48	1.23	.34	.013	.00	.00	PIPE	

FILE: B5P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-3-2019 Time: 2:27:26

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B5 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
172.345	7.443	.496	7.939	2.00	3.92	.24	8.18	.00	.53	1.41	1.500	.000	.00	1 .0
.177	.0291					.0061	.00	.50	1.15	.34	.013	.00	.00	PIPE
172.521	7.448	.514	7.962	2.00	3.74	.22	8.18	.00	.53	1.42	1.500	.000	.00	1 .0
.059	.0291					.0053	.00	.51	1.07	.34	.013	.00	.00	PIPE
172.580	7.450	.533	7.983	2.00	3.55	.20	8.18	.00	.53	1.44	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE B5 PROPOSED CONDITION

HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO 1	IS	A	SYSTEM OUTLET	102.680	5.400	1	8.497				
ELEMENT NO 2	IS	A	REACH	131.930	6.260	1		.000	.000	.000	0
ELEMENT NO 3	IS	A	REACH	141.110	6.530	1		22.500	23.377	.000	0
ELEMENT NO 4	IS	A	JUNCTION	146.060	6.670	1		6.530	.000	55.400	.000
ELEMENT NO 5	IS	A	REACH	157.810	7.020	1		22.500	29.921	.000	0
ELEMENT NO 6	IS	A	REACH	172.580	7.450	1		.000	.000	.000	0
ELEMENT NO 7	IS	A	SYSTEM HEADWORKS	172.580	7.450	1		7.450			

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B5 PROPOSED CONDITION
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 3-2019 Time: 3:42:31

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 102.680 through 167.746 and a 'JUNCT STR' entry.

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B5 PROPOSED CONDITION
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 3-2019 Time: 3:42:31

Summary table with columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth.

B5P10L														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
169.683	7.366	1.155	8.521	2.00	1.37	.03	8.55	.00	.53	1.26	1.500	.000	.00	1 .0
1.729	.0291					.0004	.00	1.16	.22	.34	.013	.00	.00	PIPE
171.412	7.416	1.103	8.519	2.00	1.44	.03	8.55	.00	.53	1.32	1.500	.000	.00	1 .0
1.168	.0291					.0005	.00	1.10	.25	.34	.013	.00	.00	PIPE
172.580	7.450	1.067	8.517	2.00	1.49	.03	8.55	.00	.53	1.36	1.500	.000	.00	1 .0

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.500															
CD	2	4	1			1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B5 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO	1	IS	A	SYSTEM OUTLET	102.680	5.400	1	16.980					
ELEMENT NO	2	IS	A	REACH	131.930	6.260	1		.013	.000	.000	.000	0
ELEMENT NO	3	IS	A	REACH	141.110	6.530	1		.013	22.500	23.377	.000	0
ELEMENT NO	4	IS	A	JUNCTION	146.060	6.670	1		.013	6.530	.000	55.400	.000
										22.500	12.605		
ELEMENT NO	5	IS	A	REACH	157.810	7.020	1		.013	22.500	29.921	.000	0
ELEMENT NO	6	IS	A	REACH	172.580	7.450	1		.013	.000	.000	.000	0
ELEMENT NO	7	IS	A	SYSTEM HEADWORKS	172.580	7.450	1						

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR DRY STACK LEASE AREA
 STORM DRAIN LINE B5 PROPOSED CONDITION
 100-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 3:45:29

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
102.680	5.400	11.580	16.980	19.40	10.98	1.87	18.85	.00	1.46	.00	1.500	.000	.00	1 .0
29.250	.0294					.0341	1.00	11.58	.00	1.50	.013	.00	.00	PIPE
131.930	6.260	11.718	17.978	19.40	10.98	1.87	19.85	.00	1.46	.00	1.500	.000	.00	1 .0
9.180	.0294					.0341	.31	.00	.00	1.50	.013	.00	.00	PIPE
141.110	6.530	11.952	18.482	19.40	10.98	1.87	20.35	.00	1.46	.00	1.500	.000	.00	1 .0
JUNCT STR	.0283					.0339	.17	.00	.00		.013	.00	.00	PIPE
146.060	6.670	12.018	18.688	19.30	10.92	1.85	20.54	.00	1.46	.00	1.500	.000	.00	1 .0
11.750	.0298					.0338	.40	.00	.00	1.35	.013	.00	.00	PIPE
157.810	7.020	12.278	19.298	19.30	10.92	1.85	21.15	.00	1.46	.00	1.500	.000	.00	1 .0
14.770	.0291					.0338	.50	12.28	.00	1.50	.013	.00	.00	PIPE
172.580	7.450	12.347	19.797	19.30	10.92	1.85	21.65	.00	1.46	.00	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1 BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										

CD 1 4 1 1.500

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE 5.6 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	7.983				
						100.000	8.120	1					
2	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						230.510	11.010	1		.013	.000	.000	.000 0
3	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						246.050	11.360	1		.013	22.502	-39.569	.000 0
4	IS	A	REACH		U/S DATA	STATION	INVERT	SECT					
						266.000	11.800	1		.013	.000	.000	.000 0
5	IS	A	SYSTEM	HEADWORKS	U/S DATA	STATION	INVERT	SECT					
						266.000	11.800	1		11.800			

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE 5.6 PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	8.120	1.003	9.123	12.30	9.80	1.49	10.61	.00	1.33	1.41	1.500	.000	.00	1 .0
3.846	.0221					.0221	.09	1.00	1.83	1.00	.013	.00	.00	PIPE
103.846	8.205	1.003	9.208	12.30	9.80	1.49	10.70	.00	1.33	1.41	1.500	.000	.00	1 .0
76.748	.0221					.0218	1.68	1.00	1.83	1.00	.013	.00	.00	PIPE
180.594	9.905	1.013	10.917	12.30	9.69	1.46	12.38	.00	1.33	1.41	1.500	.000	.00	1 .0
49.916	.0221					.0204	1.02	1.01	1.80	1.00	.013	.00	.00	PIPE
230.510	11.010	1.057	12.067	12.30	9.24	1.33	13.39	.16	1.33	1.37	1.500	.000	.00	1 .0
15.540	.0225					.0183	.28	1.22	1.65	1.00	.013	.00	.00	PIPE
246.050	11.360	1.100	12.460	12.30	8.85	1.22	13.68	.00	1.33	1.33	1.500	.000	.00	1 .0
7.350	.0221					.0168	.12	1.10	1.52	1.00	.013	.00	.00	PIPE
253.400	11.522	1.133	12.655	12.30	8.59	1.15	13.80	.00	1.33	1.29	1.500	.000	.00	1 .0
7.316	.0221					.0154	.11	1.13	1.44	1.00	.013	.00	.00	PIPE
260.716	11.683	1.188	12.872	12.30	8.19	1.04	13.91	.00	1.33	1.22	1.500	.000	.00	1 .0
3.945	.0221					.0140	.06	1.19	1.30	1.00	.013	.00	.00	PIPE
264.661	11.770	1.251	13.022	12.30	7.81	.95	13.97	.00	1.33	1.12	1.500	.000	.00	1 .0
1.339	.0221					.0128	.02	1.25	1.16	1.00	.013	.00	.00	PIPE
266.000	11.800	1.326	13.126	12.30	7.44	.86	13.99	.00	1.33	.96	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD 1 4 1 1.500

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE 5.6 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	100.000	8.120	1	8.517				
2	IS	A	REACH		U/S DATA	230.510	11.010	1		.013	.000	.000	.000 0
3	IS	A	REACH		U/S DATA	246.050	11.360	1		.013	22.502	-39.569	.000 0
4	IS	A	REACH		U/S DATA	266.000	11.800	1		.013	.000	.000	.000 0
5	IS	A	SYSTEM	HEADWORKS	U/S DATA	266.000	11.800	1	11.800				

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE 5.6 PROPOSED CONDITION
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 3-2019 Time: 3:56:57

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	8.120	1.003	9.123	12.30	9.80	1.49	10.61	.00	1.33	1.41	1.500	.000	.00	1 .0
3.846	.0221					.0221	.09	1.00	1.83	1.00	.013	.00	.00	PIPE
103.846	8.205	1.003	9.208	12.30	9.80	1.49	10.70	.00	1.33	1.41	1.500	.000	.00	1 .0
76.748	.0221					.0218	1.68	1.00	1.83	1.00	.013	.00	.00	PIPE
180.594	9.905	1.013	10.917	12.30	9.69	1.46	12.38	.00	1.33	1.41	1.500	.000	.00	1 .0
49.916	.0221					.0204	1.02	1.01	1.80	1.00	.013	.00	.00	PIPE
230.510	11.010	1.057	12.067	12.30	9.24	1.33	13.39	.16	1.33	1.37	1.500	.000	.00	1 .0
15.540	.0225					.0183	.28	1.22	1.65	1.00	.013	.00	.00	PIPE
246.050	11.360	1.100	12.460	12.30	8.85	1.22	13.68	.00	1.33	1.33	1.500	.000	.00	1 .0
7.350	.0221					.0168	.12	1.10	1.52	1.00	.013	.00	.00	PIPE
253.400	11.522	1.133	12.655	12.30	8.59	1.15	13.80	.00	1.33	1.29	1.500	.000	.00	1 .0
7.316	.0221					.0154	.11	1.13	1.44	1.00	.013	.00	.00	PIPE
260.716	11.683	1.188	12.872	12.30	8.19	1.04	13.91	.00	1.33	1.22	1.500	.000	.00	1 .0
3.945	.0221					.0140	.06	1.19	1.30	1.00	.013	.00	.00	PIPE
264.661	11.770	1.251	13.022	12.30	7.81	.95	13.97	.00	1.33	1.12	1.500	.000	.00	1 .0
1.339	.0221					.0128	.02	1.25	1.16	1.00	.013	.00	.00	PIPE
266.000	11.800	1.326	13.126	12.30	7.44	.86	13.99	.00	1.33	.96	1.500	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD	1	4	1		1.500															
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W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE 5.6 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV							
				100.000	8.120	1	19.797							
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				230.510	11.010	1	.013	.000	.000	.000	0			
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				246.050	11.360	1	.013	22.502	-39.569	.000	0			
ELEMENT NO	4 IS A	REACH	U/S DATA	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H			
				266.000	11.800	1	.013	.000	.000	.000	0			
ELEMENT NO	5 IS A	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT		W S ELEV						
				266.000	11.800	1	11.800							

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 3:48:57

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE 5.6 PROPOSED CONDITION

100-YEAR STORM - MHW CONDITION WSE=4.41

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*****
Station  | Invert  | Depth  | Water  | Q      | Vel    | Vel    | Energy | Super  | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev    | (FT)   | Elev   | (CFS)  | (FPS)  | Head   | Grd.El. | Elev   | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF      | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall | ZR | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
100.000  | 8.120   | 11.677 | 19.797 | 19.40  | 10.98  | 1.87   | 21.67  | .00    | 1.46    | .00    | 1.500   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
130.510  | .0221   |         |         |         |         | .0341  | 4.45   | 11.68  | .00     | 1.50   | .013    | .00    | .00 | PIPE
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
230.510  | 11.010  | 13.239 | 24.249 | 19.40  | 10.98  | 1.87   | 26.12  | .00    | 1.46    | .00    | 1.500   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
15.540   | .0225   |         |         |         |         | .0341  | .53    | .00    | .00     | 1.50   | .013    | .00    | .00 | PIPE
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
246.050  | 11.360  | 13.667 | 25.027 | 19.40  | 10.98  | 1.87   | 26.90  | .00    | 1.46    | .00    | 1.500   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
19.950   | .0221   |         |         |         |         | .0341  | .68    | 13.67  | .00     | 1.50   | .013    | .00    | .00 | PIPE
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
266.000  | 11.800  | 13.907 | 25.707 | 19.40  | 10.98  | 1.87   | 27.58  | .00    | 1.46    | .00    | 1.500   | .000   | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
*****

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CD 1 4 1 1.000 W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR DRY STACK LEASE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE B6 PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1						102.150	8.690	1	9.100				
2			REACH			130.340	9.250	1		.000	.000	.000	0
3			REACH			144.530	9.520	1		22.509	-36.120	.000	0
4			REACH			186.970	10.360	1		.000	.000	.000	0
5			SYSTEM	HEADWORKS		186.970	10.360	1					

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B6 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:11: 8:20

Table with columns: Station, L/Elem, Invert Elev, Ch Slope, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, SF Ave, Energy Grd.El., HF, Super Elev, SE Dpth, Critical Depth, Froude N, Flow Top Width, Norm Dp, Height/Dia.-FT, "N", Base Wt or I.D., X-Fall, ZR, ZL, No Prs/Pip, Wth, Type Ch. Contains 15 rows of data for a storm drain line profile.

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B6 PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-23-2019 Time:11: 8:20

Table header for the second page, listing column names: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth.

B6P10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
184.840	10.318	.431	10.749	1.40	4.32	.29	11.04	.00	.50	.99	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.023	.0198					.0097	.01	.43	1.33	.36	.013	.00	.00	PIPE
185.862	10.338	.447	10.785	1.40	4.12	.26	11.05	.00	.50	.99	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.650	.0198					.0085	.01	.45	1.24	.36	.013	.00	.00	PIPE
186.513	10.351	.464	10.815	1.40	3.92	.24	11.05	.00	.50	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.345	.0198					.0075	.00	.46	1.16	.36	.013	.00	.00	PIPE
186.858	10.358	.481	10.839	1.40	3.74	.22	11.06	.00	.50	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.112	.0198					.0066	.00	.48	1.08	.36	.013	.00	.00	PIPE
186.970	10.360	.501	10.861	1.40	3.56	.20	11.06	.00	.50	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT 1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH			DROP										

CD 1 4 1 1.000

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B6 PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	102.150	8.690	1	9.382				
2	IS	A	REACH		U/S DATA	130.340	9.250	1		.013	.000	.000	0
3	IS	A	REACH		U/S DATA	144.530	9.520	1		.013	22.509	-36.120	0
4	IS	A	REACH		U/S DATA	186.970	10.360	1		.013	.000	.000	0
5	IS	A	SYSTEM	HEADWORKS	U/S DATA	186.970	10.360	1					

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B6 PROPOSED CONDITION
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 2-2019 Time:11:48:28

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes rows for stations 102.150, 102.694, 102.694, 106.127, 130.340, 144.530, 145.666, 169.744, 177.024.

DANA POINT HARBOR DRY STACK LEASE AREA
STORM DRAIN LINE B6 PROPOSED CONDITION
10-YEAR STORM - MHHW +2' CONDITION WSE=7.13

Date:12- 2-2019 Time:11:48:28

Table with columns: Invert, Depth, Water, Q, Vel, Vel, Energy, Super, Critical, Flow Top, Height/, Base Wt, No Wth

B6P10L														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
180.886	10.240	.401	10.641	1.40	4.75	.35	10.99	.00	.50	.98	1.000	.000	.00	1 .0
2.380	.0198					.0126	.03	.40	1.53	.36	.013	.00	.00	PIPE
183.266	10.287	.416	10.703	1.40	4.53	.32	11.02	.00	.50	.99	1.000	.000	.00	1 .0
1.573	.0198					.0111	.02	.42	1.42	.36	.013	.00	.00	PIPE
184.840	10.318	.431	10.749	1.40	4.32	.29	11.04	.00	.50	.99	1.000	.000	.00	1 .0
1.023	.0198					.0097	.01	.43	1.33	.36	.013	.00	.00	PIPE
185.862	10.338	.447	10.785	1.40	4.12	.26	11.05	.00	.50	.99	1.000	.000	.00	1 .0
.650	.0198					.0085	.01	.45	1.24	.36	.013	.00	.00	PIPE
186.513	10.351	.464	10.815	1.40	3.92	.24	11.05	.00	.50	1.00	1.000	.000	.00	1 .0
.345	.0198					.0075	.00	.46	1.16	.36	.013	.00	.00	PIPE
186.858	10.358	.481	10.839	1.40	3.74	.22	11.06	.00	.50	1.00	1.000	.000	.00	1 .0
.112	.0198					.0066	.00	.48	1.08	.36	.013	.00	.00	PIPE
186.970	10.360	.501	10.861	1.40	3.56	.20	11.06	.00	.50	1.00	1.000	.000	.00	1 .0

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD	SECT	CHN	NO OF	AVE PIER	HEIGHT	1	BASE	ZL	ZR	INV	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CODE	NO	TYPE	PIER/PIP	WIDTH	DIAMETER	WIDTH				DROP										

CD 1 4 1 1.000

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR DRY STACK LEASE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE B6 PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM	OUTLET	U/S DATA	102.150	8.690	1	23.390				
2	IS	A	REACH		U/S DATA	130.340	9.250	1		.013	.000	.000	0
3	IS	A	REACH		U/S DATA	144.530	9.520	1		.013	22.509	-36.120	0
4	IS	A	REACH		U/S DATA	186.970	10.360	1		.013	.000	.000	0
5	IS	A	SYSTEM	HEADWORKS	U/S DATA	186.970	10.360	1					

DANA POINT HARBOR DRY STACK LEASE AREA

STORM DRAIN LINE B6 PROPOSED CONDITION

100-YEAR STORM - MHW CONDITION WSE=4.41

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*****
Station  | Invert  | Depth  | Water  | Q       | Vel    | Vel   | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev    | (FT)   | Elev   | (CFS)  | (FPS)  | Head  | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem   | Ch Slope |         |         |         |         | SF Ave | HF     | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall  | ZR | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
102.150  | 8.690   | 14.700 | 23.390 | 9.70   | 12.35  | 2.37  | 25.76  | .00    | .99     | .00    | 1.000   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
28.190   | .0199   |         |         |         |         | .0741 | 2.09   | 14.70  | .00     | 1.00   | .013    | .00     | .00 | PIPE
130.340  | 9.250   | 16.230 | 25.480 | 9.70   | 12.35  | 2.37  | 27.85  | .00    | .99     | .00    | 1.000   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
14.190   | .0190   |         |         |         |         | .0741 | 1.05   | .00    | .00     | 1.00   | .013    | .00     | .00 | PIPE
144.530  | 9.520   | 17.311 | 26.831 | 9.70   | 12.35  | 2.37  | 29.20  | .00    | .99     | .00    | 1.000   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
42.440   | .0198   |         |         |         |         | .0741 | 3.15   | 17.31  | .00     | 1.00   | .013    | .00     | .00 | PIPE
186.970  | 10.360  | 19.617 | 29.977 | 9.70   | 12.35  | 2.37  | 32.35  | .00    | .99     | .00    | 1.000   | .000    | .00 | 1 .0
          |         |         |         |         |         |         |         |         |         |         |         |         |     |     |
*****
    
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**PROPOSED CONDITION
COMMERCIAL CORE
RETAIL AREA**

COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C PROPOSED								
CONDITION MODEL								
STATION		INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM PR 10-YR	FLOW (CFS) RM 100-YR
EX	138.73	-9.5	-7.2	-	-7.2	160		
EX	175.48	-7.64	-5.34	-	-5.34			
PR	185.56			-	-3.6	450	4.02	5.07
PR	202.83			-	-0.63			
PR	203.83				-0.64	158	14.37	22.35
PR	222.30				2.1			
EX	222.36			2.19	2.19			
EX	242.25			-	2.43			
EX	300.28			-	3.13			
EX	423.65			-	4.61			
EX	425.65			-	4.64	155	3.37	5.39
EX	544.95			6.07	6.07			
EX	549.61			6.09	6.09	154	3.4	5.35
EX	549.80			6.09	6.09			
EX	980.00			7.43	7.43	153	349.2	563.89

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		5.000															
CD	2	4	1		3.000															
CD	3	4	1		4.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE C PROPOSED CONDITION
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41 -MODEL 2JX FOR LINE C2 AND C4

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV														
1	SYSTEM OUTLET		138.730	-7.200	1	4.400														
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
2	REACH		175.480	-5.340	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
3	JUNCTION		185.560	-3.600	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							4.020	.000	-3.600	-.090	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
4	REACH		202.830	-.630	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
5	JUNCTION		203.830	-.640	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							14.370	.000	.640	.045	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
6	REACH		222.300	2.100	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
7	JUNCTION		222.360	2.190	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							.000	.000	.000	.000	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV														
8	REACH		242.250	2.430	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
9	REACH		300.280	3.130	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41 -MODEL 2JX FOR LINE C2 AND C4

Date:11-15-2019 Time: 7:39:41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
138.730	-7.200	11.600	4.400	374.28	19.06	5.64	10.04	.00	4.85	.00	5.000	.000	.00	1 .0
36.750	.0506					.0207	.76	11.60	.00	2.90	.013	.00	.00	PIPE
175.480	-5.340	10.499	5.159	374.28	19.06	5.64	10.80	.00	4.85	.00	5.000	.000	.00	1 .0
JUNCT STR	.1726					.0204	.21	10.50	.00		.013	.00	.00	PIPE
185.560	-3.600	9.202	5.602	370.26	18.86	5.52	11.12	.00	4.85	.00	5.000	.000	.00	1 .0
17.270	.1720					.0202	.35	9.20	.00	2.02	.013	.00	.00	PIPE
202.830	-.630	6.581	5.951	370.26	18.86	5.52	11.47	.00	4.85	.00	5.000	.000	.00	1 .0
JUNCT STR	-.0100					.0194	.02	6.58	.00		.013	.00	.00	PIPE
203.830	-.640	7.425	6.785	355.89	18.13	5.10	11.89	.00	4.82	.00	5.000	.000	.00	1 .0
18.470	.1483					.0187	.34	7.43	.00	2.06	.013	.00	.00	PIPE
222.300	2.100	5.030	7.130	355.89	18.13	5.10	12.23	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	1.5001					.0176	.00	5.03	.00		.013	.00	.00	PIPE
222.360	2.190	4.860	7.050	355.89	18.27	5.18	12.23	.00	4.82	1.65	5.000	.000	.00	1 .0
11.360	.0121					.0172	.20	4.86	.94	5.00	.013	.00	.00	PIPE
233.720	2.327	5.000	7.327	355.89	18.13	5.10	12.43	.00	4.82	.00	5.000	.000	.00	1 .0
8.530	.0121					.0183	.16	5.00	.00	5.00	.013	.00	.00	PIPE
242.250	2.430	5.056	7.486	355.89	18.13	5.10	12.59	.00	4.82	.00	5.000	.000	.00	1 .0
58.030	.0121					.0187	1.08	5.06	.00	5.00	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C PROPOSED CONDITION
10-YEAR STORM - MHW CONDITION WSE=4.41 -MODEL 2JX FOR LINE C2 AND C4

Date:11-15-2019 Time: 7:39:41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
---------	-------------	------------	------------	---------	-----------	----------	----------------	------------	----------------	----------------	----------------	-----------------	----	----------------

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
300.280	3.130	5.440	8.570	355.89	18.13	5.10	13.67	.00	4.82	.00	5.000	.000	.00	1 .0
123.370	.0112					.0187	2.30	5.44	.00	5.00	.013	.00	.00	PIPE
423.650	4.510	6.364	10.874	355.89	18.13	5.10	15.97	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0650					.0185	.04	6.36	.00		.013	.00	.00	PIPE
425.650	4.640	6.460	11.100	352.52	17.95	5.01	16.11	.00	4.81	.00	5.000	.000	.00	1 .0
119.300	.0120					.0183	2.19	6.46	.00	5.00	.013	.00	.00	PIPE
544.950	6.070	7.216	13.286	352.52	17.95	5.01	18.29	.00	4.81	.00	5.000	.000	.00	1 .0
JUNCT STR	.0043					.0181	.08	7.22	.00		.013	.00	.00	PIPE
549.610	6.090	7.467	13.557	349.17	17.78	4.91	18.47	.00	4.81	.00	5.000	.000	.00	1 .0
.190	.0000					.0180	.00	7.47	.00	.00	.013	.00	.00	PIPE
549.800	6.090	7.781	13.871	349.17	17.78	4.91	18.78	.00	4.81	.00	5.000	.000	.00	1 .0
430.200	.0000					.0090	4.94	7.78	.00	.00	.013	.00	.00	PIPE
980.000	7.430	7.781	15.211	349.17	17.78	4.91	20.12	.00	4.81	.00	5.000	.000	.00	1 .0

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DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C PROPOSED CONDITION

10-YEAR STORM - MHW CONDITION WSE=4.41 -MODEL 2JX FOR LINE C2 AND C4

138.73	.I		CH		W		E							R
155.90	.													.
173.07	.													.
190.24	.	I		CH		W		E						JX
207.41	.		I		CH		W		E					R

224.57	.	I	CH	W	E	.	JX
241.74	.	I	CH	W	E	.	R
258.91	.	I	CH	E	.	JX	
276.08	.	I	H	E	.	R	
293.25	.	I	CH	E	.	R	
310.42	.	I	CH	E	.	R	
327.59	.	I	CHW	E	.	R	
344.76	.				.		
361.92	.				.		
379.09	.				.		
396.26	.				.		
413.43	.				.		
430.60	.	I	CH	W	E	.	JX
447.77	.	I	CH	W	E	.	R
464.94	.				.		
482.11	.				.		
499.27	.				.		
516.44	.				.		
533.61	.				.		

550.78	.	I	H	W	E	.	JX
567.95	.	I	H	W	E	.	R
585.12	.	I	H	W	E	.	R
602.29	.					.	
619.46	.					.	
636.62	.					.	
653.79	.					.	
670.96	.					.	
688.13	.					.	
705.30	.					.	
722.47	.					.	
739.64	.					.	
756.81	.					.	
773.97	.					.	
791.14	.					.	
808.31	.					.	
825.48	.					.	
842.65	.					.	
859.82	.					.	
876.99	.					.	

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		5.000															
CD	2	4	1		3.000															
CD	3	4	1		4.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE C PROPOSED CONDITION

HEADING LINE NO 3 IS -

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'-MODEL 2JX FOR LINE C2 AND

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV														
1	SYSTEM OUTLET		138.730	-7.200	1	7.100														
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
2	REACH		175.480	-5.340	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
3	JUNCTION		185.560	-3.600	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							4.020	.000	-3.600	-.090	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
4	REACH		202.830	-.630	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
5	JUNCTION		203.830	-.640	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							14.370	.000	.640	.045	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
6	REACH		222.300	2.100	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
7	JUNCTION		222.360	2.190	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							.000	.000	.000	.000	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV														
8	REACH		242.250	2.430	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
9	REACH		300.280	3.130	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C PROPOSED CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'-MODEL 2JX FOR LINE C2

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes rows for stations 138.730, 175.480, 185.560, 202.830, 203.830, 222.300, 222.360, 242.250, 300.280, and 123.370.

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C PROPOSED CONDITION
10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'-MODEL 2JX FOR LINE C2

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. This is the start of the second page of data.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
423.650	4.510	9.080	13.590	355.89	18.13	5.10	18.69	.00	4.82	.00	5.000	.000	.00	1 .0
JUNCT STR	.0650					.0185	.04	9.08	.00		.013	.00	.00	PIPE
425.650	4.640	9.177	13.817	352.52	17.95	5.01	18.82	.00	4.81	.00	5.000	.000	.00	1 .0
119.300	.0120					.0183	2.19	9.18	.00	5.00	.013	.00	.00	PIPE
544.950	6.070	9.933	16.003	352.52	17.95	5.01	21.01	.00	4.81	.00	5.000	.000	.00	1 .0
JUNCT STR	.0043					.0181	.08	9.93	.00		.013	.00	.00	PIPE
549.610	6.090	10.184	16.274	349.17	17.78	4.91	21.18	.00	4.81	.00	5.000	.000	.00	1 .0
.190	.0000					.0180	.00	10.18	.00	.00	.013	.00	.00	PIPE
549.800	6.090	10.498	16.588	349.17	17.78	4.91	21.50	.00	4.81	.00	5.000	.000	.00	1 .0
430.200	.0000					.0090	4.94	10.50	.00	.00	.013	.00	.00	PIPE
980.000	7.430	10.498	17.928	349.17	17.78	4.91	22.84	.00	4.81	.00	5.000	.000	.00	1 .0

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		5.000															
CD	2	4	1		3.000															
CD	3	4	1		4.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE C PROPOSED CONDITION

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41 -MODEL 2JX FOR LINE C2 AND C4

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV														
1	SYSTEM OUTLET		138.730	-7.200	1	4.400														
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
2	REACH		175.480	-5.340	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
3	JUNCTION		185.560	-3.600	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							5.070	.000	-3.600	-.090	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
4	REACH		202.830	-.630	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
5	JUNCTION		203.830	-.640	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							22.350	.000	.640	.045	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
6	REACH		222.300	2.100	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
7	JUNCTION		222.360	2.190	1	.013	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
							.000	.000	.000	.000	.000	.000								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	N														
8	REACH		242.250	2.430	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										
9	REACH		300.280	3.130	1	.013	RADIUS	ANGLE	ANG PT	MAN H										
							.000	.000	.000	0										

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
423.650	4.510	16.577	21.087	574.63	29.27	13.30	34.39	.00	4.97	.00	5.000	.000	.00	1 .0
JUNCT STR	.0650					.0482	.10	16.58	.00		.013	.00	.00	PIPE
425.650	4.640	17.034	21.674	569.24	28.99	13.05	34.72	.00	4.97	.00	5.000	.000	.00	1 .0
119.300	.0120					.0478	5.70	17.03	.00	5.00	.013	.00	.00	PIPE
544.950	6.070	21.303	27.373	569.24	28.99	13.05	40.42	.00	4.97	.00	5.000	.000	.00	1 .0
JUNCT STR	.0043					.0473	.22	21.30	.00		.013	.00	.00	PIPE
549.610	6.090	21.985	28.075	563.89	28.72	12.81	40.88	.00	4.97	.00	5.000	.000	.00	1 .0
.190	.0000					.0469	.01	21.99	.00	.00	.013	.00	.00	PIPE
549.800	6.090	22.803	28.893	563.89	28.72	12.81	41.70	.00	4.97	.00	5.000	.000	.00	1 .0
430.200	.0000					.0234	12.89	22.80	.00	.00	.013	.00	.00	PIPE
980.000	7.430	22.803	30.233	563.89	28.72	12.81	43.04	.00	4.97	.00	5.000	.000	.00	1 .0

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COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C1 PROPOSED CONDITION MODEL					
STATION		ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM 10-YR	FLOW (CFS) RM 100-YR
SO	100.00	6			
R	150.00	11.6			
R	217.11	12.27			
JX	218.11		35 to 50	1.87	2.86
			45 to 50	1.27	1.95
R	310.29	13.21			
SH	310.29	13.21	25	3.03	4.63

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C1
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes rows for stations 100.000 through 149.393.

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C1
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes rows for stations 100.000 through 149.393.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
150.030	11.600	1.947	13.547	6.17	1.27	.03	13.57	.00	.78	2.86	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.716	.0100					.0002	.00	1.95	.17	.62	.013	.00	.00	PIPE
157.746	11.677	1.869	13.546	6.17	1.33	.03	13.57	.00	.78	2.91	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.223	.0100					.0002	.00	1.87	.19	.62	.013	.00	.00	PIPE
164.969	11.749	1.795	13.545	6.17	1.40	.03	13.57	.00	.78	2.94	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.803	.0100					.0002	.00	1.80	.20	.62	.013	.00	.00	PIPE
171.772	11.817	1.726	13.543	6.17	1.47	.03	13.58	.00	.78	2.97	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.401	.0100					.0002	.00	1.73	.22	.62	.013	.00	.00	PIPE
178.174	11.881	1.660	13.541	6.17	1.54	.04	13.58	.00	.78	2.98	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.048	.0100					.0003	.00	1.66	.23	.62	.013	.00	.00	PIPE
184.222	11.942	1.597	13.539	6.17	1.61	.04	13.58	.00	.78	2.99	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.712	.0100					.0003	.00	1.60	.25	.62	.013	.00	.00	PIPE
189.934	11.999	1.538	13.537	6.17	1.69	.04	13.58	.00	.78	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.404	.0100					.0003	.00	1.54	.27	.62	.013	.00	.00	PIPE
195.337	12.053	1.481	13.534	6.17	1.77	.05	13.58	.00	.78	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.113	.0100					.0004	.00	1.48	.29	.62	.013	.00	.00	PIPE
200.450	12.104	1.427	13.531	6.17	1.86	.05	13.58	.00	.78	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.838	.0100					.0004	.00	1.43	.31	.62	.013	.00	.00	PIPE

▲ FILE: C1P10H.WSW

W S P G W - CIVILDESIGN Version 14.07

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time:10: 4:58

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C1

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope													
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
205.288	12.152	1.376	13.528	6.17	1.95	.06	13.59	.00	.78	2.99	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.570	.0100					.0005	.00	1.38	.33	.62	.013	.00	.00	PIPE
209.858	12.198	1.327	13.524	6.17	2.05	.07	13.59	.00	.78	2.98	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.317	.0100					.0006	.00	1.33	.36	.62	.013	.00	.00	PIPE

214.175	12.241	1.279	13.520	6.17	2.15	.07	13.59	.00	.78	2.97	3.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.935	.0100					.0006	.00	1.28	.38	.62	.013	.00	.00	PIPE	
217.110	12.270	1.247	13.517	6.17	2.22	.08	13.59	.00	.78	2.96	3.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	.1000							1.25	.40		.013	.00	.00	PIPE	
----- WARNING - Junction Analysis - Large Lateral Flow(s) -----															
218.110	12.370	.445	12.815	3.03	8.96	1.25	14.06	.00	.75	.99	1.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNCT STR	.1000							.45	2.71		.013	.00	.00	PIPE	
218.110	12.370	1.186	13.556	3.03	1.17	.02	13.58	.00	.54	2.93	3.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.404	.0091					.0002	.00	1.19	.22	.45	.013	.00	.00	PIPE	
222.514	12.410	1.145	13.555	3.03	1.22	.02	13.58	.00	.54	2.91	3.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.220	.0091					.0002	.00	1.14	.23	.45	.013	.00	.00	PIPE	
226.734	12.449	1.105	13.553	3.03	1.28	.03	13.58	.00	.54	2.89	3.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.017	.0091					.0003	.00	1.10	.25	.45	.013	.00	.00	PIPE	

FILE: C1P10H.WSW

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PAGE 4

Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 11-26-2019 Time: 10: 4:58

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C1

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
230.751	12.485	1.067	13.552	3.03	1.35	.03	13.58	.00	.54	2.87	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.835	.0091					.0003	.00	1.07	.27	.45	.013	.00	.00	PIPE
234.586	12.520	1.030	13.550	3.03	1.41	.03	13.58	.00	.54	2.85	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.673	.0091					.0003	.00	1.03	.29	.45	.013	.00	.00	PIPE
238.259	12.554	.995	13.548	3.03	1.48	.03	13.58	.00	.54	2.82	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.486	.0091					.0004	.00	.99	.31	.45	.013	.00	.00	PIPE
241.745	12.585	.961	13.546	3.03	1.55	.04	13.58	.00	.54	2.80	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.342	.0091					.0004	.00	.96	.33	.45	.013	.00	.00	PIPE
245.088	12.616	.928	13.544	3.03	1.63	.04	13.59	.00	.54	2.77	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.161	.0091					.0005	.00	.93	.35	.45	.013	.00	.00	PIPE

25.027 | .0091 | | | | .0086 | .22 | .45 | 1.47 | .45 | .013 | .00 | .00 | PIPE
 295.492 | 13.075 | .459 | 13.534 | 3.03 | 4.43 | .31 | 13.84 | .00 | .54 | 2.16 | 3.000 | .000 | .00 | 1 | .0
 7.935 | .0091 | | | | .0076 | .06 | .46 | 1.39 | .45 | .013 | .00 | .00 | PIPE
 FILE: C1P10H.WSW W S P G W - CIVILDESIGN Version 14.07 PAGE 6
 Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING Date:11-26-2019 Time:10: 4:58
 DANA POINT HARBOR COMMERCIAL CORE AREA
 STORM DRAIN LINE C1
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
303.427	13.147	.474	13.621	3.03	4.23	.28	13.90	.00	.54	2.19	3.000	.000	.00	1 .0
3.707	.0091					.0066	.02	.47	1.30	.45	.013	.00	.00	PIPE
307.134	13.181	.490	13.671	3.03	4.03	.25	13.92	.00	.54	2.22	3.000	.000	.00	1 .0
1.947	.0091					.0058	.01	.49	1.22	.45	.013	.00	.00	PIPE
309.082	13.199	.506	13.705	3.03	3.84	.23	13.93	.00	.54	2.25	3.000	.000	.00	1 .0
.941	.0091					.0050	.00	.51	1.14	.45	.013	.00	.00	PIPE
310.022	13.208	.523	13.731	3.03	3.66	.21	13.94	.00	.54	2.28	3.000	.000	.00	1 .0
.268	.0091					.0044	.00	.52	1.07	.45	.013	.00	.00	PIPE
310.290	13.210	.542	13.752	3.03	3.48	.19	13.94	.00	.54	2.31	3.000	.000	.00	1 .0

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			3.000															
CD	2	4	1			1.000															

W S P G W PAGE NO 1
 WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - STORM DRAIN LINE C1
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W PAGE NO 2
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H			
ELEMENT NO 1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	6.000	1	16.274							
ELEMENT NO 2	IS	A	REACH	U/S DATA	150.030	11.600	1		.013	.000	.000	.000	0		
ELEMENT NO 3	IS	A	REACH	U/S DATA	217.110	12.270	1		.013	.000	.000	.000	0		
ELEMENT NO 4	IS	A	JUNCTION	U/S DATA	218.110	12.370	2		.013	1.870	1.270	14.370	14.370	70.900	-45.000
										.000	.000				

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H		
ELEMENT NO 5	IS	A	REACH	U/S DATA	310.290	13.210	1		.013	.000	.000	.000	0
ELEMENT NO 6	IS	A	SYSTEM HEADWORKS	U/S DATA	310.290	13.210	1						

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 STORM DRAIN LINE C1

Date:11-26-2019 Time:10:17:12

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	6.000	10.274	16.274	6.17	.87	.01	16.29	.00	.78	.00	3.000	.000	.00	1 .0
50.030	.1119					.0001	.00	10.27	.00	.34	.013	.00	.00	PIPE
150.030	11.600	4.678	16.278	6.17	.87	.01	16.29	.00	.78	.00	3.000	.000	.00	1 .0
67.080	.0100					.0001	.01	4.68	.00	.62	.013	.00	.00	PIPE
217.110	12.270	4.014	16.284	6.17	.87	.01	16.30	.00	.78	.00	3.000	.000	.00	1 .0
JUNCT STR	.1000					.0037	.00	4.01	.00		.013	.00	.00	PIPE
218.110	12.370	3.845	16.215	3.03	.43	.00	16.22	.00	.54	.00	3.000	.000	.00	1 .0
92.180	.0091					.0000	.00	3.84	.00	.45	.013	.00	.00	PIPE
310.290	13.210	3.007	16.217	3.03	.43	.00	16.22	.00	.54	.00	3.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		3.000															
CD	2	4	1		1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS - STORM DRAIN LINE C1

HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H		
1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	6.000	1	16.274						
2	IS	A	REACH	U/S DATA	150.030	11.600	1	.013	.000	.000	.000	0		
3	IS	A	REACH	U/S DATA	217.110	12.270	1	.013	.000	.000	.000	0		
4	IS	A	JUNCTION	U/S DATA	218.110	12.370	2	.013	1.870	1.270	14.370	14.370	70.900	-45.000

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

5	IS	A	REACH	U/S DATA	310.290	13.210	1	.013	.000	.000	.000	0
6	IS	A	SYSTEM HEADWORKS	U/S DATA	310.290	13.210	1	13.210				

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 STORM DRAIN LINE C1

Date:11-26-2019 Time:10:17:12

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	6.000	10.274	16.274	6.17	.87	.01	16.29	.00	.78	.00	3.000	.000	.00	1 .0
50.030	.1119					.0001	.00	10.27	.00	.34	.013	.00	.00	PIPE
150.030	11.600	4.678	16.278	6.17	.87	.01	16.29	.00	.78	.00	3.000	.000	.00	1 .0
67.080	.0100					.0001	.01	4.68	.00	.62	.013	.00	.00	PIPE
217.110	12.270	4.014	16.284	6.17	.87	.01	16.30	.00	.78	.00	3.000	.000	.00	1 .0
JUNCT STR	.1000					.0037	.00	4.01	.00		.013	.00	.00	PIPE
218.110	12.370	3.845	16.215	3.03	.43	.00	16.22	.00	.54	.00	3.000	.000	.00	1 .0
92.180	.0091					.0000	.00	3.84	.00	.45	.013	.00	.00	PIPE
310.290	13.210	3.007	16.217	3.03	.43	.00	16.22	.00	.54	.00	3.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		3.000															
CD	2	4	1		1.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS -

STORM DRAIN LINE C1

HEADING LINE NO 3 IS -

100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	6.000	1	13.557				
2	IS	A	REACH	U/S DATA	150.030	11.600	1		.000	.000	.000	0
3	IS	A	REACH	U/S DATA	217.110	12.270	1		.000	.000	.000	0
4	IS	A	JUNCTION	U/S DATA	218.110	12.370	2		.000	.000	70.900	-45.000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS												
5	IS	A	REACH	U/S DATA	310.290	13.210	1		.000	.000	.000	0
6	IS	A	SYSTEM HEADWORKS	U/S DATA	310.290	13.210	1					

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C1
100-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 100.000 through 149.310.

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C1
100-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 100.000 through 149.310.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
150.004	11.597	1.937	13.535	9.44	1.96	.06	13.59	.00	.97	2.87	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.026	.1119					.0004	.00	1.94	.27	.42	.013	.00	.00	PIPE
150.030	11.600	1.935	13.535	9.44	1.96	.06	13.59	.00	.97	2.87	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.457	.0100					.0004	.00	1.93	.27	.76	.013	.00	.00	PIPE
157.487	11.674	1.857	13.531	9.44	2.05	.07	13.60	.00	.97	2.91	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.941	.0100					.0004	.00	1.86	.29	.76	.013	.00	.00	PIPE
164.429	11.744	1.784	13.528	9.44	2.15	.07	13.60	.00	.97	2.95	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.503	.0100					.0005	.00	1.78	.31	.76	.013	.00	.00	PIPE
170.932	11.809	1.715	13.524	9.44	2.26	.08	13.60	.00	.97	2.97	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.079	.0100					.0005	.00	1.72	.34	.76	.013	.00	.00	PIPE
177.010	11.869	1.650	13.519	9.44	2.37	.09	13.61	.00	.97	2.99	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.678	.0100					.0006	.00	1.65	.36	.76	.013	.00	.00	PIPE
182.689	11.926	1.588	13.514	9.44	2.49	.10	13.61	.00	.97	2.99	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.323	.0100					.0007	.00	1.59	.39	.76	.013	.00	.00	PIPE
188.012	11.979	1.529	13.508	9.44	2.61	.11	13.61	.00	.97	3.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.969	.0100					.0008	.00	1.53	.42	.76	.013	.00	.00	PIPE
192.981	12.029	1.473	13.502	9.44	2.73	.12	13.62	.00	.97	3.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.626	.0100					.0009	.00	1.47	.45	.76	.013	.00	.00	PIPE

▲ FILE: C1P00H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time:10:20:11

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C1

100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope													
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
197.607	12.075	1.419	13.494	9.44	2.87	.13	13.62	.00	.97	3.00	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.293	.0100					.0010	.00	1.42	.48	.76	.013	.00	.00	PIPE
201.899	12.118	1.368	13.486	9.44	3.01	.14	13.63	.00	.97	2.99	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.956	.0100					.0012	.00	1.37	.52	.76	.013	.00	.00	PIPE

205.855	12.158	1.319	13.476	9.44	3.15	.15	13.63	.00	.97	2.98	3.000	.000	.00	1	.0
3.637	.0100					.0013	.00	1.32	.55	.76	.013	.00	.00	PIPE	
209.492	12.194	1.272	13.466	9.44	3.31	.17	13.64	.00	.97	2.97	3.000	.000	.00	1	.0
3.297	.0100					.0015	.01	1.27	.59	.76	.013	.00	.00	PIPE	
212.789	12.227	1.227	13.454	9.44	3.47	.19	13.64	.00	.97	2.95	3.000	.000	.00	1	.0
2.946	.0100					.0017	.01	1.23	.64	.76	.013	.00	.00	PIPE	
215.735	12.256	1.184	13.440	9.44	3.64	.21	13.65	.00	.97	2.93	3.000	.000	.00	1	.0
1.375	.0100					.0019	.00	1.18	.68	.76	.013	.00	.00	PIPE	
217.110	12.270	1.163	13.433	9.44	3.73	.22	13.65	.00	.97	2.92	3.000	.000	.00	1	.0
JUNCT STR	.1000							1.16	.71		.013	.00	.00	PIPE	
----- WARNING - Junction Analysis - Large Lateral Flow(s) -----															
218.110	12.370	.548	12.918	4.63	10.52	1.72	14.64	.00	.90	1.00	1.000	.000	.00	1	.0
JUNCT STR	.1000							.55	2.79		.013	.00	.00	PIPE	

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Program Package Serial Number: 7132 WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time:10:20:11

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C1
100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
218.110	12.370	1.220	13.590	4.63	1.71	.05	13.64	.00	.67	2.95	3.000	.000	.00	1 .0
4.398	.0091					.0004	.00	1.22	.32	.55	.013	.00	.00	PIPE
222.508	12.410	1.178	13.588	4.63	1.80	.05	13.64	.00	.67	2.93	3.000	.000	.00	1 .0
4.182	.0091					.0005	.00	1.18	.34	.55	.013	.00	.00	PIPE
226.691	12.448	1.137	13.585	4.63	1.89	.06	13.64	.00	.67	2.91	3.000	.000	.00	1 .0
3.947	.0091					.0006	.00	1.14	.36	.55	.013	.00	.00	PIPE
230.637	12.484	1.097	13.581	4.63	1.98	.06	13.64	.00	.67	2.89	3.000	.000	.00	1 .0
3.753	.0091					.0006	.00	1.10	.39	.55	.013	.00	.00	PIPE
234.390	12.518	1.059	13.578	4.63	2.07	.07	13.64	.00	.67	2.87	3.000	.000	.00	1 .0
3.530	.0091					.0007	.00	1.06	.41	.55	.013	.00	.00	PIPE

4.317 .0091 .0064 .03 .59 1.30 .55 .013 .00 .00 PIPE
 306.507 | 13.176 | .608 | 13.783 | 4.63 | 4.52 | .32 | 14.10 | .00 | .67 | 2.41 | 3.000 | .000 | .00 | 1 | .0
 2.317 .0091 .0056 .01 .61 1.22 .55 .013 .00 .00 PIPE
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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 11-26-2019 Time: 10:20:11

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C1

100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
308.824	13.197	.629	13.825	4.63	4.30	.29	14.11	.00	.67	2.44	3.000	.000	.00	1 .0
1.125	.0091					.0049	.01	.63	1.14	.55	.013	.00	.00	PIPE
309.949	13.207	.650	13.857	4.63	4.10	.26	14.12	.00	.67	2.47	3.000	.000	.00	1 .0
.341	.0091					.0043	.00	.65	1.07	.55	.013	.00	.00	PIPE
310.290	13.210	.673	13.883	4.63	3.91	.24	14.12	.00	.67	2.50	3.000	.000	.00	1 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		4.000															
CD	2	4	1		1.000															
CD	3	4	1		3.000															
CD	4	4	1		1.500															
CD	5	4	1		1.000															
CD	6	4	1		2.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE C2
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV															
1	SYSTEM OUTLET		100.000	-3.670	1	5.602															
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																					
2	REACH		126.850	2.140	1		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	45.000	0										
3	REACH		196.960	2.840	1		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	.000	0										
4	JUNCTION		197.970	2.860	3		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
								RADIUS	ANGLE												
								.000	.000	45.000	.000										
5	REACH		269.480	3.560	3		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	-45.000	1										
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS																					
6	REACH		323.860	4.000	6		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	-45.000	1										
7	REACH		404.770	4.920	6		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	-64.340	1										
8	JUNCTION		406.770	4.943	6		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4								
								RADIUS	ANGLE												
								2.546	45.000												
9	REACH		451.240	5.380	6		N														
								RADIUS	ANGLE	ANG PT	MAN H										
								.000	.000	45.000	0										

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT																
10	REACH					N															
								RADIUS	ANGLE	ANG PT	MAN H										

ELEMENT NO	11	IS A JUNCTION	511.960	5.990	6		.013			.000	.000	90.000	1	
		U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			513.960	6.010	6	4	0	.013	8.800	.000	6.250	.000	-90.000	.000
											RADIUS	ANGLE		
											.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	12	IS A REACH												
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			723.320	8.104	4			.013			.000	.000	.000	0

ELEMENT NO	13	IS A JUNCTION												
		U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			724.320	8.114	4	5	0	.013	3.670	.000	8.360	.000	-90.000	.000
											RADIUS	ANGLE		
											.000	.000		

ELEMENT NO	14	IS A REACH												
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			816.910	9.040	4			.013			.000	.000	.000	0

ELEMENT NO	15	IS A SYSTEM HEADWORKS												
		U/S DATA	STATION	INVERT	SECT						W S ELEV			
			816.910	9.040	4						9.040			

COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C2 PROPOSED CONDITION MODEL					
STATION		ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM 10-YR	FLOW (CFS) RM 100-YR
SO	100.00	-3.67			
R	126.85	2.14			
R	196.96	2.84			
JX	197.97	2.86	350	0.18	0.50
R	269.48	3.56			
R	323.86	4			
R	404.77	4.92			
JX	406.77	4.94	345	4.45	4.49
R	451.24	5.38			
R	511.96	5.99			
JX	513.96	6.01	310	8.80	15.86
R	723.32	8.104			
JX	724.32	8.114	230	3.67	5.65
R	816.91	9.04			
SH	816.91	9.04	225	1.53	2.35

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DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE C2
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data for stations 100.000 through 196.960 and a junction point.

DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE C2
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
197.970	2.860	2.683	5.543	18.45	2.77	.12	5.66	.00	1.38	1.85	3.000	.000	.00	1 .0
15.592	.0098					.0007	.01	2.68	.26	1.08	.013	.00	.00	PIPE
213.562	3.013	2.529	5.542	18.45	2.90	.13	5.67	.00	1.38	2.18	3.000	.000	.00	1 .0
12.836	.0098					.0008	.01	2.53	.30	1.08	.013	.00	.00	PIPE
226.398	3.138	2.400	5.539	18.45	3.04	.14	5.68	.00	1.38	2.40	3.000	.000	.00	1 .0
11.115	.0098					.0008	.01	2.40	.34	1.08	.013	.00	.00	PIPE
237.513	3.247	2.287	5.534	18.45	3.19	.16	5.69	.00	1.38	2.55	3.000	.000	.00	1 .0
9.839	.0098					.0009	.01	2.29	.37	1.08	.013	.00	.00	PIPE
247.352	3.343	2.184	5.527	18.45	3.35	.17	5.70	.00	1.38	2.67	3.000	.000	.00	1 .0
8.820	.0098					.0010	.01	2.18	.41	1.08	.013	.00	.00	PIPE
256.172	3.430	2.089	5.519	18.45	3.51	.19	5.71	.00	1.38	2.76	3.000	.000	.00	1 .0
7.936	.0098					.0012	.01	2.09	.45	1.08	.013	.00	.00	PIPE
264.108	3.507	2.002	5.509	18.45	3.68	.21	5.72	.00	1.38	2.83	3.000	.000	.00	1 .0
5.372	.0098					.0013	.01	2.00	.49	1.08	.013	.00	.00	PIPE
269.480	3.560	1.941	5.501	18.45	5.92	.54	6.05	.00	1.55	.68	2.000	.000	.00	1 .0
41.945	.0081					.0059	.25	1.94	.49	1.49	.013	.00	.00	PIPE
311.425	3.899	1.793	5.692	18.45	6.21	.60	6.29	.00	1.55	1.22	2.000	.000	.00	1 .0
4.644	.0081					.0060	.03	1.79	.70	1.49	.013	.00	.00	PIPE

▲ FILE: C2P10H.WSW

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WATER SURFACE PROFILE LISTING

Date: 11-26-2019 Time: 1:16:16

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE C2

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
316.068	3.937	1.736	5.673	18.45	6.37	.63	6.30	.00	1.55	1.35	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
316.068	3.937	1.318	5.255	18.45	8.40	1.10	6.35	.00	1.55	1.90	2.000	.000	.00	1 .0
7.792	.0081					.0112	.09	1.32	1.38	1.49	.013	.00	.00	PIPE

323.860	4.000	1.318	5.318	18.45	8.40	1.10	6.41	.00	1.55	1.90	2.000	.000	.00	1	.0
47.119	.0114					.0108	.51	1.32	1.38	1.31	.013	.00	.00	PIPE	
370.979	4.536	1.351	5.886	18.45	8.17	1.04	6.92	.00	1.55	1.87	2.000	.000	.00	1	.0
23.326	.0114					.0099	.23	1.35	1.31	1.31	.013	.00	.00	PIPE	
394.305	4.801	1.410	6.211	18.45	7.79	.94	7.15	.00	1.55	1.82	2.000	.000	.00	1	.0
8.320	.0114					.0088	.07	1.41	1.21	1.31	.013	.00	.00	PIPE	
402.625	4.896	1.475	6.370	18.45	7.43	.86	7.23	.00	1.55	1.76	2.000	.000	.00	1	.0
2.145	.0114					.0079	.02	1.47	1.10	1.31	.013	.00	.00	PIPE	
404.770	4.920	1.546	6.466	18.45	7.08	.78	7.24	2.00	1.55	1.68	2.000	.000	.00	1	.0
JUNCT STR	.0115					.0057	.01	2.00	1.00		.013	.00	.00	PIPE	
406.770	4.943	2.186	7.129	14.00	4.46	.31	7.44	.00	1.35	.00	2.000	.000	.00	1	.0
38.678	.0098					.0038	.15	2.19	.00	1.14	.013	.00	.00	PIPE	
445.448	5.323	2.000	7.323	14.00	4.46	.31	7.63	.00	1.35	.00	2.000	.000	.00	1	.0
5.792	.0098					.0036	.02	2.00	.00	1.14	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING Date: 11-26-2019 Time: 1:16:16
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
451.240	5.380	1.961	7.341	14.00	4.48	.31	7.65	.00	1.35	.56	2.000	.000	.00	1 .0
19.066	.0100					.0034	.06	1.96	.33	1.14	.013	.00	.00	PIPE
470.306	5.572	1.803	7.374	14.00	4.70	.34	7.72	.00	1.35	1.19	2.000	.000	.00	1 .0
10.825	.0100					.0035	.04	1.80	.52	1.14	.013	.00	.00	PIPE
481.131	5.680	1.698	7.378	14.00	4.92	.38	7.75	.00	1.35	1.43	2.000	.000	.00	1 .0
7.962	.0100					.0038	.03	1.70	.62	1.14	.013	.00	.00	PIPE
489.093	5.760	1.610	7.370	14.00	5.17	.41	7.78	.00	1.35	1.58	2.000	.000	.00	1 .0
6.037	.0100					.0042	.03	1.61	.70	1.14	.013	.00	.00	PIPE
495.131	5.821	1.533	7.354	14.00	5.42	.46	7.81	.00	1.35	1.69	2.000	.000	.00	1 .0

2.245	.0100					.0046	.01	1.53	.77	1.14	.013	.00	.00	PIPE
497.375	5.843	1.464	7.307	14.00	5.68	.50	7.81	.00	1.35	1.77	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
497.375	5.843	1.191	7.034	14.00	7.18	.80	7.83	.00	1.35	1.96	2.000	.000	.00	1 .0
8.095	.0100					.0082	.07	1.19	1.27	1.14	.013	.00	.00	PIPE
505.470	5.925	1.239	7.164	14.00	6.85	.73	7.89	.00	1.35	1.94	2.000	.000	.00	1 .0
5.147	.0100					.0073	.04	1.24	1.18	1.14	.013	.00	.00	PIPE
510.618	5.977	1.291	7.268	14.00	6.53	.66	7.93	.00	1.35	1.91	2.000	.000	.00	1 .0
1.342	.0100					.0064	.01	1.29	1.09	1.14	.013	.00	.00	PIPE

▲ FILE: C2P10H.WSW

W S P G W - CIVILDESIGN Version 14.07
 Program Package Serial Number: 7132

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WATER SURFACE PROFILE LISTING Date: 11-26-2019 Time: 1:16:16
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
511.960	5.990	1.348	7.338	14.00	6.22	.60	7.94	.00	1.35	1.88	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0033	.01	1.35	1.00		.013	.00	.00	PIPE
513.960	6.010	2.238	8.248	5.20	2.94	.13	8.38	.00	.88	.00	1.500	.000	.00	1 .0
97.666	.0100					.0024	.24	2.24	.00	.75	.013	.00	.00	PIPE
611.626	6.987	1.500	8.487	5.20	2.94	.13	8.62	.00	.88	.00	1.500	.000	.00	1 .0
16.122	.0100					.0023	.04	1.50	.00	.75	.013	.00	.00	PIPE
627.748	7.148	1.361	8.509	5.20	3.09	.15	8.66	.00	.88	.87	1.500	.000	.00	1 .0
8.481	.0100					.0022	.02	1.36	.39	.75	.013	.00	.00	PIPE
636.230	7.233	1.280	8.513	5.20	3.24	.16	8.68	.00	.88	1.06	1.500	.000	.00	1 .0
6.622	.0100					.0024	.02	1.28	.46	.75	.013	.00	.00	PIPE
642.852	7.299	1.214	8.513	5.20	3.39	.18	8.69	.00	.88	1.18	1.500	.000	.00	1 .0
5.490	.0100					.0026	.01	1.21	.52	.75	.013	.00	.00	PIPE
648.342	7.354	1.155	8.509	5.20	3.56	.20	8.71	.00	.88	1.26	1.500	.000	.00	1 .0
4.642	.0100					.0029	.01	1.16	.58	.75	.013	.00	.00	PIPE

652.984	7.401	1.103	8.503	5.20	3.73	.22	8.72	.00	.88	1.32	1.500	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.930	.0100					.0033	.01	1.10	.64	.75	.013	.00	.00	PIPE	
656.914	7.440	1.055	8.494	5.20	3.92	.24	8.73	.00	.88	1.37	1.500	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.120	.0100					.0037	.01	1.05	.70	.75	.013	.00	.00	PIPE	

FILE: C2P10H.WSW
 W S P G W - CIVILDESIGN Version 14.07
 Program Package Serial Number: 7132
 WATER SURFACE PROFILE LISTING
 Date: 11-26-2019 Time: 1:16:16
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
659.034	7.461	1.010	8.471	5.20	4.11	.26	8.73	.00	.88	1.41	1.500	.000	.00	1 .0	
HYDRAULIC JUMP															
659.034	7.461	.746	8.207	5.20	5.93	.55	8.75	.00	.88	1.50	1.500	.000	.00	1 .0	
31.234	.0100					.0099	.31	.75	1.37	.75	.013	.00	.00	PIPE	
690.268	7.773	.752	8.526	5.20	5.86	.53	9.06	.00	.88	1.50	1.500	.000	.00	1 .0	
22.437	.0100					.0091	.20	.75	1.34	.75	.013	.00	.00	PIPE	
712.706	7.998	.781	8.779	5.20	5.59	.49	9.26	.00	.88	1.50	1.500	.000	.00	1 .0	
7.052	.0100					.0080	.06	.78	1.25	.75	.013	.00	.00	PIPE	
719.758	8.068	.811	8.880	5.20	5.33	.44	9.32	.00	.88	1.49	1.500	.000	.00	1 .0	
2.824	.0100					.0071	.02	.81	1.16	.75	.013	.00	.00	PIPE	
722.582	8.097	.843	8.940	5.20	5.08	.40	9.34	.00	.88	1.49	1.500	.000	.00	1 .0	
.738	.0100					.0063	.00	.84	1.08	.75	.013	.00	.00	PIPE	
723.320	8.104	.878	8.982	5.20	4.84	.36	9.35	.00	.88	1.48	1.500	.000	.00	1 .0	
JUNCT STR	.0100					.0030	.00	.88	1.00		.013	.00	.00	PIPE	
724.320	8.114	1.400	9.514	1.53	.89	.01	9.53	.00	.46	.75	1.500	.000	.00	1 .0	
9.111	.0100					.0002	.00	1.40	.10	.39	.013	.00	.00	PIPE	
733.431	8.205	1.310	9.515	1.53	.93	.01	9.53	.00	.46	1.00	1.500	.000	.00	1 .0	
7.117	.0100					.0002	.00	1.31	.13	.39	.013	.00	.00	PIPE	

FILE: C2P10H.WSW
 W S P G W - CIVILDESIGN Version 14.07
 Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-26-2019 Time: 1:16:16

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
740.548	8.276	1.239	9.515	1.53	.98	.01	9.53	.00	.46	1.14	1.500	.000	.00	1 .0
6.104	.0100					.0002	.00	1.24	.15	.39	.013	.00	.00	PIPE
746.652	8.337	1.178	9.515	1.53	1.03	.02	9.53	.00	.46	1.23	1.500	.000	.00	1 .0
5.438	.0100					.0002	.00	1.18	.16	.39	.013	.00	.00	PIPE
752.090	8.392	1.123	9.515	1.53	1.08	.02	9.53	.00	.46	1.30	1.500	.000	.00	1 .0
4.922	.0100					.0003	.00	1.12	.18	.39	.013	.00	.00	PIPE
757.013	8.441	1.073	9.514	1.53	1.13	.02	9.53	.00	.46	1.35	1.500	.000	.00	1 .0
4.518	.0100					.0003	.00	1.07	.20	.39	.013	.00	.00	PIPE
761.530	8.486	1.027	9.513	1.53	1.19	.02	9.54	.00	.46	1.39	1.500	.000	.00	1 .0
4.184	.0100					.0003	.00	1.03	.22	.39	.013	.00	.00	PIPE
765.714	8.528	.985	9.513	1.53	1.24	.02	9.54	.00	.46	1.42	1.500	.000	.00	1 .0
3.888	.0100					.0004	.00	.98	.24	.39	.013	.00	.00	PIPE
769.602	8.567	.945	9.512	1.53	1.30	.03	9.54	.00	.46	1.45	1.500	.000	.00	1 .0
3.632	.0100					.0004	.00	.94	.26	.39	.013	.00	.00	PIPE
773.235	8.603	.908	9.511	1.53	1.37	.03	9.54	.00	.46	1.47	1.500	.000	.00	1 .0
3.416	.0100					.0005	.00	.91	.28	.39	.013	.00	.00	PIPE
776.650	8.637	.872	9.509	1.53	1.44	.03	9.54	.00	.46	1.48	1.500	.000	.00	1 .0
3.196	.0100					.0006	.00	.87	.30	.39	.013	.00	.00	PIPE

▲ FILE: C2P10H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:11-26-2019 Time: 1:16:16

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

779.846	8.669	.839	9.508	1.53	1.51	.04	9.54	.00	.46	1.49	1.500	.000	.00	1	.0
2.996	.0100					.0006	.00	.84	.32	.39	.013	.00	.00	PIPE	
782.843	8.699	.807	9.506	1.53	1.58	.04	9.55	.00	.46	1.50	1.500	.000	.00	1	.0
2.832	.0100					.0007	.00	.81	.35	.39	.013	.00	.00	PIPE	
785.675	8.728	.777	9.505	1.53	1.66	.04	9.55	.00	.46	1.50	1.500	.000	.00	1	.0
2.647	.0100					.0008	.00	.78	.37	.39	.013	.00	.00	PIPE	
788.322	8.754	.748	9.502	1.53	1.74	.05	9.55	.00	.46	1.50	1.500	.000	.00	1	.0
2.500	.0100					.0009	.00	.75	.40	.39	.013	.00	.00	PIPE	
790.822	8.779	.721	9.500	1.53	1.82	.05	9.55	.00	.46	1.50	1.500	.000	.00	1	.0
2.337	.0100					.0010	.00	.72	.43	.39	.013	.00	.00	PIPE	
793.159	8.802	.695	9.497	1.53	1.91	.06	9.55	.00	.46	1.50	1.500	.000	.00	1	.0
2.180	.0100					.0012	.00	.69	.46	.39	.013	.00	.00	PIPE	
795.339	8.824	.670	9.494	1.53	2.00	.06	9.56	.00	.46	1.49	1.500	.000	.00	1	.0
2.040	.0100					.0013	.00	.67	.49	.39	.013	.00	.00	PIPE	
797.380	8.845	.646	9.491	1.53	2.10	.07	9.56	.00	.46	1.49	1.500	.000	.00	1	.0
1.894	.0100					.0015	.00	.65	.53	.39	.013	.00	.00	PIPE	
799.273	8.864	.623	9.487	1.53	2.20	.08	9.56	.00	.46	1.48	1.500	.000	.00	1	.0
1.738	.0100					.0017	.00	.62	.57	.39	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time: 1:16:16

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE C2

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
801.011	8.881	.601	9.482	1.53	2.31	.08	9.57	.00	.46	1.47	1.500	.000	.00	1 .0
1.584	.0100					.0020	.00	.60	.61	.39	.013	.00	.00	PIPE
802.596	8.897	.580	9.477	1.53	2.42	.09	9.57	.00	.46	1.46	1.500	.000	.00	1 .0
1.431	.0100					.0023	.00	.58	.65	.39	.013	.00	.00	PIPE
804.027	8.911	.560	9.471	1.53	2.54	.10	9.57	.00	.46	1.45	1.500	.000	.00	1 .0

1.248	.0100						.0026	.00	.56	.70	.39	.013	.00	.00	PIPE
805.274	8.924	.541	9.464	1.53	2.67	.11	9.57	.00	.46	1.44	1.500	.000	.00	1	.0
.223	.0100						.0029	.00	.54	.74	.39	.013	.00	.00	PIPE
805.497	8.926	.522	9.448	1.53	2.80	.12	9.57	.00	.46	1.43	1.500	.000	.00	1	.0
HYDRAULIC JUMP															
805.497	8.926	.390	9.316	1.53	4.18	.27	9.59	.00	.46	1.32	1.500	.000	.00	1	.0
4.330	.0100						.0090	.04	.39	1.40	.39	.013	.00	.00	PIPE
809.827	8.969	.404	9.373	1.53	3.99	.25	9.62	.00	.46	1.33	1.500	.000	.00	1	.0
4.042	.0100						.0079	.03	.40	1.31	.39	.013	.00	.00	PIPE
813.869	9.010	.418	9.427	1.53	3.80	.22	9.65	.00	.46	1.34	1.500	.000	.00	1	.0
1.891	.0100						.0069	.01	.42	1.23	.39	.013	.00	.00	PIPE
815.760	9.028	.432	9.461	1.53	3.63	.20	9.67	.00	.46	1.36	1.500	.000	.00	1	.0
.905	.0100						.0061	.01	.43	1.15	.39	.013	.00	.00	PIPE

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Program Package Serial Number: 7132
 WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C2
 10-YEAR STORM - MHW CONDITION WSE=4.41
 Date: 11-26-2019 Time: 1:16:16

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
816.665	9.038	.447	9.485	1.53	3.46	.19	9.67	.00	.46	1.37	1.500	.000	.00	1 .0
.245	.0100					.0053	.00	.45	1.07	.39	.013	.00	.00	PIPE
816.910	9.040	.464	9.504	1.53	3.29	.17	9.67	.00	.46	1.39	1.500	.000	.00	1 .0

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		4.000															
CD	2	4	1		1.000															
CD	3	4	1		3.000															
CD	4	4	1		1.500															
CD	5	4	1		1.000															
CD	6	4	1		2.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
 HEADING LINE NO 2 IS -
 HEADING LINE NO 3 IS -

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE C2

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV							
1	SYSTEM OUTLET		100.000	-3.670	1	8.302							
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING													
2	REACH		126.850	2.140	1		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	45.000	0		
3	REACH		196.960	2.840	1		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	.000	0		
4	JUNCTION		197.970	2.860	3		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
							.013	.180	.000	3.860	.000	45.000	.000
										RADIUS	ANGLE		
										.000	.000		
5	REACH		269.480	3.560	3		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-45.000	1		
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS													
6	REACH		323.860	4.000	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-45.000	1		
7	REACH		404.770	4.920	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-64.340	1		
8	JUNCTION		406.770	4.943	6		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
							.013	4.450	.000	5.190	.000	45.000	.000
										RADIUS	ANGLE		
										2.546	45.000		
9	REACH		451.240	5.380	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	45.000	0		

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	N					
10	REACH						N	RADIUS	ANGLE	ANG PT	MAN H

ELEMENT NO	11	IS A	JUNCTION	511.960	5.990	6		.013			.000	.000	90.000	1	
				*	*	*	*	*	*	*	*	*	*	*	
			U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
				513.960	6.010	6	4	0	.013	8.800	.000	6.250	.000	-90.000	.000
												RADIUS	ANGLE		
												.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	12	IS A	REACH												
				*	*	*									
			U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
				723.320	8.104	4			.013			.000	.000	.000	0

ELEMENT NO	13	IS A	JUNCTION												
				*	*	*	*	*	*	*	*	*	*	*	*
			U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
				724.320	8.114	4	5	0	.013	3.670	.000	8.360	.000	-90.000	.000
												RADIUS	ANGLE		
												.000	.000		

ELEMENT NO	14	IS A	REACH												
				*	*	*									
			U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
				816.910	9.040	4			.013			.000	.000	.000	0

ELEMENT NO	15	IS A	SYSTEM HEADWORKS												
				*		*				*					
			U/S DATA	STATION	INVERT	SECT						W S ELEV			
				816.910	9.040	4						9.040			

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
511.960	5.990	4.433	10.423	14.00	4.46	.31	10.73	.00	1.35	.00	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0022	.00	4.43	.00		.013	.00	.00	PIPE
513.960	6.010	4.949	10.959	5.20	2.94	.13	11.09	.00	.88	.00	1.500	.000	.00	1 .0
209.360	.0100					.0025	.51	4.95	.00	.75	.013	.00	.00	PIPE
723.320	8.104	3.368	11.472	5.20	2.94	.13	11.61	.00	.88	.00	1.500	.000	.00	1 .0
JUNCT STR	.0100					.0013	.00	3.37	.00		.013	.00	.00	PIPE
724.320	8.114	3.605	11.719	1.53	.87	.01	11.73	.00	.46	.00	1.500	.000	.00	1 .0
92.590	.0100					.0002	.02	3.61	.00	.39	.013	.00	.00	PIPE
816.910	9.040	2.699	11.739	1.53	.87	.01	11.75	.00	.46	.00	1.500	.000	.00	1 .0

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		4.000															
CD	2	4	1		1.000															
CD	3	4	1		3.000															
CD	4	4	1		1.500															
CD	5	4	1		1.000															
CD	6	4	1		2.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE C2
 HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV							
1	SYSTEM OUTLET		100.000	-3.670	1	5.602							
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING													
2	REACH		126.850	2.140	1		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	45.000	0		
3	REACH		196.960	2.840	1		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	.000	0		
4	JUNCTION		197.970	2.860	3		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
							.013	.500	.000	3.860	.000	45.000	.000
										RADIUS	ANGLE		
										.000	.000		
5	REACH		269.480	3.560	3		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-45.000	1		
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS													
6	REACH		323.860	4.000	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-45.000	1		
7	REACH		404.770	4.920	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	-64.340	1		
8	JUNCTION		406.770	4.943	6		N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
							.013	4.490	.000	5.190	.000	45.000	.000
										RADIUS	ANGLE		
										2.546	45.000		
9	REACH		451.240	5.380	6		N	RADIUS	ANGLE	ANG PT	MAN H		
							.013	.000	.000	45.000	0		

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT					
10	REACH					N	RADIUS	ANGLE	ANG PT	MAN H

ELEMENT NO	11	IS A JUNCTION	511.960	5.990	6		.013			.000	.000	90.000	1	
		U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			513.960	6.010	6	4	0	.013	15.860	.000	6.250	.000	-90.000	.000
											RADIUS	ANGLE		
											.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	12	IS A REACH												
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			723.320	8.104	4			.013			.000	.000	.000	0

ELEMENT NO	13	IS A JUNCTION												
		U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			724.320	8.114	4	5	0	.013	5.650	.000	8.360	.000	-90.000	.000
											RADIUS	ANGLE		
											.000	.000		

ELEMENT NO	14	IS A REACH												
		U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
			816.910	9.040	4			.013			.000	.000	.000	0

ELEMENT NO	15	IS A SYSTEM HEADWORKS												
		U/S DATA	STATION	INVERT	SECT						W S ELEV			
			816.910	9.040	4						9.040			

DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE C2
100-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data for stations 100.000 through 196.960 and a final row for JUNCT STR.

DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE C2
100-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip.

L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
197.970	2.860	2.594	5.454	28.35	4.36 .30	5.75	.00	1.72	2.05	3.000	.000	.00	1 .0
13.501	.0098				.0017	.02	2.59	.43	1.37	.013	.00	.00	PIPE
211.471	2.992	2.456	5.448	28.35	4.58 .33	5.77	.00	1.72	2.31	3.000	.000	.00	1 .0
11.082	.0098				.0019	.02	2.46	.49	1.37	.013	.00	.00	PIPE
222.552	3.101	2.336	5.437	28.35	4.80 .36	5.79	.00	1.72	2.49	3.000	.000	.00	1 .0
9.327	.0098				.0021	.02	2.34	.55	1.37	.013	.00	.00	PIPE
231.879	3.192	2.229	5.421	28.35	5.03 .39	5.81	.00	1.72	2.62	3.000	.000	.00	1 .0
7.885	.0098				.0024	.02	2.23	.61	1.37	.013	.00	.00	PIPE
239.764	3.269	2.131	5.400	28.35	5.28 .43	5.83	.00	1.72	2.72	3.000	.000	.00	1 .0
6.597	.0098				.0026	.02	2.13	.66	1.37	.013	.00	.00	PIPE
246.361	3.334	2.040	5.374	28.35	5.54 .48	5.85	.00	1.72	2.80	3.000	.000	.00	1 .0
5.312	.0098				.0030	.02	2.04	.72	1.37	.013	.00	.00	PIPE
251.673	3.386	1.956	5.342	28.35	5.81 .52	5.87	.00	1.72	2.86	3.000	.000	.00	1 .0
HYDRAULIC JUMP													
251.673	3.386	1.507	4.892	28.35	7.98 .99	5.88	.00	1.72	3.00	3.000	.000	.00	1 .0
5.459	.0098				.0069	.04	1.51	1.29	1.37	.013	.00	.00	PIPE
257.132	3.439	1.534	4.974	28.35	7.79 .94	5.92	.00	1.72	3.00	3.000	.000	.00	1 .0
7.599	.0098				.0063	.05	1.53	1.25	1.37	.013	.00	.00	PIPE

▲ FILE: C2P00H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time: 1:21:54

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE C2

100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
264.731	3.514	1.594	5.107	28.35	7.43 .86	5.96	.00	1.72	2.99	3.000	.000	.00	.00	1 .0
3.693	.0098				.0056	.02	1.59	1.16	1.37	.013	.00	.00	.00	PIPE
268.424	3.550	1.656	5.206	28.35	7.09 .78	5.99	.00	1.72	2.98	3.000	.000	.00	.00	1 .0
1.056	.0098				.0049	.01	1.66	1.08	1.37	.013	.00	.00	.00	PIPE

COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C3					
PROPOSED CONDITION MODEL					
STATION		ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM 10-YR	FLOW (CFS) RM 100-YR
SO	100.00	5.6			
R	179.38	9.61			
JX	180.38	9.65	85 to 90	2.35	3.67
R	227.99	9.89			
JX	228.99	9.9	100 to 105	1.11	1.7
R	383.13	10.64			
JX	384.13	10.65	120	1.10	1.7
R	606.80	11.76			
R	617.03	11.81			
SH	617.03	11.81	75	2.19	3.34

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		3.000															
CD	2	4	1		1.000															
CD	3	4	1		2.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS -

PROPOSED STORM DRAIN LINE C3

HEADING LINE NO 3 IS -

10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV												
1	IS	A	SYSTEM OUTLET	100.000	5.600	1	11.000												
2	IS	A	REACH	179.380	9.610	1	N								RADIUS	ANGLE	ANG PT	MAN H	
			U/S DATA												.000	.000	.000	0	
3	IS	A	JUNCTION	180.380	9.650	1	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
			U/S DATA				2	0	.013	2.350	.000	10.650	.000	-45.000	.000				
												RADIUS	ANGLE						
												.000	.000						

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

4	IS	A	REACH	227.990	9.890	3	N								RADIUS	ANGLE	ANG PT	MAN H
			U/S DATA												.000	.000	.000	0
5	IS	A	JUNCTION	228.990	9.900	3	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4			
			U/S DATA				2	0	.013	1.110	.000	10.400	.000	-45.000	.000			
												RADIUS	ANGLE					
												.000	.000					
6	IS	A	REACH	383.130	10.640	3	N								RADIUS	ANGLE	ANG PT	MAN H
			U/S DATA												.000	.000	.000	0
7	IS	A	JUNCTION	384.130	10.650	3	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4			
			U/S DATA				2	0	.013	1.100	.000	10.900	.000	-45.000	.000			
												RADIUS	ANGLE					
												.000	.000					

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

8	IS	A	REACH	606.800	11.760	2	N								RADIUS	ANGLE	ANG PT	MAN H	
			U/S DATA												.000	.000	-45.000	0	
9	IS	A	REACH	617.030	11.810	2	N								RADIUS	ANGLE	ANG PT	MAN H	
			U/S DATA												.000	.000	.000	0	
10	IS	A	SYSTEM HEADWORKS	617.030	11.810	2	W S ELEV												
			U/S DATA				11.810												

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE C3
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 100.000 through 166.755.

DANA POINT HARBOR
PROPOSED STORM DRAIN LINE C3
10-YEAR STORM

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 166.755 through 167.000.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
168.347	9.053	1.937	10.990	6.75	1.40	.03	11.02	.00	.82	2.87	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.484	.0505					.0002	.00	1.94	.19	.43	.013	.00	.00	PIPE
169.831	9.128	1.860	10.987	6.75	1.47	.03	11.02	.00	.82	2.91	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.387	.0505					.0002	.00	1.86	.21	.43	.013	.00	.00	PIPE
171.218	9.198	1.787	10.984	6.75	1.54	.04	11.02	.00	.82	2.94	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.302	.0505					.0002	.00	1.79	.22	.43	.013	.00	.00	PIPE
172.519	9.263	1.718	10.981	6.75	1.61	.04	11.02	.00	.82	2.97	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.221	.0505					.0003	.00	1.72	.24	.43	.013	.00	.00	PIPE
173.740	9.325	1.652	10.977	6.75	1.69	.04	11.02	.00	.82	2.98	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.149	.0505					.0003	.00	1.65	.26	.43	.013	.00	.00	PIPE
174.889	9.383	1.590	10.973	6.75	1.77	.05	11.02	.00	.82	2.99	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.081	.0505					.0004	.00	1.59	.28	.43	.013	.00	.00	PIPE
175.970	9.438	1.531	10.969	6.75	1.86	.05	11.02	.00	.82	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.014	.0505					.0004	.00	1.53	.30	.43	.013	.00	.00	PIPE
176.984	9.489	1.475	10.964	6.75	1.95	.06	11.02	.00	.82	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.955	.0505					.0005	.00	1.47	.32	.43	.013	.00	.00	PIPE
177.939	9.537	1.421	10.958	6.75	2.05	.07	11.02	.00	.82	3.00	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.896	.0505					.0005	.00	1.42	.34	.43	.013	.00	.00	PIPE

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-13-2019 Time:10:43:10

DANA POINT HARBOR
PROPOSED STORM DRAIN LINE C3
10-YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope													
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
178.835	9.582	1.370	10.952	6.75	2.15	.07	11.02	.00	.82	2.99	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.545	.0505					.0006	.00	1.37	.37	.43	.013	.00	.00	PIPE
179.380	9.610	1.338	10.948	6.75	2.21	.08	11.02	.00	.82	2.98	3.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0400					.0004	.00	1.34	.39		.013	.00	.00	PIPE

180.380	9.650	1.343	10.993	4.40	1.96	.06	11.05	.00	.74	1.88	2.000	.000	.00	1	.0
11.156	.0050					.0006	.01	1.34	.32	.72	.013	.00	.00	PIPE	
191.536	9.706	1.288	10.994	4.40	2.06	.07	11.06	.00	.74	1.92	2.000	.000	.00	1	.0
10.404	.0050					.0007	.01	1.29	.34	.72	.013	.00	.00	PIPE	
201.940	9.759	1.236	10.995	4.40	2.16	.07	11.07	.00	.74	1.94	2.000	.000	.00	1	.0
9.790	.0050					.0008	.01	1.24	.37	.72	.013	.00	.00	PIPE	
211.730	9.808	1.188	10.996	4.40	2.26	.08	11.08	.00	.74	1.96	2.000	.000	.00	1	.0
9.188	.0050					.0009	.01	1.19	.40	.72	.013	.00	.00	PIPE	
220.917	9.854	1.142	10.996	4.40	2.37	.09	11.08	.00	.74	1.98	2.000	.000	.00	1	.0
7.073	.0050					.0010	.01	1.14	.43	.72	.013	.00	.00	PIPE	
227.990	9.890	1.106	10.996	4.40	2.47	.09	11.09	.00	.74	1.99	2.000	.000	.00	1	.0
JUNCT STR	.0100					.0008	.00	1.11	.46		.013	.00	.00	PIPE	
228.990	9.900	1.155	11.055	3.29	1.75	.05	11.10	.00	.63	1.98	2.000	.000	.00	1	.0
9.312	.0048					.0006	.01	1.16	.32	.62	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

Date:11-13-2019 Time:10:43:10

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
238.302	9.945	1.111	11.056	3.29	1.84	.05	11.11	.00	.63	1.99	2.000	.000	.00	1 .0
8.782	.0048					.0006	.01	1.11	.34	.62	.013	.00	.00	PIPE
247.083	9.987	1.069	11.056	3.29	1.93	.06	11.11	.00	.63	2.00	2.000	.000	.00	1 .0
8.347	.0048					.0007	.01	1.07	.37	.62	.013	.00	.00	PIPE
255.430	10.027	1.029	11.056	3.29	2.02	.06	11.12	.00	.63	2.00	2.000	.000	.00	1 .0
7.954	.0048					.0008	.01	1.03	.39	.62	.013	.00	.00	PIPE
263.384	10.065	.991	11.056	3.29	2.12	.07	11.13	.00	.63	2.00	2.000	.000	.00	1 .0
7.528	.0048					.0009	.01	.99	.42	.62	.013	.00	.00	PIPE
270.913	10.101	.955	11.056	3.29	2.22	.08	11.13	.00	.63	2.00	2.000	.000	.00	1 .0

7.197	.0048						.0011	.01	.96	.45	.62	.013	.00	.00	PIPE
278.109	10.136	.921	11.056	3.29	2.33	.08	11.14	.00	.63	1.99	2.000	.000	.00	.00	1 .0
6.830	.0048						.0012	.01	.92	.49	.62	.013	.00	.00	PIPE
284.939	10.169	.888	11.056	3.29	2.44	.09	11.15	.00	.63	1.99	2.000	.000	.00	.00	1 .0
6.506	.0048						.0014	.01	.89	.52	.62	.013	.00	.00	PIPE
291.445	10.200	.856	11.056	3.29	2.56	.10	11.16	.00	.63	1.98	2.000	.000	.00	.00	1 .0
6.169	.0048						.0016	.01	.86	.56	.62	.013	.00	.00	PIPE
297.614	10.229	.826	11.055	3.29	2.69	.11	11.17	.00	.63	1.97	2.000	.000	.00	.00	1 .0
5.877	.0048						.0018	.01	.83	.60	.62	.013	.00	.00	PIPE

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 Program Package Serial Number: 7132
 WATER SURFACE PROFILE LISTING

Date:11-13-2019 Time:10:43:10

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
303.490	10.258	.797	11.054	3.29	2.82	.12	11.18	.00	.63	1.96	2.000	.000	.00	1 .0
5.600	.0048					.0020	.01	.80	.64	.62	.013	.00	.00	PIPE
309.091	10.285	.769	11.053	3.29	2.96	.14	11.19	.00	.63	1.95	2.000	.000	.00	1 .0
5.260	.0048					.0023	.01	.77	.69	.62	.013	.00	.00	PIPE
314.350	10.310	.742	11.052	3.29	3.10	.15	11.20	.00	.63	1.93	2.000	.000	.00	1 .0
4.912	.0048					.0026	.01	.74	.74	.62	.013	.00	.00	PIPE
319.262	10.333	.717	11.050	3.29	3.25	.16	11.21	.00	.63	1.92	2.000	.000	.00	1 .0
4.592	.0048					.0030	.01	.72	.79	.62	.013	.00	.00	PIPE
323.854	10.355	.692	11.047	3.29	3.41	.18	11.23	.00	.63	1.90	2.000	.000	.00	1 .0
4.084	.0048					.0034	.01	.69	.84	.62	.013	.00	.00	PIPE
327.938	10.375	.668	11.043	3.29	3.58	.20	11.24	.00	.63	1.89	2.000	.000	.00	1 .0
3.122	.0048					.0039	.01	.67	.90	.62	.013	.00	.00	PIPE
331.060	10.390	.646	11.036	3.29	3.75	.22	11.25	.00	.63	1.87	2.000	.000	.00	1 .0

HYDRAULIC JUMP

331.060	10.390	.622	11.012	3.29	3.95	.24	11.25	.00	.63	1.85	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.230	.0048					.0048	.24	.62	1.04	.62	.013	.00	.00	PIPE	
380.290	10.626	.622	11.248	3.29	3.95	.24	11.49	.00	.63	1.85	2.000	.000	.00	1	.0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.840	.0048					.0046	.01	.62	1.04	.62	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
383.130	10.640	.634	11.274	3.29	3.85	.23	11.50	.00	.63	1.86	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0026	.00	.63	1.00		.013	.00	.00	PIPE
384.130	10.650	.817	11.467	2.19	3.19	.16	11.62	.00	.63	.77	1.000	.000	.00	1 .0
24.390	.0050					.0040	.10	.82	.60	.72	.013	.00	.00	PIPE
408.520	10.772	.777	11.549	2.19	3.34	.17	11.72	.00	.63	.83	1.000	.000	.00	1 .0
32.952	.0050					.0044	.15	.78	.66	.72	.013	.00	.00	PIPE
441.472	10.936	.742	11.677	2.19	3.51	.19	11.87	.00	.63	.88	1.000	.000	.00	1 .0
43.956	.0050					.0048	.21	.74	.73	.72	.013	.00	.00	PIPE
485.428	11.155	.722	11.877	2.19	3.61	.20	12.08	.00	.63	.90	1.000	.000	.00	1 .0
121.372	.0050					.0049	.60	.72	.77	.72	.013	.00	.00	PIPE
606.800	11.760	.722	12.482	2.19	3.61	.20	12.68	.00	.63	.90	1.000	.000	.00	1 .0
10.230	.0049					.0050	.05	.72	.77	.73	.013	.00	.00	PIPE
617.030	11.810	.724	12.534	2.19	3.60	.20	12.73	.00	.63	.89	1.000	.000	.00	1 .0

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM

100.00	.I	C	H	WE	.	R
105.02	.				.	
110.04	.				.	
115.06	.				.	
120.08	.				.	
125.10	.				.	
130.12	.				.	
135.14	.				.	
140.16	.				.	
145.18	.				.	
150.20	.		I C	HE	.	R
155.22	.		I C	WE H	.	R
160.24	.		I C	WE H	.	R
165.26	.		I C	WE H	.	R
170.28	.		I C	WE H	.	R
175.30	.		I C	WE H	.	R
180.32	.		I C	WE H	.	R
185.34	.		I C	WE H	.	R

190.35	.	I	C	WE	H	.	R
195.37	.	I	C	WE	H	.	R
200.39	.	I	C	WE	H	.	R
205.41	.	I	C	WE	H	.	R
210.43	.	I	C	WE	H	.	R
215.45	.	I	C	WE	H	.	R
220.47	.	I	C	WE	H	.	R
225.49	.	I	C	WE	H	.	R
230.51	.	I	C	WE	H	.	R
235.53	.	I	C	WE	H	.	R
240.55	.	I	C	WE	H	.	JX
245.57	.	I	C	WE	H	.	R
250.59	.	I	C	WE	H	.	R
255.61	.	I	C	WE	H	.	R
260.63	.	I	C	WE	H	.	R
265.65	.	I	C	WE	H	.	R
270.67	.	I	C	WE	H	.	JX
275.69	.	I	C	WE	H	.	R
280.71	.	I	C	WE	H	.	R
285.73	.	I	C	WE	H	.	R

290.75	.	I	C	WE	H	.	R
295.77	.	I	C	WE	H	.	R
300.79	.	I	C	WE	H	.	R
305.81	.	I	C	WE	H	.	R
310.83	.	I	C	WE	H	.	R
315.85	.	I	C	WE	H	.	R
320.87	.	I	C	WE	H	.	R
325.89	.	I	C	WE	H	.	R
330.91	.	I	C	WE	H	.	R
335.93	.	I	CW	E	H	.	R
340.95	.	I	CW	E	H	.	R
345.97	.	I	CW	E	H	.	R
350.99	.	I	W	E	H	.	R
356.01	.	I	W	E	H	.	R
361.02	.	I	W	E	H	.	R
366.04	.					.	
371.06	.					.	
376.08	.					.	
381.10	.	I	W	E	H	.	R

386.12	.	I	W	E	H	.	JX
391.14	.	I	C	W	H	.	R
396.16	.					.	
401.18	.					.	
406.20	.					.	
411.22	.	I	C	W	EH	.	R
416.24	.					.	
421.26	.					.	
426.28	.					.	
431.30	.					.	
436.32	.					.	
441.34	.					.	
446.36	.	I	C	W	EH	.	R
451.38	.					.	
456.40	.					.	
461.42	.					.	
466.44	.					.	
471.46	.					.	
476.48	.					.	

481.50	.				.
486.52	.		I	C W E H	. R
491.54	.				.
496.56	.				.
501.58	.				.
506.60	.				.
511.62	.				.
516.64	.				.
521.66	.				.
526.68	.				.
531.70	.				.
536.71	.				.
541.73	.				.
546.75	.				.
551.77	.				.
556.79	.				.
561.81	.				.
566.83	.				.
571.85	.				.
576.87	.				.

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1		3.000															
CD	2	4	1		1.000															
CD	3	4	1		2.000															

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA

HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE C3

HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV						
1	IS	A	SYSTEM OUTLET	100.000	5.600	1	13.817						
2	IS	A	REACH	179.380	9.610	1		RADIUS	ANGLE	ANG PT	MAN H		
3	IS	A	JUNCTION	180.380	9.650	1							
			U/S DATA	STATION	INVERT	SECT	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			U/S DATA	180.380	9.650	1	.013	2.350	.000	10.650	.000	-45.000	.000
										RADIUS	ANGLE		
										.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

4	IS	A	REACH	227.990	9.890	3	.013			RADIUS	ANGLE	ANG PT	MAN H
5	IS	A	JUNCTION	228.990	9.900	3	.013	1.110	.000	10.400	.000	-45.000	.000
6	IS	A	REACH	383.130	10.640	3	.013			RADIUS	ANGLE	ANG PT	MAN H
7	IS	A	JUNCTION	384.130	10.650	3	.013	1.100	.000	10.900	.000	-45.000	.000
			U/S DATA	STATION	INVERT	SECT	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			U/S DATA	384.130	10.650	3	.013	1.100	.000	10.900	.000	-45.000	.000
										RADIUS	ANGLE		
										.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

8	IS	A	REACH	606.800	11.760	2	.013			RADIUS	ANGLE	ANG PT	MAN H
			U/S DATA	STATION	INVERT	SECT	N			.000	.000	-45.000	0

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

9	IS	A	REACH	617.030	11.810	2	.013			RADIUS	ANGLE	ANG PT	MAN H
10	IS	A	SYSTEM HEADWORKS	617.030	11.810	2				W S ELEV			
			U/S DATA	STATION	INVERT	SECT				11.810			

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C3
 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Date:11-26-2019 Time:10:47:31

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	5.600	8.217	13.817	6.75	.95	.01	13.83	.00	.82	.00	3.000	.000	.00	1 .0
79.380	.0505					.0001	.01	8.22	.00	.43	.013	.00	.00	PIPE
179.380	9.610	4.215	13.825	6.75	.95	.01	13.84	.00	.82	.00	3.000	.000	.00	1 .0
JUNCT STR	.0400					.0001	.00	4.22	.00		.013	.00	.00	PIPE
180.380	9.650	4.170	13.820	4.40	1.40	.03	13.85	.00	.74	.00	2.000	.000	.00	1 .0
47.610	.0050					.0004	.02	4.17	.00	.72	.013	.00	.00	PIPE
227.990	9.890	3.948	13.838	4.40	1.40	.03	13.87	.00	.74	.00	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0003	.00	3.95	.00		.013	.00	.00	PIPE
228.990	9.900	3.954	13.854	3.29	1.05	.02	13.87	.00	.63	.00	2.000	.000	.00	1 .0
154.140	.0048					.0002	.03	3.95	.00	.62	.013	.00	.00	PIPE
383.130	10.640	3.246	13.886	3.29	1.05	.02	13.90	.00	.63	.00	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0002	.00	3.25	.00		.013	.00	.00	PIPE
384.130	10.650	3.245	13.895	2.19	2.79	.12	14.02	.00	.63	.00	1.000	.000	.00	1 .0
222.670	.0050					.0038	.84	3.24	.00	.72	.013	.00	.00	PIPE
606.800	11.760	2.994	14.754	2.19	2.79	.12	14.87	.00	.63	.00	1.000	.000	.00	1 .0
10.230	.0049					.0038	.04	2.99	.00	.73	.013	.00	.00	PIPE
617.030	11.810	2.983	14.793	2.19	2.79	.12	14.91	.00	.63	.00	1.000	.000	.00	1 .0

DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE C3
 100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	5.600	16.200	21.800	10.41	1.47	.03	21.83	.00	1.02	.00	3.000	.000	.00	1 .0
79.380	.0505					.0002	.02	16.20	.00	.54	.013	.00	.00	PIPE
179.380	9.610	12.209	21.819	10.41	1.47	.03	21.85	.00	1.02	.00	3.000	.000	.00	1 .0
JUNCT STR	.0400					.0002	.00	12.21	.00		.013	.00	.00	PIPE
180.380	9.650	12.155	21.805	6.74	2.15	.07	21.88	.00	.92	.00	2.000	.000	.00	1 .0
47.610	.0050					.0009	.04	12.16	.00	.90	.013	.00	.00	PIPE
227.990	9.890	11.958	21.848	6.74	2.15	.07	21.92	.00	.92	.00	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0007	.00	11.96	.00		.013	.00	.00	PIPE
228.990	9.900	11.986	21.886	5.03	1.60	.04	21.93	.00	.79	.00	2.000	.000	.00	1 .0
154.140	.0048					.0005	.08	11.99	.00	.78	.013	.00	.00	PIPE
383.130	10.640	11.322	21.962	5.03	1.60	.04	22.00	.00	.79	.00	2.000	.000	.00	1 .0
JUNCT STR	.0100					.0004	.00	11.32	.00		.013	.00	.00	PIPE
384.130	10.650	11.331	21.981	3.34	4.25	.28	22.26	.00	.78	.00	1.000	.000	.00	1 .0
222.670	.0050					.0088	1.96	11.33	.00	1.00	.013	.00	.00	PIPE
606.800	11.760	12.220	23.980	3.34	4.25	.28	24.26	.00	.78	.00	1.000	.000	.00	1 .0
10.230	.0049					.0088	.09	12.22	.00	1.00	.013	.00	.00	PIPE
617.030	11.810	12.260	24.070	3.34	4.25	.28	24.35	.00	.78	.00	1.000	.000	.00	1 .0

DANA POINT HARBOR

PROPOSED STORM DRAIN LINE C3

100-YEAR STORM

100.00	.I	C	H		W	.	R
110.55	.					.	
121.10	.					.	
131.65	.					.	
142.21	.					.	
152.76	.					.	
163.31	.					.	
173.86	.					.	
184.41	.		I	C	H	W	JX
194.96	.		I	C	H	W	R
205.52	.					.	
216.07	.					.	
226.62	.					.	
237.17	.		I	C	H	WE	JX
247.72	.		I	C	H	WE	R
258.27	.					.	
268.83	.					.	
279.38	.					.	

289.93	.					.
300.48	.					.
311.03	.					.
321.58	.					.
332.14	.					.
342.69	.					.
353.24	.					.
363.79	.					.
374.34	.					.
384.89	.	I	C	H	W	JX
395.45	.	I	CH		WE	R
406.00	.					.
416.55	.					.
427.10	.					.
437.65	.					.
448.20	.					.
458.76	.					.
469.31	.					.
479.86	.					.
490.41	.					.

COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE C4					
PROPOSED CONDITION MODEL					
STATION		ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM 10-YR	FLOW (CFS) RM 100-YR
SO	100.00	-3			
R	161.87	4.69			
R	182.03	4.82			
JX	183.03	4.84	185	0.85	1.34
R	277.98	5.3			
JX	278.98	5.35	180	0.73	1.14
R	404.35	5.93			
JX	405.35	5.98	175	1.34	2.09
R	448.07	6.15			
JX	449.07	6.2	170	1.35	2.06
R	550.50	7.69			
R	598.87	8.41			
SH	598.87	8.41	165	1.57	2.40

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	449.070	6.200	3	2	0	.013	1.350	.000	6.450	.000	-90.000	.000
									RADIUS	ANGLE		
									.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	IS A	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
11				550.500	7.690	4	.013	.000	.000	.000	0
12				598.870	8.410	4	.013	.000	.000	.000	0
13											

U/S DATA STATION INVERT SECT W S ELEV

598.870 8.410 4 8.410

DANA POINT HARBOR COMMERCIAL CORE AREA
STORM DRAIN LINE C4
10-YEAR STORM - MHW CONDITION WSE=4.41

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 100.000 through 152.881.

DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

Table with columns: Station, Invert Elev, Depth (FT), Water Elev, Q (CFS), Vel (FPS), Vel Head, Energy Grd.El., Super Elev, Critical Depth, Flow Top Width, Height/Dia.-FT, Base Wt or I.D., ZL, No Wth Prs/Pip. Includes data rows for stations 100.000 through 152.881.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
153.532	3.654	1.937	5.591	5.84	1.21	.02	5.61	.00	.76	2.87	3.000	.000	.00	1 .0
.608	.1243					.0001	.00	1.94	.16	.33	.013	.00	.00	PIPE
154.140	3.729	1.860	5.589	5.84	1.27	.02	5.61	.00	.76	2.91	3.000	.000	.00	1 .0
.569	.1243					.0002	.00	1.86	.18	.33	.013	.00	.00	PIPE
154.708	3.800	1.787	5.586	5.84	1.33	.03	5.61	.00	.76	2.94	3.000	.000	.00	1 .0
.535	.1243					.0002	.00	1.79	.19	.33	.013	.00	.00	PIPE
155.243	3.866	1.718	5.584	5.84	1.40	.03	5.61	.00	.76	2.97	3.000	.000	.00	1 .0
.503	.1243					.0002	.00	1.72	.21	.33	.013	.00	.00	PIPE
155.746	3.929	1.652	5.581	5.84	1.46	.03	5.61	.00	.76	2.98	3.000	.000	.00	1 .0
.474	.1243					.0002	.00	1.65	.22	.33	.013	.00	.00	PIPE
156.219	3.988	1.590	5.578	5.84	1.54	.04	5.61	.00	.76	2.99	3.000	.000	.00	1 .0
.447	.1243					.0003	.00	1.59	.24	.33	.013	.00	.00	PIPE
156.666	4.043	1.531	5.574	5.84	1.61	.04	5.61	.00	.76	3.00	3.000	.000	.00	1 .0
.421	.1243					.0003	.00	1.53	.26	.33	.013	.00	.00	PIPE
157.087	4.096	1.475	5.570	5.84	1.69	.04	5.61	.00	.76	3.00	3.000	.000	.00	1 .0
.398	.1243					.0003	.00	1.47	.28	.33	.013	.00	.00	PIPE
157.485	4.145	1.421	5.566	5.84	1.77	.05	5.61	.00	.76	3.00	3.000	.000	.00	1 .0
.375	.1243					.0004	.00	1.42	.30	.33	.013	.00	.00	PIPE

▲ FILE: C4P10H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-11-2019 Time:10:41:27

DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
157.860	4.192	1.370	5.561	5.84	1.86	.05	5.61	.00	.76	2.99	3.000	.000	.00	1 .0
.352	.1243					.0004	.00	1.37	.32	.33	.013	.00	.00	PIPE
158.212	4.235	1.321	5.556	5.84	1.95	.06	5.61	.00	.76	2.98	3.000	.000	.00	1 .0
.332	.1243					.0005	.00	1.32	.34	.33	.013	.00	.00	PIPE

158.544	4.277	1.274	5.550	5.84	2.04	.06	5.62	.00	.76	2.97	3.000	.000	.00	1	.0
.311	.1243					.0006	.00	1.27	.37	.33	.013	.00	.00	PIPE	
158.855	4.315	1.229	5.544	5.84	2.14	.07	5.62	.00	.76	2.95	3.000	.000	.00	1	.0
.291	.1243					.0007	.00	1.23	.39	.33	.013	.00	.00	PIPE	
159.145	4.351	1.186	5.537	5.84	2.25	.08	5.62	.00	.76	2.93	3.000	.000	.00	1	.0
.272	.1243					.0008	.00	1.19	.42	.33	.013	.00	.00	PIPE	
159.417	4.385	1.144	5.529	5.84	2.36	.09	5.62	.00	.76	2.91	3.000	.000	.00	1	.0
.252	.1243					.0009	.00	1.14	.45	.33	.013	.00	.00	PIPE	
159.669	4.416	1.105	5.521	5.84	2.47	.09	5.62	.00	.76	2.89	3.000	.000	.00	1	.0
.232	.1243					.0010	.00	1.10	.48	.33	.013	.00	.00	PIPE	
159.901	4.445	1.067	5.512	5.84	2.59	.10	5.62	.00	.76	2.87	3.000	.000	.00	1	.0
.213	.1243					.0011	.00	1.07	.52	.33	.013	.00	.00	PIPE	
160.114	4.472	1.030	5.502	5.84	2.72	.11	5.62	.00	.76	2.85	3.000	.000	.00	1	.0
.085	.1243					.0013	.00	1.03	.55	.33	.013	.00	.00	PIPE	

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DANA POINT HARBOR
 STORM DRAIN LINE C4
 10 YEAR STORM

WATER SURFACE PROFILE LISTING

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Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
160.199	4.482	.995	5.477	5.84	2.85	.13	5.60	.00	.76	2.82	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
160.199	4.482	.542	5.024	5.84	6.72	.70	5.72	.00	.76	2.31	3.000	.000	.00	1 .0
.193	.1243					.0142	.00	.54	1.93	.33	.013	.00	.00	PIPE
160.392	4.506	.560	5.066	5.84	6.40	.64	5.70	.00	.76	2.34	3.000	.000	.00	1 .0
.349	.1243					.0124	.00	.56	1.81	.33	.013	.00	.00	PIPE
160.741	4.550	.579	5.129	5.84	6.11	.58	5.71	.00	.76	2.37	3.000	.000	.00	1 .0
.291	.1243					.0108	.00	.58	1.69	.33	.013	.00	.00	PIPE
161.032	4.586	.599	5.184	5.84	5.82	.53	5.71	.00	.76	2.40	3.000	.000	.00	1 .0

.240	.1243						.0095	.00	.60	1.59	.33	.013	.00	.00	PIPE
161.272	4.616	.619	5.234	5.84	5.55	.48	5.71	.00	.76	2.43	3.000	.000	.00	.00	1 .0
.194	.1243						.0083	.00	.62	1.49	.33	.013	.00	.00	PIPE
161.466	4.640	.640	5.280	5.84	5.29	.44	5.71	.00	.76	2.46	3.000	.000	.00	.00	1 .0
.152	.1243						.0072	.00	.64	1.39	.33	.013	.00	.00	PIPE
161.617	4.659	.662	5.320	5.84	5.05	.40	5.72	.00	.76	2.49	3.000	.000	.00	.00	1 .0
.113	.1243						.0063	.00	.66	1.30	.33	.013	.00	.00	PIPE
161.731	4.673	.684	5.357	5.84	4.81	.36	5.72	.00	.76	2.52	3.000	.000	.00	.00	1 .0
.078	.1243						.0055	.00	.68	1.22	.33	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
161.809	4.682	.708	5.390	5.84	4.59	.33	5.72	.00	.76	2.55	3.000	.000	.00	1 .0
.046	.1243					.0048	.00	.71	1.14	.33	.013	.00	.00	PIPE
161.855	4.688	.732	5.420	5.84	4.37	.30	5.72	.00	.76	2.58	3.000	.000	.00	1 .0
.015	.1243					.0042	.00	.73	1.07	.33	.013	.00	.00	PIPE
161.870	4.690	.758	5.448	5.84	4.16	.27	5.72	.00	.76	2.61	3.000	.000	.00	1 .0
161.870	4.690	.786	5.476	5.84	5.10	.40	5.88	.00	.85	1.95	2.000	.000	.00	1 .0
9.967	.0064					.0062	.06	.79	1.17	.78	.013	.00	.00	PIPE
171.837	4.754	.794	5.548	5.84	5.03	.39	5.94	.00	.85	1.96	2.000	.000	.00	1 .0
8.672	.0064					.0057	.05	.79	1.15	.78	.013	.00	.00	PIPE
180.509	4.810	.823	5.633	5.84	4.79	.36	5.99	.00	.85	1.97	2.000	.000	.00	1 .0
1.521	.0064					.0050	.01	.82	1.07	.78	.013	.00	.00	PIPE
182.030	4.820	.854	5.674	5.84	4.56	.32	6.00	.00	.85	1.98	2.000	.000	.00	1 .0
JUNCT STR	.0200					.0031	.00	.85	1.00		.013	.00	.00	PIPE

DANA POINT HARBOR
 STORM DRAIN LINE C4
 10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
277.980	5.300	.787	6.087	4.99	4.35	.29	6.38	.00	.79	1.95	2.000	.000	.00	1 .0
JUNCT STR	.0500					.0031	.00	.79	1.00		.013	.00	.00	PIPE
278.980	5.350	.965	6.315	4.26	2.84	.13	6.44	.00	.72	2.00	2.000	.000	.00	1 .0
7.728	.0046					.0017	.01	.97	.58	.72	.013	.00	.00	PIPE
286.708	5.386	.930	6.316	4.26	2.98	.14	6.45	.00	.72	2.00	2.000	.000	.00	1 .0
7.327	.0046					.0019	.01	.93	.62	.72	.013	.00	.00	PIPE
294.035	5.420	.897	6.316	4.26	3.12	.15	6.47	.00	.72	1.99	2.000	.000	.00	1 .0
6.990	.0046					.0022	.02	.90	.66	.72	.013	.00	.00	PIPE
301.025	5.452	.865	6.317	4.26	3.27	.17	6.48	.00	.72	1.98	2.000	.000	.00	1 .0
6.622	.0046					.0025	.02	.86	.71	.72	.013	.00	.00	PIPE
307.647	5.483	.834	6.317	4.26	3.43	.18	6.50	.00	.72	1.97	2.000	.000	.00	1 .0
6.310	.0046					.0029	.02	.83	.76	.72	.013	.00	.00	PIPE
313.957	5.512	.805	6.317	4.26	3.60	.20	6.52	.00	.72	1.96	2.000	.000	.00	1 .0
5.861	.0046					.0033	.02	.80	.82	.72	.013	.00	.00	PIPE
319.818	5.539	.777	6.316	4.26	3.78	.22	6.54	.00	.72	1.95	2.000	.000	.00	1 .0
5.378	.0046					.0037	.02	.78	.88	.72	.013	.00	.00	PIPE
325.196	5.564	.750	6.313	4.26	3.96	.24	6.56	.00	.72	1.94	2.000	.000	.00	1 .0
3.603	.0046					.0042	.02	.75	.94	.72	.013	.00	.00	PIPE

DANA POINT HARBOR
 STORM DRAIN LINE C4
 10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
---------	-------------	------------	------------	---------	-----------	----------	----------------	------------	----------------	----------------	----------------	-----------------	----	----------------

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
328.799	5.580	.725	6.305	4.26	4.15	.27	6.57	.00	.72	1.92	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
328.799	5.580	.719	6.300	4.26	4.19	.27	6.57	.00	.72	1.92	2.000	.000	.00	1 .0
74.139	.0046					.0046	.34	.72	1.01	.72	.013	.00	.00	PIPE
402.937	5.923	.719	6.643	4.26	4.19	.27	6.92	.00	.72	1.92	2.000	.000	.00	1 .0
1.413	.0046					.0046	.01	.72	1.01	.72	.013	.00	.00	PIPE
404.350	5.930	.725	6.655	4.26	4.15	.27	6.92	.00	.72	1.92	2.000	.000	.00	1 .0
JUNCT STR .0500														
405.350	5.980	.927	6.907	2.92	2.05	.07	6.97	.00	.60	1.99	2.000	.000	.00	1 .0
8.774	.0040					.0009	.01	.93	.43	.61	.013	.00	.00	PIPE
414.124	6.015	.894	6.909	2.92	2.15	.07	6.98	.00	.60	1.99	2.000	.000	.00	1 .0
8.448	.0040					.0011	.01	.89	.46	.61	.013	.00	.00	PIPE
422.572	6.049	.862	6.910	2.92	2.25	.08	6.99	.00	.60	1.98	2.000	.000	.00	1 .0
8.129	.0040					.0012	.01	.86	.49	.61	.013	.00	.00	PIPE
430.701	6.081	.831	6.912	2.92	2.36	.09	7.00	.00	.60	1.97	2.000	.000	.00	1 .0
7.847	.0040					.0014	.01	.83	.53	.61	.013	.00	.00	PIPE
438.548	6.112	.802	6.914	2.92	2.48	.10	7.01	.00	.60	1.96	2.000	.000	.00	1 .0
7.610	.0040					.0016	.01	.80	.56	.61	.013	.00	.00	PIPE

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DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
446.158	6.142	.774	6.916	2.92	2.60	.11	7.02	.00	.60	1.95	2.000	.000	.00	1 .0
1.912	.0040					.0017	.00	.77	.60	.61	.013	.00	.00	PIPE
448.070	6.150	.767	6.917	2.92	2.63	.11	7.02	.00	.60	1.95	2.000	.000	.00	1 .0

JUNCT STR	.0500					.0010	.00	.77	.61		.013	.00	.00	PIPE
449.070	6.200	.867	7.067	1.57	2.17	.07	7.14	.00	.53	.68	1.000	.000	.00	1 .0
3.052	.0147					.0019	.01	.87	.37	.42	.013	.00	.00	PIPE
452.122	6.245	.821	7.066	1.57	2.28	.08	7.15	.00	.53	.77	1.000	.000	.00	1 .0
2.541	.0147					.0020	.01	.82	.42	.42	.013	.00	.00	PIPE
454.664	6.282	.781	7.063	1.57	2.39	.09	7.15	.00	.53	.83	1.000	.000	.00	1 .0
2.184	.0147					.0023	.00	.78	.47	.42	.013	.00	.00	PIPE
456.848	6.314	.745	7.059	1.57	2.50	.10	7.16	.00	.53	.87	1.000	.000	.00	1 .0
1.895	.0147					.0025	.00	.74	.52	.42	.013	.00	.00	PIPE
458.742	6.342	.712	7.054	1.57	2.63	.11	7.16	.00	.53	.91	1.000	.000	.00	1 .0
1.650	.0147					.0028	.00	.71	.57	.42	.013	.00	.00	PIPE
460.392	6.366	.681	7.048	1.57	2.75	.12	7.17	.00	.53	.93	1.000	.000	.00	1 .0
.639	.0147					.0032	.00	.68	.62	.42	.013	.00	.00	PIPE
461.031	6.376	.653	7.029	1.57	2.89	.13	7.16	.00	.53	.95	1.000	.000	.00	1 .0

HYDRAULIC JUMP
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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR
 STORM DRAIN LINE C4
 10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
461.031	6.376	.417	6.793	1.57	5.06	.40	7.19	.00	.53	.99	1.000	.000	.00	1 .0
65.470	.0147					.0147	.96	.42	1.59	.42	.013	.00	.00	PIPE
526.501	7.337	.417	7.755	1.57	5.06	.40	8.15	.00	.53	.99	1.000	.000	.00	1 .0
23.999	.0147					.0148	.35	.42	1.59	.42	.013	.00	.00	PIPE
550.500	7.690	.416	8.106	1.57	5.09	.40	8.51	.00	.53	.99	1.000	.000	.00	1 .0
6.569	.0149					.0149	.10	.42	1.60	.42	.013	.00	.00	PIPE
557.069	7.788	.416	8.203	1.57	5.09	.40	8.61	.00	.53	.99	1.000	.000	.00	1 .0
23.809	.0149					.0143	.34	.42	1.60	.42	.013	.00	.00	PIPE

580.877	8.142	.425	8.567	1.57	4.94	.38	8.95	.00	.53	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.349	.0149					.0129	.12	.43	1.53	.42	.013	.00	.00	PIPE	
590.226	8.281	.441	8.722	1.57	4.71	.34	9.07	.00	.53	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.203	.0149					.0113	.05	.44	1.43	.42	.013	.00	.00	PIPE	
594.429	8.344	.457	8.801	1.57	4.49	.31	9.11	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.298	.0149					.0100	.02	.46	1.33	.42	.013	.00	.00	PIPE	
596.727	8.378	.474	8.852	1.57	4.28	.28	9.14	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.281	.0149					.0088	.01	.47	1.24	.42	.013	.00	.00	PIPE	
598.008	8.397	.492	8.889	1.57	4.08	.26	9.15	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.669	.0149					.0077	.01	.49	1.16	.42	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

Date:11-11-2019 Time:10:41:27

DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
598.677	8.407	.511	8.918	1.57	3.89	.23	9.15	.00	.53	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.193	.0149					.0068	.00	.51	1.08	.42	.013	.00	.00	PIPE
598.870	8.410	.532	8.942	1.57	3.70	.21	9.15	.00	.53	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

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DANA POINT HARBOR
STORM DRAIN LINE C4
10 YEAR STORM

100.00 .I C H W . R
102.70 .

105.39	.								
108.09	.								
110.79	.								
113.48	.								
116.18	.								
118.88	.								
121.57	.								
124.27	.								
126.97	.								
129.66	.								
132.36	.								
135.06	.								
137.75	.								
140.45	.								
143.15	.								
145.84	.		I	C		H		.	R
148.54	.		I	C		W H		.	R
151.24	.		I	C		W H		.	R
153.93	.		I	C		W H		.	R

156.63	.	I	C	W	H	.	R
159.33	.	I	C	W	H	.	R
162.02	.	I	C	W	H	.	R
164.72	.	I	C	W	H	.	R
167.41	.	I	C	W	H	.	R
170.11	.	I	C	W	H	.	R
172.81	.	I	C	W	H	.	R
175.50	.	I	C	W	H	.	R
178.20	.	I	C	W	H	.	R
180.90	.	I	C	W	H	.	R
183.59	.	I	C	W	H	.	R
186.29	.	I	C	W	H	.	R
188.99	.	I	C	W	H	.	R
191.68	.	I	C	WE	H	.	R
194.38	.	I	C	WE	H	.	R
197.08	.	I	C	WE	H	.	R
199.77	.	I	C	WE	H	.	R
202.47	.	I	C	WE	H	.	R
205.17	.	I	C	WE	H	.	R
207.86	.	I	C	WE	H	.	R

210.56	.	I	C WE	H	.	R
213.26	.	I	C WE	H	.	R
215.95	.	I	C WE	H	.	R
218.65	.	I	W C E	H	.	R
221.35	.	I	W C E	H	.	R
224.04	.	I	WC E	H	.	R
226.74	.	I	W C E	H	.	R
229.44	.	I	WC E	H	.	R
232.13	.	I	WC E	H	.	R
234.83	.	I	W E	H	.	R
237.53	.	I	W E	H	.	R
240.22	.	I	WC E	H	.	R
242.92	.	I	WC E	H	.	R
245.62	.	I	W E	H	.	R
248.31	.	I	W E	H	.	R
251.01	.	I	WC E	H	.	R
253.71	.	I	W E	H	.	R
256.40	.	I	W E	H	.	JX
259.10	.	I	C WE	H	.	R

261.80	.	I	C W E	H	.	R
264.49	.	I	CW E	H	.	R
267.19	.	I	CW E	H	.	R
269.89	.	I	CW E	H	.	R
272.58	.	I	CW E	H	.	R
275.28	.	I	W E	H	.	R
277.98	.	I	W E	H	.	R
280.67	.	I	W E	H	.	R
283.37	.	I	W E	H	.	R
286.07	.	I	W E	H	.	R
288.76	.	I	WC E	H	.	R
291.46	.	I	W E	H	.	JX
294.15	.	I	C WE	H	.	R
296.85	.	I	C WE	H	.	R
299.55	.	I	C WE	H	.	R
302.24	.	I	C WE	H	.	R
304.94	.				.	
307.64	.				.	
310.33	.	I	CWE	H	.	R

366.96	.					.
369.66	.					.
372.36	.					.
375.05	.					.
377.75	.					.
380.45	.					.
383.14	.					.
385.84	.					.
388.54	.					.
391.23	.					.
393.93	.					.
396.63	.					.
399.32	.					.
402.02	.					.
404.72	.	I	W E	H		. R
407.41	.	I	W E	H		. JX
410.11	.	I	C WE	H		. R
412.80	.					.
415.50	.	I	C WE	H		. R

418.20	.						
420.89	.						
423.59	.		I	C WE	H	.	R
426.29	.						
428.98	.						
431.68	.		I	C WE	H	.	R
434.38	.						
437.07	.						
439.77	.		I	CWE	H	.	R
442.47	.						
445.16	.						
447.86	.		I	CWE	H	.	R
450.56	.		I	CWE	H	.	JX
453.25	.		I	C WH		.	R
455.95	.		I	C WH		.	R
458.65	.		I	C WH		.	R
461.34	.		I	C W H		.	R
464.04	.		I	C W H		.	R
466.74	.		I	CWE H		.	R

469.43	.			I	CWE	H	.	R
472.13	.			I	WC	EH	.	R
474.83	.						.	
477.52	.						.	
480.22	.						.	
482.92	.						.	
485.61	.						.	
488.31	.						.	
491.01	.						.	
493.70	.						.	
496.40	.						.	
499.10	.						.	
501.79	.						.	
504.49	.						.	
507.19	.						.	
509.88	.						.	
512.58	.						.	
515.28	.						.	
517.97	.						.	
520.67	.						.	

523.37	.			.
526.06	.			.
528.76	.	I	WC E H	. R
531.46	.			.
534.15	.			.
536.85	.			.
539.54	.			.
542.24	.			.
544.94	.			.
547.63	.			.
550.33	.			.
553.03	.	I	WC E H	. R
555.72	.			.
558.42	.	I	WC EH	. R
561.12	.			.
563.81	.			.
566.51	.			.
569.21	.			.
571.90	.			.

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
449.070	6.200	2.314	8.514	1.57	2.00	.06	8.58	.00	.53	.00	1.000	.000	.00	1 .0
101.430	.0147					.0019	.20	2.31	.00	.42	.013	.00	.00	PIPE
550.500	7.690	1.021	8.711	1.57	2.00	.06	8.77	.00	.53	.00	1.000	.000	.00	1 .0
1.623	.0149					.0019	.00	1.02	.00	.42	.013	.00	.00	PIPE
552.123	7.714	1.000	8.714	1.57	2.00	.06	8.78	.00	.53	.00	1.000	.000	.00	1 .0
6.538	.0149					.0018	.01	1.00	.00	.42	.013	.00	.00	PIPE
558.661	7.811	.907	8.719	1.57	2.10	.07	8.79	.00	.53	.58	1.000	.000	.00	1 .0
3.578	.0149					.0018	.01	.91	.33	.42	.013	.00	.00	PIPE
562.239	7.865	.853	8.718	1.57	2.20	.08	8.79	.00	.53	.71	1.000	.000	.00	1 .0
2.842	.0149					.0019	.01	.85	.39	.42	.013	.00	.00	PIPE
565.081	7.907	.809	8.716	1.57	2.31	.08	8.80	.00	.53	.79	1.000	.000	.00	1 .0
2.395	.0149					.0021	.01	.81	.44	.42	.013	.00	.00	PIPE
567.476	7.943	.770	8.713	1.57	2.42	.09	8.80	.00	.53	.84	1.000	.000	.00	1 .0
2.063	.0149					.0023	.00	.77	.49	.42	.013	.00	.00	PIPE
569.539	7.973	.735	8.709	1.57	2.54	.10	8.81	.00	.53	.88	1.000	.000	.00	1 .0
1.798	.0149					.0026	.00	.74	.53	.42	.013	.00	.00	PIPE
571.338	8.000	.703	8.703	1.57	2.66	.11	8.81	.00	.53	.91	1.000	.000	.00	1 .0
1.553	.0149					.0029	.00	.70	.58	.42	.013	.00	.00	PIPE

▲ FILE: C4P10H2.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time: 1:44:27

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C4

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope													
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
572.891	8.023	.673	8.697	1.57	2.79	.12	8.82	.00	.53	.94	1.000	.000	.00	1 .0
.566	.0149					.0033	.00	.67	.63	.42	.013	.00	.00	PIPE
573.457	8.032	.646	8.678	1.57	2.93	.13	8.81	.00	.53	.96	1.000	.000	.00	1 .0

HYDRAULIC JUMP

573.457	8.032	.416	8.447	1.57	5.09	.40	8.85	.00	.53	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.421	.0149					.0143	.11	.42	1.60	.42	.013	.00	.00	PIPE	
580.877	8.142	.425	8.567	1.57	4.94	.38	8.95	.00	.53	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
9.349	.0149					.0129	.12	.43	1.53	.42	.013	.00	.00	PIPE	
590.226	8.281	.441	8.722	1.57	4.71	.34	9.07	.00	.53	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.203	.0149					.0113	.05	.44	1.43	.42	.013	.00	.00	PIPE	
594.429	8.344	.457	8.801	1.57	4.49	.31	9.11	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.298	.0149					.0100	.02	.46	1.33	.42	.013	.00	.00	PIPE	
596.727	8.378	.474	8.852	1.57	4.28	.28	9.14	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.281	.0149					.0088	.01	.47	1.24	.42	.013	.00	.00	PIPE	
598.008	8.397	.492	8.889	1.57	4.08	.26	9.15	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.669	.0149					.0077	.01	.49	1.16	.42	.013	.00	.00	PIPE	
598.677	8.407	.511	8.918	1.57	3.89	.23	9.15	.00	.53	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.193	.0149					.0068	.00	.51	1.08	.42	.013	.00	.00	PIPE	

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:11-26-2019 Time: 1:44:27

DANA POINT HARBOR COMMERCIAL CORE AREA

STORM DRAIN LINE C4

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
598.870	8.410	.532	8.942	1.57	3.70	.21	9.15	.00	.53	1.00	1.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

▲

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	449.070	6.200	3	2	0	.013	2.060	.000	6.450	.000	-90.000	.000
									RADIUS	ANGLE		
									.000	.000		

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	IS A	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
11	IS A	REACH									
			U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
				550.500	7.690	4	.013	.000	.000	.000	0
12	IS A	REACH									
			U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
				598.870	8.410	4	.013	.000	.000	.000	0
13	IS A	SYSTEM HEADWORKS									
			U/S DATA	STATION	INVERT	SECT		W S ELEV			
				598.870	8.410	4		8.410			

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
404.350	5.930	1.838	7.768	6.55	2.17	.07	7.84	.00	.91	1.09	2.000	.000	.00	1 .0
JUNCT STR	.0500					.0005	.00	1.84	.23		.013	.00	.00	PIPE
405.350	5.980	1.826	7.806	4.46	1.48	.03	7.84	.00	.74	1.13	2.000	.000	.00	1 .0
29.447	.0040					.0003	.01	1.83	.16	.77	.013	.00	.00	PIPE
434.797	6.097	1.716	7.813	4.46	1.55	.04	7.85	.00	.74	1.40	2.000	.000	.00	1 .0
13.273	.0040					.0004	.00	1.72	.19	.77	.013	.00	.00	PIPE
448.070	6.150	1.666	7.816	4.46	1.59	.04	7.86	.00	.74	1.49	2.000	.000	.00	1 .0
JUNCT STR	.0500					.0002	.00	1.67	.21		.013	.00	.00	PIPE
449.070	6.200	1.673	7.873	2.40	3.06	.14	8.02	.00	.66	.00	1.000	.000	.00	1 .0
66.245	.0147					.0045	.30	1.67	.00	.53	.013	.00	.00	PIPE
515.315	7.173	1.000	8.173	2.40	3.06	.14	8.32	.00	.66	.00	1.000	.000	.00	1 .0
7.363	.0147					.0042	.03	1.00	.00	.53	.013	.00	.00	PIPE
522.678	7.281	.907	8.189	2.40	3.21	.16	8.35	.00	.66	.58	1.000	.000	.00	1 .0
3.577	.0147					.0041	.01	.91	.50	.53	.013	.00	.00	PIPE
526.255	7.334	.853	8.187	2.40	3.36	.18	8.36	.00	.66	.71	1.000	.000	.00	1 .0
2.075	.0147					.0044	.01	.85	.59	.53	.013	.00	.00	PIPE
528.331	7.364	.809	8.173	2.40	3.53	.19	8.37	.00	.66	.79	1.000	.000	.00	1 .0

HYDRAULIC JUMP
 ▲ FILE: C4P00H.WSW

DANA POINT HARBOR COMMERCIAL CORE AREA
 STORM DRAIN LINE C4
 100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
528.331	7.364	.531	7.895	2.40	5.67	.50	8.39	.00	.66	1.00	1.000	.000	.00	1 .0
22.169	.0147					.0149	.33	.53	1.53	.53	.013	.00	.00	PIPE
550.500	7.690	.531	8.221	2.40	5.67	.50	8.72	.00	.66	1.00	1.000	.000	.00	1 .0
27.707	.0149					.0144	.40	.53	1.53	.53	.013	.00	.00	PIPE

578.207	8.102	.542	8.645	2.40	5.52	.47	9.12	.00	.66	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
11.719	.0149					.0130	.15	.54	1.47	.53	.013	.00	.00	PIPE	
589.926	8.277	.564	8.840	2.40	5.26	.43	9.27	.00	.66	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.914	.0149					.0115	.06	.56	1.37	.53	.013	.00	.00	PIPE	
594.840	8.350	.586	8.936	2.40	5.02	.39	9.33	.00	.66	.99	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.491	.0149					.0102	.03	.59	1.27	.53	.013	.00	.00	PIPE	
597.331	8.387	.610	8.997	2.40	4.78	.36	9.35	.00	.66	.98	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.191	.0149					.0090	.01	.61	1.18	.53	.013	.00	.00	PIPE	
598.522	8.405	.635	9.040	2.40	4.56	.32	9.36	.00	.66	.96	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.348	.0149					.0080	.00	.64	1.09	.53	.013	.00	.00	PIPE	
598.870	8.410	.663	9.073	2.40	4.34	.29	9.37	.00	.66	.95	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

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COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE D PROPOSED								
CONDITION MODEL								
STATION		INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM PR 10-YR	FLOW (CFS) RM 100-YR
EX	100.00	-4.4	-2.1		-2.10	497		
PR	115.36			-	2.30			
PR	146.90			-	3.62			
PR	147.90			-	3.64	495	2.83	4.24
PR	200.70			-	4.7			
PR	201.70			-	4.72	465	2.96	4.5
PR	287.74			-	5.14			
PR	288.74			-	5.15	420	0.94	1.44
PR	344.13			-	5.42			
PR	344.13			-	5.42	405	2.13	3.25

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.250														
CD	2	4	1			1.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE D
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	-2.100	1	4.410								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
2	IS	A	REACH	U/S DATA	115.360	2.300	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
3	IS	A	REACH	U/S DATA	146.900	3.620	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
4	IS	A	JUNCTION	U/S DATA	147.900	3.640	1	2	0	.013	2.830	.000	3.620	.000	-90.000	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
5	IS	A	REACH	U/S DATA	200.700	4.700	1	.013	.000	.000	.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
6	IS	A	JUNCTION	U/S DATA	201.700	4.720	1	1	0	.013	2.960	.000	4.720	.000	39.900	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
7	IS	A	REACH	U/S DATA	287.740	5.140	1	.013	.000	.000	-23.240	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
8	IS	A	JUNCTION	U/S DATA	288.740	5.150	1	2	0	.013	.940	.000	5.140	.000	-90.000	.000

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	344.130	5.420	1	.013	.000	.000	.000	0
ELEMENT NO	IS <th>A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th> </th>	A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th>	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT	W S ELEV				
10	IS	A	SYSTEM HEADWORKS	U/S DATA	344.130	5.420	1	5.420				

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE D
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	-2.100	6.510	4.410	8.86	7.22	.81	5.22	.00	1.15	.00	1.250	.000	.00	1 .0
15.360	.2865					.0188	.29	6.51	.00	.43	.013	.00	.00	PIPE
115.360	2.300	2.639	4.939	8.86	7.22	.81	5.75	.00	1.15	.00	1.250	.000	.00	1 .0
31.540	.0419					.0188	.59	2.64	.00	.75	.013	.00	.00	PIPE
146.900	3.620	2.153	5.773	8.86	7.22	.81	6.58	.00	1.15	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0138	.01	2.15	.00		.013	.00	.00	PIPE
147.900	3.640	3.016	6.656	6.03	4.91	.37	7.03	.00	.99	.00	1.250	.000	.00	1 .0
52.800	.0201					.0087	.46	3.02	.00	.74	.013	.00	.00	PIPE
200.700	4.700	2.416	7.116	6.03	4.91	.37	7.49	.00	.99	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0055	.01	2.42	.00		.013	.00	.00	PIPE
201.700	4.720	2.818	7.538	3.07	2.50	.10	7.64	.00	.71	.00	1.250	.000	.00	1 .0
86.040	.0049					.0023	.19	2.82	.00	.76	.013	.00	.00	PIPE
287.740	5.140	2.600	7.740	3.07	2.50	.10	7.84	.00	.71	.00	1.250	.000	.00	1 .0
JUNCT STR	.0100					.0017	.00	2.60	.00		.013	.00	.00	PIPE
288.740	5.150	2.692	7.842	2.13	1.74	.05	7.89	.00	.58	.00	1.250	.000	.00	1 .0
55.390	.0049					.0011	.06	2.69	.00	.60	.013	.00	.00	PIPE
344.130	5.420	2.483	7.903	2.13	1.74	.05	7.95	.00	.58	.00	1.250	.000	.00	1 .0

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.250														
CD	2	4	1			1.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE D
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	-2.100	1	7.130								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
2	IS	A	REACH	U/S DATA	115.360	2.300	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
3	IS	A	REACH	U/S DATA	146.900	3.620	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
4	IS	A	JUNCTION	U/S DATA	147.900	3.640	1	2	0	.013	2.830	.000	3.620	.000	-90.000	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
5	IS	A	REACH	U/S DATA	200.700	4.700	1	.013	.000	.000	.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
6	IS	A	JUNCTION	U/S DATA	201.700	4.720	1	1	0	.013	2.960	.000	4.720	.000	39.900	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
7	IS	A	REACH	U/S DATA	287.740	5.140	1	.013	.000	.000	-23.240	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
8	IS	A	JUNCTION	U/S DATA	288.740	5.150	1	2	0	.013	.940	.000	5.140	.000	-90.000	.000

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	344.130	5.420	1	.013	.000	.000	.000	0
ELEMENT NO	IS <th>A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th> </th>	A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th>	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT	W S ELEV				
10	IS	A	SYSTEM HEADWORKS	U/S DATA	344.130	5.420	1	5.420				

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE D
 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	-2.100	9.230	7.130	8.86	7.22	.81	7.94	.00	1.15	.00	1.250	.000	.00	1 .0
15.360	.2865					.0188	.29	9.23	.00	.43	.013	.00	.00	PIPE
115.360	2.300	5.359	7.659	8.86	7.22	.81	8.47	.00	1.15	.00	1.250	.000	.00	1 .0
31.540	.0419					.0188	.59	5.36	.00	.75	.013	.00	.00	PIPE
146.900	3.620	4.873	8.493	8.86	7.22	.81	9.30	.00	1.15	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0138	.01	4.87	.00		.013	.00	.00	PIPE
147.900	3.640	5.736	9.376	6.03	4.91	.37	9.75	.00	.99	.00	1.250	.000	.00	1 .0
52.800	.0201					.0087	.46	5.74	.00	.74	.013	.00	.00	PIPE
200.700	4.700	5.136	9.836	6.03	4.91	.37	10.21	.00	.99	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0055	.01	5.14	.00		.013	.00	.00	PIPE
201.700	4.720	5.538	10.258	3.07	2.50	.10	10.36	.00	.71	.00	1.250	.000	.00	1 .0
86.040	.0049					.0023	.19	5.54	.00	.76	.013	.00	.00	PIPE
287.740	5.140	5.320	10.460	3.07	2.50	.10	10.56	.00	.71	.00	1.250	.000	.00	1 .0
JUNCT STR	.0100					.0017	.00	5.32	.00		.013	.00	.00	PIPE
288.740	5.150	5.412	10.562	2.13	1.74	.05	10.61	.00	.58	.00	1.250	.000	.00	1 .0
55.390	.0049					.0011	.06	5.41	.00	.60	.013	.00	.00	PIPE
344.130	5.420	5.203	10.623	2.13	1.74	.05	10.67	.00	.58	.00	1.250	.000	.00	1 .0

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.250															
CD	2	4	1			1.000															

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE D
 HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
1	IS	A	SYSTEM OUTLET	U/S DATA	100.000	-2.100	1	4.410								
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
2	IS	A	REACH	U/S DATA	115.360	2.300	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
3	IS	A	REACH	U/S DATA	146.900	3.620	1	.013	.000	.000	90.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
4	IS	A	JUNCTION	U/S DATA	147.900	3.640	1	2	0	.013	4.240	.000	3.620	.000	-90.000	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
5	IS	A	REACH	U/S DATA	200.700	4.700	1	.013	.000	.000	.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
6	IS	A	JUNCTION	U/S DATA	201.700	4.720	1	1	0	.013	4.500	.000	4.720	.000	39.900	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
7	IS	A	REACH	U/S DATA	287.740	5.140	1	.013	.000	.000	-23.240	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
8	IS	A	JUNCTION	U/S DATA	288.740	5.150	1	2	0	.013	1.440	.000	5.150	.000	-90.000	.000

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	344.130	5.420	1	.013	.000	.000	.000	0
ELEMENT NO	IS <th>A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th> </th>	A <th>SYSTEM HEADWORKS</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>W S ELEV</th>	SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT	W S ELEV				
10	IS	A	SYSTEM HEADWORKS	U/S DATA	344.130	5.420	1	5.420				

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE D
 100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	-2.100	6.510	4.410	13.43	10.94	1.86	6.27	.00	1.23	.00	1.250	.000	.00	1 .0
15.360	.2865					.0432	.66	6.51	.00	.54	.013	.00	.00	PIPE
115.360	2.300	3.326	5.626	13.43	10.94	1.86	7.49	.00	1.23	.00	1.250	.000	.00	1 .0
31.540	.0419					.0432	1.36	3.33	.00	1.04	.013	.00	.00	PIPE
146.900	3.620	3.922	7.542	13.43	10.94	1.86	9.40	.00	1.23	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0317	.03	3.92	.00		.013	.00	.00	PIPE
147.900	3.640	5.911	9.551	9.19	7.49	.87	10.42	.00	1.16	.00	1.250	.000	.00	1 .0
52.800	.0201					.0202	1.07	5.91	.00	1.03	.013	.00	.00	PIPE
200.700	4.700	5.920	10.620	9.19	7.49	.87	11.49	.00	1.16	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0128	.01	5.92	.00		.013	.00	.00	PIPE
201.700	4.720	6.880	11.600	4.69	3.82	.23	11.83	.00	.88	.00	1.250	.000	.00	1 .0
86.040	.0049					.0053	.45	6.88	.00	1.08	.013	.00	.00	PIPE
287.740	5.140	6.931	12.071	4.69	3.82	.23	12.30	.00	.88	.00	1.250	.000	.00	1 .0
JUNCT STR	.0100					.0039	.00	6.93	.00		.013	.00	.00	PIPE
288.740	5.150	7.161	12.311	3.25	2.65	.11	12.42	.00	.73	.00	1.250	.000	.00	1 .0
55.390	.0049					.0025	.14	7.16	.00	.79	.013	.00	.00	PIPE
344.130	5.420	7.031	12.451	3.25	2.65	.11	12.56	.00	.73	.00	1.250	.000	.00	1 .0

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.250														
CD	2	4	1			1.000														

W S P G W PAGE NO 1
 WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE E
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV							
1	IS	A	SYSTEM	OUTLET	U/S DATA	100.000	-2.100	1	4.410							
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
2	IS	A	REACH	U/S DATA	115.870	2.300	1	.013	.000	.000	.000	0				
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
3	IS	A	REACH	U/S DATA	142.470	4.530	1	.013	.000	.000	90.000	1				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
4	IS	A	JUNCTION	U/S DATA	143.470	4.550	1	2	0	.013	1.340	.000	4.550	.000	90.000	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
5	IS	A	REACH	U/S DATA	228.400	6.250	1	.013	.000	.000	-90.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
6	IS	A	JUNCTION	U/S DATA	229.400	6.270	1	2	0	.013	1.840	.000	6.250	.000	90.000	.000
ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
7	IS	A	REACH	U/S DATA	343.240	7.400	1	.013	.000	.000	.000	0				
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> </th>	A <th>JUNCTION</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th>	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
8	IS	A	JUNCTION	U/S DATA	344.240	7.400	2	2	0	.013	1.880	.000	7.400	.000	45.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 W S P G W PAGE NO 3

ELEMENT NO	IS <th>A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> </th>	A <th>REACH</th> <th>U/S DATA</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>N</th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th>	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
9	IS	A	REACH	U/S DATA	408.040	8.210	2	.013	.000	.000	-45.000	0
10	IS	A	REACH									

					EP10H					
					N	RADIUS	ANGLE	ANG PT	MAN	H
		U/S DATA	STATION	INVERT	SECT	.013	.000	.000	-45.000	0
ELEMENT NO	11	IS A REACH	433.780	8.530	2					
		U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			511.350	9.490	2	.013	.000	.000	45.000	0
ELEMENT NO	12	IS A REACH								
		U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			536.180	9.800	2	.013	.000	.000	45.000	0
ELEMENT NO	13	IS A REACH								
		U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			581.230	10.360	2	.013	.000	.000	.000	0
ELEMENT NO	14	IS A SYSTEM HEADWORKS								
		U/S DATA	STATION	INVERT	SECT		W S ELEV			
			581.230	10.360	2		10.360			

**COMMERCIAL CORE RETAIL AREA HYDRAULIC LINE E PROPOSED CONDITION
MODEL**

STATION		INV PER AS BUILT	INV CONV NAVD88	INV PER FIELD	ELEV WSPG	HYDROLOGY NODE	FLOW (CFS) RM PR 10-YR	FLOW (CFS) RM 100-YR
EX	100.00	-4.4	-2.1		-2.10	590		
PR	115.87			-	2.30			
PR	142.47			-	4.53			
PR	143.47			-	4.55	580	1.34	2.06
PR	228.40			-	6.25			
PR	229.40			-	6.27	560	1.84	2.86
PR	343.24			-	7.40			
PR	344.24			-	7.40	540	1.88	2.90
PR	408.04			-	8.21			
PR	433.78			-	8.53			
PR	511.35			-	9.49			

WATER SURFACE PROFILE LISTING
 DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE E
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 5:11:31

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Prs/Pip	Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
100.000	-2.100	6.510	4.410	6.01	4.90	.37	4.78	.00	.99	.00	1.250	.000	.00	1	.0
15.870	.2773					.0087	.14	6.51	.00	.36	.013	.00	.00	PIPE	
115.870	2.300	2.247	4.547	6.01	4.90	.37	4.92	.00	.99	.00	1.250	.000	.00	1	.0
8.845	.0838					.0087	.08	2.25	.00	.49	.013	.00	.00	PIPE	
124.715	3.041	1.650	4.691	6.01	4.90	.37	5.06	.00	.99	.00	1.250	.000	.00	1	.0
HYDRAULIC JUMP															
124.715	3.041	.562	3.603	6.01	11.23	1.96	5.56	.00	.99	1.24	1.250	.000	.00	1	.0
1.981	.0838					.0470	.09	.56	3.02	.49	.013	.00	.00	PIPE	
126.696	3.208	.583	3.790	6.01	10.71	1.78	5.57	.00	.99	1.25	1.250	.000	.00	1	.0
3.294	.0838					.0414	.14	.58	2.81	.49	.013	.00	.00	PIPE	
129.990	3.484	.605	4.089	6.01	10.21	1.62	5.71	.00	.99	1.25	1.250	.000	.00	1	.0
2.619	.0838					.0364	.10	.60	2.62	.49	.013	.00	.00	PIPE	
132.609	3.703	.628	4.331	6.01	9.74	1.47	5.80	.00	.99	1.25	1.250	.000	.00	1	.0
2.119	.0838					.0321	.07	.63	2.44	.49	.013	.00	.00	PIPE	
134.728	3.881	.652	4.533	6.01	9.28	1.34	5.87	.00	.99	1.25	1.250	.000	.00	1	.0
1.734	.0838					.0283	.05	.65	2.27	.49	.013	.00	.00	PIPE	
136.462	4.026	.677	4.704	6.01	8.85	1.22	5.92	.00	.99	1.25	1.250	.000	.00	1	.0
1.424	.0838					.0249	.04	.68	2.11	.49	.013	.00	.00	PIPE	

DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE E
 10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 5:11:31

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No	Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	----	-----

EP10H														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
137.886	4.146	.704	4.850	6.01	8.44	1.11	5.96	.00	.99	1.24	1.250	.000	.00	1 .0
1.172	.0838					.0220	.03	.70	1.96	.49	.013	.00	.00	PIPE
139.058	4.244	.732	4.976	6.01	8.05	1.01	5.98	.00	.99	1.23	1.250	.000	.00	1 .0
.959	.0838					.0195	.02	.73	1.82	.49	.013	.00	.00	PIPE
140.017	4.324	.762	5.086	6.01	7.67	.91	6.00	.00	.99	1.22	1.250	.000	.00	1 .0
.773	.0838					.0172	.01	.76	1.69	.49	.013	.00	.00	PIPE
140.790	4.389	.793	5.183	6.01	7.32	.83	6.01	.00	.99	1.20	1.250	.000	.00	1 .0
.612	.0838					.0153	.01	.79	1.56	.49	.013	.00	.00	PIPE
141.402	4.440	.827	5.268	6.01	6.98	.76	6.02	.00	.99	1.18	1.250	.000	.00	1 .0
.467	.0838					.0136	.01	.83	1.44	.49	.013	.00	.00	PIPE
141.869	4.480	.863	5.343	6.01	6.65	.69	6.03	.00	.99	1.16	1.250	.000	.00	1 .0
.331	.0838					.0121	.00	.86	1.33	.49	.013	.00	.00	PIPE
142.200	4.507	.902	5.409	6.01	6.34	.62	6.03	.00	.99	1.12	1.250	.000	.00	1 .0
.201	.0838					.0108	.00	.90	1.22	.49	.013	.00	.00	PIPE
142.401	4.524	.944	5.468	6.01	6.05	.57	6.04	.00	.99	1.08	1.250	.000	.00	1 .0
.069	.0838					.0097	.00	.94	1.11	.49	.013	.00	.00	PIPE
142.470	4.530	.991	5.521	6.01	5.76	.51	6.04	.00	.99	1.01	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0072	.01	.99	1.00		.013	.00	.00	PIPE

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 WATER SURFACE PROFILE LISTING
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DANA POINT HARBOR COMMERCIAL CORE AREA
 PROPOSED STORM DRAIN LINE E
 10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
143.470	4.550	1.439	5.989	4.67	3.81	.22	6.21	.00	.88	.00	1.250	.000	.00	1 .0
17.296	.0200					.0052	.09	1.44	.00	.63	.013	.00	.00	PIPE

EP10H															
160.766	4.896	1.250	6.146	4.67	3.81	.22	6.37	.00	.88	.00	1.250	.000	.00	1	.0
3.861	.0200					.0048	.02	1.25	.00	.63	.013	.00	.00	PIPE	
164.627	4.973	1.134	6.108	4.67	3.99	.25	6.35	.00	.88	.73	1.250	.000	.00	1	.0
HYDRAULIC JUMP															
164.627	4.973	.636	5.609	4.67	7.45	.86	6.47	.00	.88	1.25	1.250	.000	.00	1	.0
34.830	.0200					.0186	.65	.64	1.85	.63	.013	.00	.00	PIPE	
199.457	5.671	.660	6.331	4.67	7.10	.78	7.11	.00	.88	1.25	1.250	.000	.00	1	.0
12.503	.0200					.0164	.20	.66	1.72	.63	.013	.00	.00	PIPE	
211.960	5.921	.686	6.607	4.67	6.77	.71	7.32	.00	.88	1.24	1.250	.000	.00	1	.0
6.777	.0200					.0145	.10	.69	1.60	.63	.013	.00	.00	PIPE	
218.737	6.057	.713	6.769	4.67	6.46	.65	7.42	.00	.88	1.24	1.250	.000	.00	1	.0
4.180	.0200					.0128	.05	.71	1.49	.63	.013	.00	.00	PIPE	
222.917	6.140	.742	6.882	4.67	6.16	.59	7.47	.00	.88	1.23	1.250	.000	.00	1	.0
2.665	.0200					.0113	.03	.74	1.38	.63	.013	.00	.00	PIPE	
225.582	6.194	.772	6.965	4.67	5.87	.54	7.50	.00	.88	1.22	1.250	.000	.00	1	.0
1.645	.0200					.0100	.02	.77	1.28	.63	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
227.227	6.227	.804	7.031	4.67	5.60	.49	7.52	.00	.88	1.20	1.250	.000	.00	1 .0
.893	.0200					.0089	.01	.80	1.18	.63	.013	.00	.00	PIPE
228.120	6.244	.838	7.083	4.67	5.34	.44	7.53	.00	.88	1.17	1.250	.000	.00	1 .0
.280	.0200					.0079	.00	.84	1.09	.63	.013	.00	.00	PIPE
228.400	6.250	.876	7.126	4.67	5.08	.40	7.53	.00	.88	1.14	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0047	.00	.88	1.00		.013	.00	.00	PIPE

EP10H															
229.400	6.270	1.359	7.629	2.83	2.31	.08	7.71	.00	.68	.00	1.250	.000	.00	1	.0
13.598	.0099					.0019	.03	1.36	.00	.58	.013	.00	.00	PIPE	
242.998	6.405	1.250	7.655	2.83	2.31	.08	7.74	.00	.68	.00	1.250	.000	.00	1	.0
13.096	.0099					.0018	.02	1.25	.00	.58	.013	.00	.00	PIPE	
256.094	6.535	1.134	7.669	2.83	2.42	.09	7.76	.00	.68	.73	1.250	.000	.00	1	.0
7.098	.0099					.0017	.01	1.13	.34	.58	.013	.00	.00	PIPE	
263.192	6.605	1.067	7.672	2.83	2.54	.10	7.77	.00	.68	.88	1.250	.000	.00	1	.0
5.657	.0099					.0019	.01	1.07	.40	.58	.013	.00	.00	PIPE	
268.848	6.662	1.011	7.673	2.83	2.66	.11	7.78	.00	.68	.98	1.250	.000	.00	1	.0
4.800	.0099					.0021	.01	1.01	.45	.58	.013	.00	.00	PIPE	
273.648	6.709	.963	7.672	2.83	2.79	.12	7.79	.00	.68	1.05	1.250	.000	.00	1	.0
4.143	.0099					.0023	.01	.96	.50	.58	.013	.00	.00	PIPE	

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DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave		HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
277.791	6.750	.919	7.669	2.83	2.93	.13	7.80	.00	.68	1.10	1.250	.000	.00	1 .0
3.640	.0099					.0026	.01	.92	.55	.58	.013	.00	.00	PIPE
281.431	6.786	.879	7.665	2.83	3.07	.15	7.81	.00	.68	1.14	1.250	.000	.00	1 .0
3.171	.0099					.0029	.01	.88	.60	.58	.013	.00	.00	PIPE
284.602	6.818	.842	7.660	2.83	3.22	.16	7.82	.00	.68	1.17	1.250	.000	.00	1 .0
2.763	.0099					.0032	.01	.84	.66	.58	.013	.00	.00	PIPE
287.365	6.845	.807	7.653	2.83	3.38	.18	7.83	.00	.68	1.20	1.250	.000	.00	1 .0
1.825	.0099					.0036	.01	.81	.71	.58	.013	.00	.00	PIPE
289.190	6.863	.775	7.638	2.83	3.54	.19	7.83	.00	.68	1.21	1.250	.000	.00	1 .0

HYDRAULIC JUMP

EP10H

289.190	6.863	.580	7.444	2.83	5.08	.40	7.84	.00	.68	1.25	1.250	.000	.00	1	.0
22.406	.0099					.0099	.22	.58	1.34	.58	.013	.00	.00	PIPE	
311.596	7.086	.581	7.667	2.83	5.07	.40	8.07	.00	.68	1.25	1.250	.000	.00	1	.0
23.080	.0099					.0093	.21	.58	1.34	.58	.013	.00	.00	PIPE	
334.676	7.315	.602	7.917	2.83	4.83	.36	8.28	.00	.68	1.25	1.250	.000	.00	1	.0
5.786	.0099					.0082	.05	.60	1.24	.58	.013	.00	.00	PIPE	
340.462	7.372	.625	7.998	2.83	4.61	.33	8.33	.00	.68	1.25	1.250	.000	.00	1	.0
2.202	.0099					.0072	.02	.63	1.16	.58	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
342.664	7.394	.649	8.044	2.83	4.39	.30	8.34	.00	.68	1.25	1.250	.000	.00	1 .0
.576	.0099					.0063	.00	.65	1.08	.58	.013	.00	.00	PIPE
343.240	7.400	.676	8.076	2.83	4.18	.27	8.35	.00	.68	1.25	1.250	.000	.00	1 .0
JUNCT STR	.0000					.0033	.00	.68	1.00		.013	.00	.00	PIPE
344.240	7.400	.980	8.380	.95	1.22	.02	8.40	.00	.41	.28	1.000	.000	.00	1 .0
6.365	.0127					.0006	.00	.98	.13	.33	.013	.00	.00	PIPE
350.605	7.481	.901	8.382	.95	1.27	.03	8.41	.00	.41	.60	1.000	.000	.00	1 .0
4.157	.0127					.0006	.00	.90	.20	.33	.013	.00	.00	PIPE
354.761	7.534	.849	8.382	.95	1.34	.03	8.41	.00	.41	.72	1.000	.000	.00	1 .0
3.412	.0127					.0007	.00	.85	.24	.33	.013	.00	.00	PIPE
358.174	7.577	.805	8.382	.95	1.40	.03	8.41	.00	.41	.79	1.000	.000	.00	1 .0
2.973	.0127					.0008	.00	.81	.27	.33	.013	.00	.00	PIPE
361.147	7.615	.767	8.381	.95	1.47	.03	8.41	.00	.41	.85	1.000	.000	.00	1 .0
2.648	.0127					.0009	.00	.77	.30	.33	.013	.00	.00	PIPE

EP10H															
363.795	7.648	.732	8.380	.95	1.54	.04	8.42	.00	.41	.89	1.000	.000	.00	1	.0
2.395	.0127					.0010	.00	.73	.33	.33	.013	.00	.00	PIPE	
366.190	7.679	.700	8.379	.95	1.62	.04	8.42	.00	.41	.92	1.000	.000	.00	1	.0
2.181	.0127					.0011	.00	.70	.36	.33	.013	.00	.00	PIPE	

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DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
368.371	7.706	.671	8.377	.95	1.70	.04	8.42	.00	.41	.94	1.000	.000	.00	1 .0
2.005	.0127					.0012	.00	.67	.39	.33	.013	.00	.00	PIPE
370.376	7.732	.643	8.375	.95	1.78	.05	8.42	.00	.41	.96	1.000	.000	.00	1 .0
1.834	.0127					.0014	.00	.64	.42	.33	.013	.00	.00	PIPE
372.210	7.755	.618	8.373	.95	1.87	.05	8.43	.00	.41	.97	1.000	.000	.00	1 .0
1.693	.0127					.0015	.00	.62	.45	.33	.013	.00	.00	PIPE
373.903	7.777	.593	8.370	.95	1.96	.06	8.43	.00	.41	.98	1.000	.000	.00	1 .0
1.547	.0127					.0017	.00	.59	.49	.33	.013	.00	.00	PIPE
375.450	7.796	.570	8.367	.95	2.05	.07	8.43	.00	.41	.99	1.000	.000	.00	1 .0
1.413	.0127					.0020	.00	.57	.53	.33	.013	.00	.00	PIPE
376.862	7.814	.549	8.363	.95	2.15	.07	8.43	.00	.41	1.00	1.000	.000	.00	1 .0
1.280	.0127					.0022	.00	.55	.57	.33	.013	.00	.00	PIPE
378.143	7.830	.528	8.358	.95	2.26	.08	8.44	.00	.41	1.00	1.000	.000	.00	1 .0
1.149	.0127					.0025	.00	.53	.61	.33	.013	.00	.00	PIPE
379.292	7.845	.508	8.353	.95	2.37	.09	8.44	.00	.41	1.00	1.000	.000	.00	1 .0
.511	.0127					.0029	.00	.51	.66	.33	.013	.00	.00	PIPE
379.802	7.851	.490	8.341	.95	2.48	.10	8.44	.00	.41	1.00	1.000	.000	.00	1 .0

HYDRAULIC JUMP

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 5:11:31

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
379.802	7.851	.331	8.183	.95	4.18	.27	8.45	.00	.41	.94	1.000	.000	.00	1 .0
11.147	.0127					.0127	.14	.33	1.50	.33	.013	.00	.00	PIPE
390.949	7.993	.331	8.324	.95	4.18	.27	8.60	.00	.41	.94	1.000	.000	.00	1 .0
17.091	.0127					.0126	.21	.33	1.50	.33	.013	.00	.00	PIPE
408.040	8.210	.333	8.543	.95	4.15	.27	8.81	.00	.41	.94	1.000	.000	.00	1 .0
8.574	.0124					.0124	.11	.33	1.49	.33	.013	.00	.00	PIPE
416.614	8.317	.333	8.649	.95	4.15	.27	8.92	.00	.41	.94	1.000	.000	.00	1 .0
17.166	.0124					.0124	.21	.33	1.49	.33	.013	.00	.00	PIPE
433.780	8.530	.333	8.863	.95	4.15	.27	9.13	.00	.41	.94	1.000	.000	.00	1 .0
60.607	.0124					.0124	.75	.33	1.48	.33	.013	.00	.00	PIPE
494.387	9.280	.333	9.613	.95	4.15	.27	9.88	.00	.41	.94	1.000	.000	.00	1 .0
16.964	.0124					.0124	.21	.33	1.48	.33	.013	.00	.00	PIPE
511.350	9.490	.333	9.823	.95	4.16	.27	10.09	.00	.41	.94	1.000	.000	.00	1 .0
7.720	.0125					.0125	.10	.33	1.49	.33	.013	.00	.00	PIPE
519.070	9.586	.333	9.919	.95	4.16	.27	10.19	.00	.41	.94	1.000	.000	.00	1 .0
17.110	.0125					.0125	.21	.33	1.49	.33	.013	.00	.00	PIPE
536.180	9.800	.333	10.133	.95	4.15	.27	10.40	.00	.41	.94	1.000	.000	.00	1 .0
18.372	.0124					.0124	.23	.33	1.49	.33	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E
10-YEAR STORM - MHW CONDITION WSE=4.41

Date:12- 3-2019 Time: 5:11:31

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

Station	Elev		(FT)	Elev		(CFS)	(FPS)	Head		Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
	L/Elem	Ch		Slope	Grd.El.			SF Ave	HF							
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
554.552	10.028	.333	10.361	.95	4.15	.27	10.63	.00	.41	.94	1.000	.000	.00	1	.0	
16.518	.0124					.0118	.20	.33	1.49	.33	.013	.00	.00	PIPE		
571.070	10.234	.342	10.576	.95	4.00	.25	10.82	.00	.41	.95	1.000	.000	.00	1	.0	
5.599	.0124					.0105	.06	.34	1.41	.33	.013	.00	.00	PIPE		
576.669	10.303	.354	10.657	.95	3.82	.23	10.88	.00	.41	.96	1.000	.000	.00	1	.0	
2.475	.0124					.0092	.02	.35	1.32	.33	.013	.00	.00	PIPE		
579.144	10.334	.367	10.701	.95	3.64	.21	10.91	.00	.41	.96	1.000	.000	.00	1	.0	
1.275	.0124					.0081	.01	.37	1.23	.33	.013	.00	.00	PIPE		
580.419	10.350	.380	10.730	.95	3.47	.19	10.92	.00	.41	.97	1.000	.000	.00	1	.0	
.622	.0124					.0071	.00	.38	1.15	.33	.013	.00	.00	PIPE		
581.042	10.358	.394	10.751	.95	3.31	.17	10.92	.00	.41	.98	1.000	.000	.00	1	.0	
.188	.0124					.0062	.00	.39	1.08	.33	.013	.00	.00	PIPE		
581.230	10.360	.409	10.769	.95	3.15	.15	10.92	.00	.41	.98	1.000	.000	.00	1	.0	

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER	HEIGHT 1	BASE DIAMETER	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1			1.250														
CD	2	4	1			1.000														

W S P G W PAGE NO 1
 WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR COMMERCIAL CORE AREA
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE E
 HEADING LINE NO 3 IS - 10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

W S P G W PAGE NO 2
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	-WARNING											
1					100.000	-2.100	1	7.130												
2			REACH		115.870	2.300	1	.013	RADIUS	ANGLE	ANG PT	MAN	H							
3			REACH		142.470	4.530	1	.013	.000	.000	90.000	1								
4			JUNCTION		143.470	4.550	1	.013	1.340	.000	4.550	.000	90.000	.000						
5			REACH		228.400	6.250	1	.013	.000	.000	-90.000	0								
6			JUNCTION		229.400	6.270	1	.013	1.840	.000	6.250	.000	90.000	.000						
7			REACH		343.240	7.400	1	.013	.000	.000	.000	0								
8			JUNCTION		344.240	7.400	2	.013	1.880	.000	7.400	.000	45.000	.000						

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 W S P G W PAGE NO 3

W S P G W PAGE NO 3
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN	H
9					408.040	8.210	2	.013	.000	.000	-45.000	0	
10			REACH										

					EP10L					
					N	RADIUS	ANGLE	ANG PT	MAN	H
ELEMENT NO	11	IS A	REACH		.013	.000	.000	-45.000	0	
		U/S DATA	STATION	INVERT SECT						
			433.780	8.530 2						
			*	* *						
ELEMENT NO	12	IS A	REACH		.013	.000	.000	45.000	0	
		U/S DATA	STATION	INVERT SECT						
			511.350	9.490 2						
			*	* *						
ELEMENT NO	13	IS A	REACH		.013	.000	.000	45.000	0	
		U/S DATA	STATION	INVERT SECT						
			536.180	9.800 2						
			*	* *						
ELEMENT NO	14	IS A	SYSTEM HEADWORKS		.013	.000	.000	.000	0	
		U/S DATA	STATION	INVERT SECT						
			581.230	10.360 2						
						W S ELEV				
						10.360				

WATER SURFACE PROFILE LISTING
DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E

Date:12- 3-2019 Time: 5:12:22

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	-2.100	9.230	7.130	6.01	4.90	.37	7.50	.00	.99	.00	1.250	.000	.00	1 .0
15.870	.2773					.0087	.14	9.23	.00	.36	.013	.00	.00	PIPE
115.870	2.300	4.967	7.267	6.01	4.90	.37	7.64	.00	.99	.00	1.250	.000	.00	1 .0
26.600	.0838					.0087	.23	4.97	.00	.49	.013	.00	.00	PIPE
142.470	4.530	3.097	7.627	6.01	4.90	.37	8.00	.00	.99	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0069	.01	3.10	.00		.013	.00	.00	PIPE
143.470	4.550	3.379	7.929	4.67	3.81	.22	8.15	.00	.88	.00	1.250	.000	.00	1 .0
84.930	.0200					.0052	.44	3.38	.00	.63	.013	.00	.00	PIPE
228.400	6.250	2.190	8.440	4.67	3.81	.22	8.66	.00	.88	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0036	.00	2.19	.00		.013	.00	.00	PIPE
229.400	6.270	2.458	8.728	2.83	2.31	.08	8.81	.00	.68	.00	1.250	.000	.00	1 .0
113.840	.0099					.0019	.22	2.46	.00	.58	.013	.00	.00	PIPE
343.240	7.400	1.546	8.946	2.83	2.31	.08	9.03	.00	.68	.00	1.250	.000	.00	1 .0
JUNCT STR	.0000					.0013	.00	1.55	.00		.013	.00	.00	PIPE
344.240	7.400	1.615	9.015	.95	1.21	.02	9.04	.00	.41	.00	1.000	.000	.00	1 .0
51.618	.0127					.0007	.04	1.62	.00	.33	.013	.00	.00	PIPE
395.858	8.055	1.000	9.055	.95	1.21	.02	9.08	.00	.41	.00	1.000	.000	.00	1 .0
7.436	.0127					.0007	.00	1.00	.00	.33	.013	.00	.00	PIPE

DANA POINT HARBOR COMMERCIAL CORE AREA
PROPOSED STORM DRAIN LINE E

Date:12- 3-2019 Time: 5:12:22

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	--------

EP10L														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
403.294	8.150	.907	9.057	.95	1.27	.02	9.08	.00	.41	.58	1.000	.000	.00	1 .0
4.257	.0127					.0006	.00	.91	.20	.33	.013	.00	.00	PIPE
407.550	8.204	.853	9.057	.95	1.33	.03	9.08	.00	.41	.71	1.000	.000	.00	1 .0
.490	.0127					.0007	.00	.85	.23	.33	.013	.00	.00	PIPE
408.040	8.210	.847	9.057	.95	1.34	.03	9.09	.00	.41	.72	1.000	.000	.00	1 .0
3.479	.0124					.0007	.00	.85	.24	.33	.013	.00	.00	PIPE
411.519	8.253	.804	9.057	.95	1.40	.03	9.09	.00	.41	.79	1.000	.000	.00	1 .0
3.023	.0124					.0008	.00	.80	.27	.33	.013	.00	.00	PIPE
414.542	8.291	.765	9.056	.95	1.47	.03	9.09	.00	.41	.85	1.000	.000	.00	1 .0
2.700	.0124					.0009	.00	.77	.30	.33	.013	.00	.00	PIPE
417.242	8.324	.731	9.055	.95	1.54	.04	9.09	.00	.41	.89	1.000	.000	.00	1 .0
2.441	.0124					.0010	.00	.73	.33	.33	.013	.00	.00	PIPE
419.683	8.355	.699	9.054	.95	1.62	.04	9.09	.00	.41	.92	1.000	.000	.00	1 .0
2.231	.0124					.0011	.00	.70	.36	.33	.013	.00	.00	PIPE
421.913	8.382	.670	9.052	.95	1.70	.04	9.10	.00	.41	.94	1.000	.000	.00	1 .0
2.034	.0124					.0012	.00	.67	.39	.33	.013	.00	.00	PIPE
423.947	8.408	.642	9.050	.95	1.78	.05	9.10	.00	.41	.96	1.000	.000	.00	1 .0
1.877	.0124					.0014	.00	.64	.42	.33	.013	.00	.00	PIPE

FILE: EP10L.WSW

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WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 5:12:22

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
425.824	8.431	.617	9.048	.95	1.87	.05	9.10	.00	.41	.97	1.000	.000	.00	1 .0
1.724	.0124					.0015	.00	.62	.46	.33	.013	.00	.00	PIPE

EP10L

427.549	8.453	.592	9.045	.95	1.96	.06	9.10	.00	.41	.98	1.000	.000	.00	1	.0
1.584	.0124					.0017	.00	.59	.49	.33	.013	.00	.00	PIPE	
429.133	8.472	.570	9.042	.95	2.06	.07	9.11	.00	.41	.99	1.000	.000	.00	1	.0
1.438	.0124					.0020	.00	.57	.53	.33	.013	.00	.00	PIPE	
430.571	8.490	.548	9.038	.95	2.16	.07	9.11	.00	.41	1.00	1.000	.000	.00	1	.0
1.313	.0124					.0022	.00	.55	.57	.33	.013	.00	.00	PIPE	
431.884	8.506	.527	9.034	.95	2.26	.08	9.11	.00	.41	1.00	1.000	.000	.00	1	.0
1.178	.0124					.0025	.00	.53	.61	.33	.013	.00	.00	PIPE	
433.062	8.521	.508	9.029	.95	2.37	.09	9.12	.00	.41	1.00	1.000	.000	.00	1	.0
.688	.0124					.0028	.00	.51	.66	.33	.013	.00	.00	PIPE	
433.750	8.530	.496	9.025	.95	2.45	.09	9.12	.00	.41	1.00	1.000	.000	.00	1	.0
HYDRAULIC JUMP															
433.750	8.530	.333	8.863	.95	4.15	.27	9.13	.00	.41	.94	1.000	.000	.00	1	.0
.030	.0124					.0124	.00	.33	1.49	.33	.013	.00	.00	PIPE	
433.780	8.530	.333	8.863	.95	4.15	.27	9.13	.00	.41	.94	1.000	.000	.00	1	.0
60.607	.0124					.0124	.75	.33	1.48	.33	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING

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DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
494.387	9.280	.333	9.613	.95	4.15	.27	9.88	.00	.41	.94	1.000	.000	.00	1 .0
16.964	.0124					.0124	.21	.33	1.48	.33	.013	.00	.00	PIPE
511.350	9.490	.333	9.823	.95	4.16	.27	10.09	.00	.41	.94	1.000	.000	.00	1 .0
7.720	.0125					.0125	.10	.33	1.49	.33	.013	.00	.00	PIPE
519.070	9.586	.333	9.919	.95	4.16	.27	10.19	.00	.41	.94	1.000	.000	.00	1 .0
17.110	.0125					.0125	.21	.33	1.49	.33	.013	.00	.00	PIPE

EP10L															
536.180	9.800	.333	10.133	.95	4.15	.27	10.40	.00	.41	.94	1.000	.000	.00	1	.0
18.372	.0124					.0124	.23	.33	1.49	.33	.013	.00	.00	PIPE	
554.552	10.028	.333	10.361	.95	4.15	.27	10.63	.00	.41	.94	1.000	.000	.00	1	.0
16.518	.0124					.0118	.20	.33	1.49	.33	.013	.00	.00	PIPE	
571.070	10.234	.342	10.576	.95	4.00	.25	10.82	.00	.41	.95	1.000	.000	.00	1	.0
5.599	.0124					.0105	.06	.34	1.41	.33	.013	.00	.00	PIPE	
576.669	10.303	.354	10.657	.95	3.82	.23	10.88	.00	.41	.96	1.000	.000	.00	1	.0
2.475	.0124					.0092	.02	.35	1.32	.33	.013	.00	.00	PIPE	
579.144	10.334	.367	10.701	.95	3.64	.21	10.91	.00	.41	.96	1.000	.000	.00	1	.0
1.275	.0124					.0081	.01	.37	1.23	.33	.013	.00	.00	PIPE	
580.419	10.350	.380	10.730	.95	3.47	.19	10.92	.00	.41	.97	1.000	.000	.00	1	.0
.622	.0124					.0071	.00	.38	1.15	.33	.013	.00	.00	PIPE	

FILE: EP10L.WSW

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WATER SURFACE PROFILE LISTING

Date: 12-3-2019 Time: 5:12:22

DANA POINT HARBOR COMMERCIAL CORE AREA

PROPOSED STORM DRAIN LINE E

10-YEAR STORM - MHHW CONDITION WSE=5.13 PLUS 2'

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
581.042	10.358	.394	10.751	.95	3.31	.17	10.92	.00	.41	.98	1.000	.000	.00	1 .0
.188	.0124					.0062	.00	.39	1.08	.33	.013	.00	.00	PIPE
581.230	10.360	.409	10.769	.95	3.15	.15	10.92	.00	.41	.98	1.000	.000	.00	1 .0

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)	
CD	1	4	1			1.250															
CD	2	4	1			1.000															

W S P G W PAGE NO 1
 WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - DANA POINT HARBOR
 HEADING LINE NO 2 IS - PROPOSED STORM DRAIN LINE E
 HEADING LINE NO 3 IS - 100-YEAR STORM - MHW CONDITION WSE=4.41

W S P G W PAGE NO 2
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS	A	SYSTEM	OUTLET	STATION	INVERT	SECT	W S ELEV												
1	IS	A	SYSTEM	OUTLET	100.000	-2.100	1	4.410												
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
2	IS	A	REACH	115.870	2.300	1	.013		.000	.000	.000	0								
ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
3	IS	A	REACH	142.470	4.530	1	.013		.000	.000	90.000	1								
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td> </th>	A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td>	JUNCTION	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
4	IS	A	JUNCTION	143.470	4.550	1	2	0	.013	2.060	.000	4.550	.000	90.000	.000					
ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
5	IS	A	REACH	228.400	6.250	1	.013		.000	.000	-90.000	0								
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td> </th>	A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td>	JUNCTION	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
6	IS	A	JUNCTION	229.400	6.270	1	2	0	.013	2.860	.000	6.250	.000	90.000	.000					
ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
7	IS	A	REACH	343.240	7.400	1	.013		.000	.000	.000	0								
ELEMENT NO	IS <th>A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td> </th>	A <th>JUNCTION</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th>LAT-1</th> <th>LAT-2</th> <th>N</th> <th>Q3</th> <th>Q4</th> <th>INVERT-3</th> <th>INVERT-4</th> <th>PHI 3</th> <th>PHI 4</th> <td colspan="5"></td>	JUNCTION	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
8	IS	A	JUNCTION	344.240	7.400	2	2	0	.013	2.900	.000	7.400	.000	45.000	.000					
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING																				

W S P G W PAGE NO 3
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
9	IS	A	REACH	408.040	8.210	2	.013		.000	.000	-45.000	0								
ELEMENT NO	IS <th>A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td> </th>	A <th>REACH</th> <th>STATION</th> <th>INVERT</th> <th>SECT</th> <th></th> <th></th> <th>RADIUS</th> <th>ANGLE</th> <th>ANG PT</th> <th>MAN H</th> <td colspan="8"></td>	REACH	STATION	INVERT	SECT			RADIUS	ANGLE	ANG PT	MAN H								
10	IS	A	REACH																	

					EPOOH					
U/S DATA					N	RADIUS	ANGLE	ANG PT	MAN	H
ELEMENT NO	11	IS A REACH	STATION	INVERT SECT	.013	.000	.000	-45.000	0	
			433.780	8.530 2						
			*	* *						
			U/S DATA	STATION	N	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO	12	IS A REACH	511.350	9.490 2	.013	.000	.000	45.000	0	
			*	* *						
			U/S DATA	STATION	N	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO	13	IS A REACH	536.180	9.800 2	.013	.000	.000	45.000	0	
			*	* *						
			U/S DATA	STATION	N	RADIUS	ANGLE	ANG PT	MAN H	
ELEMENT NO	14	IS A SYSTEM HEADWORKS	581.230	10.360 2	.013	.000	.000	.000	0	
			*	* *						
			U/S DATA	STATION		W S ELEV				
			581.230	10.360 2		10.360				

DANA POINT HARBOR
PROPOSED STORM DRAIN LINE E
100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Prs/Pip	Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
100.000	-2.100	6.510	4.410	9.26	7.55	.88	5.29	.00	1.16	.00	1.250	.000	.00	1	.0
15.870	.2773					.0205	.33	6.51	.00	.45	.013	.00	.00	PIPE	
115.870	2.300	2.436	4.736	9.26	7.55	.88	5.62	.00	1.16	.00	1.250	.000	.00	1	.0
13.362	.0838					.0205	.27	2.44	.00	.62	.013	.00	.00	PIPE	
129.232	3.420	1.761	5.182	9.26	7.55	.88	6.07	.00	1.16	.00	1.250	.000	.00	1	.0
HYDRAULIC JUMP															
129.232	3.420	.786	4.206	9.26	11.40	2.02	6.22	.00	1.16	1.21	1.250	.000	.00	1	.0
.316	.0838					.0395	.01	.79	2.45	.62	.013	.00	.00	PIPE	
129.548	3.447	.786	4.233	9.26	11.40	2.02	6.25	.00	1.16	1.21	1.250	.000	.00	1	.0
3.229	.0838					.0373	.12	.79	2.45	.62	.013	.00	.00	PIPE	
132.777	3.717	.819	4.537	9.26	10.87	1.83	6.37	.00	1.16	1.19	1.250	.000	.00	1	.0
2.592	.0838					.0332	.09	.82	2.26	.62	.013	.00	.00	PIPE	
135.369	3.935	.854	4.789	9.26	10.36	1.67	6.46	.00	1.16	1.16	1.250	.000	.00	1	.0
2.088	.0838					.0295	.06	.85	2.08	.62	.013	.00	.00	PIPE	
137.457	4.110	.893	5.002	9.26	9.88	1.51	6.52	.00	1.16	1.13	1.250	.000	.00	1	.0
1.679	.0838					.0264	.04	.89	1.91	.62	.013	.00	.00	PIPE	
139.136	4.250	.934	5.184	9.26	9.42	1.38	6.56	.00	1.16	1.09	1.250	.000	.00	1	.0
1.329	.0838					.0237	.03	.93	1.74	.62	.013	.00	.00	PIPE	

DANA POINT HARBOR
PROPOSED STORM DRAIN LINE E
100-YEAR STORM - MHW CONDITION WSE=4.41

Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt	No	Wth
--------	-------	-------	---	-----	-----	--------	-------	----------	----------	---------	---------	----	-----

EPOOH														
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
140.464	4.362	.979	5.341	9.26	8.98	1.25	6.59	.00	1.16	1.03	1.250	.000	.00	1 .0
1.011	.0838					.0214	.02	.98	1.58	.62	.013	.00	.00	PIPE
141.475	4.447	1.030	5.476	9.26	8.56	1.14	6.61	.00	1.16	.95	1.250	.000	.00	1 .0
.695	.0838					.0195	.01	1.03	1.42	.62	.013	.00	.00	PIPE
142.170	4.505	1.089	5.593	9.26	8.16	1.03	6.63	.00	1.16	.84	1.250	.000	.00	1 .0
.300	.0838					.0182	.01	1.09	1.24	.62	.013	.00	.00	PIPE
142.470	4.530	1.164	5.694	9.26	7.78	.94	6.63	.00	1.16	.63	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0151	.02	1.16	1.00		.013	.00	.00	PIPE
143.470	4.550	1.924	6.474	7.20	5.87	.53	7.01	.00	1.07	.00	1.250	.000	.00	1 .0
84.930	.0200					.0124	1.06	1.92	.00	.84	.013	.00	.00	PIPE
228.400	6.250	1.438	7.688	7.20	5.87	.53	8.22	.00	1.07	.00	1.250	.000	.00	1 .0
JUNCT STR	.0200					.0085	.01	1.44	.00		.013	.00	.00	PIPE
229.400	6.270	2.107	8.377	4.34	3.54	.19	8.57	.00	.84	.00	1.250	.000	.00	1 .0
113.840	.0099					.0045	.51	2.11	.00	.75	.013	.00	.00	PIPE
343.240	7.400	1.491	8.891	4.34	3.54	.19	9.09	.00	.84	.00	1.250	.000	.00	1 .0
JUNCT STR	.0000					.0031	.00	1.49	.00		.013	.00	.00	PIPE
344.240	7.400	1.653	9.053	1.44	1.83	.05	9.11	.00	.51	.00	1.000	.000	.00	1 .0
59.716	.0127					.0016	.10	1.65	.00	.41	.013	.00	.00	PIPE

FILE: EPOOH.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date:12- 3-2019 Time: 5: 8:35

DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE E
 100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
403.956	8.158	1.000	9.158	1.44	1.83	.05	9.21	.00	.51	.00	1.000	.000	.00	1 .0
4.084	.0127					.0015	.01	1.00	.00	.41	.013	.00	.00	PIPE

EPOOH														
408.040	8.210	.951	9.161	1.44	1.87	.05	9.22	.00	.51	.43	1.000	.000	.00	1 .0
5.527	.0124					.0014	.01	.95	.25	.42	.013	.00	.00	PIPE
413.567	8.279	.885	9.164	1.44	1.96	.06	9.22	.00	.51	.64	1.000	.000	.00	1 .0
3.982	.0124					.0015	.01	.89	.32	.42	.013	.00	.00	PIPE
417.548	8.328	.836	9.164	1.44	2.05	.07	9.23	.00	.51	.74	1.000	.000	.00	1 .0
3.300	.0124					.0017	.01	.84	.37	.42	.013	.00	.00	PIPE
420.848	8.369	.794	9.163	1.44	2.15	.07	9.23	.00	.51	.81	1.000	.000	.00	1 .0
2.839	.0124					.0018	.01	.79	.42	.42	.013	.00	.00	PIPE
423.687	8.405	.756	9.161	1.44	2.26	.08	9.24	.00	.51	.86	1.000	.000	.00	1 .0
2.489	.0124					.0020	.01	.76	.46	.42	.013	.00	.00	PIPE
426.176	8.435	.723	9.158	1.44	2.37	.09	9.25	.00	.51	.90	1.000	.000	.00	1 .0
2.194	.0124					.0023	.00	.72	.51	.42	.013	.00	.00	PIPE
428.371	8.463	.692	9.154	1.44	2.48	.10	9.25	.00	.51	.92	1.000	.000	.00	1 .0
1.955	.0124					.0026	.00	.69	.55	.42	.013	.00	.00	PIPE
430.326	8.487	.663	9.150	1.44	2.61	.11	9.26	.00	.51	.95	1.000	.000	.00	1 .0
1.711	.0124					.0029	.00	.66	.60	.42	.013	.00	.00	PIPE

▲ FILE: EPOOH.WSW

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WATER SURFACE PROFILE LISTING

Date: 12-3-2019 Time: 5: 8:35

DANA POINT HARBOR

PROPOSED STORM DRAIN LINE E

100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
432.036	8.508	.636	9.144	1.44	2.73	.12	9.26	.00	.51	.96	1.000	.000	.00	1 .0
1.303	.0124					.0032	.00	.64	.65	.42	.013	.00	.00	PIPE
433.340	8.525	.611	9.135	1.44	2.87	.13	9.26	.00	.51	.98	1.000	.000	.00	1 .0
HYDRAULIC JUMP														
433.340	8.525	.416	8.941	1.44	4.65	.34	9.28	.00	.51	.99	1.000	.000	.00	1 .0
.440	.0124					.0124	.01	.42	1.46	.42	.013	.00	.00	PIPE

EPOOH															
433.780	8.530	.417	8.947	1.44	4.65	.34	9.28	.00	.51	.99	1.000	.000	.00	1	.0
56.645	.0124					.0124	.70	.42	1.46	.42	.013	.00	.00	PIPE	
490.425	9.231	.417	9.648	1.44	4.65	.34	9.98	.00	.51	.99	1.000	.000	.00	1	.0
20.925	.0124					.0124	.26	.42	1.46	.42	.013	.00	.00	PIPE	
511.350	9.490	.416	9.906	1.44	4.66	.34	10.24	.00	.51	.99	1.000	.000	.00	1	.0
3.115	.0125					.0125	.04	.42	1.47	.42	.013	.00	.00	PIPE	
514.465	9.529	.416	9.945	1.44	4.66	.34	10.28	.00	.51	.99	1.000	.000	.00	1	.0
21.715	.0125					.0125	.27	.42	1.47	.42	.013	.00	.00	PIPE	
536.180	9.800	.416	10.216	1.44	4.65	.34	10.55	.00	.51	.99	1.000	.000	.00	1	.0
6.458	.0124					.0124	.08	.42	1.46	.42	.013	.00	.00	PIPE	
542.638	9.880	.416	10.297	1.44	4.65	.34	10.63	.00	.51	.99	1.000	.000	.00	1	.0
20.846	.0124					.0121	.25	.42	1.46	.42	.013	.00	.00	PIPE	

FILE: EP00H.WSW

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Program Package Serial Number: 7132

WATER SURFACE PROFILE LISTING

Date: 12-3-2019 Time: 5: 8:35

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DANA POINT HARBOR
 PROPOSED STORM DRAIN LINE E
 100-YEAR STORM - MHW CONDITION WSE=4.41

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave		HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
563.484	10.139	.422	10.561	1.44	4.57	.32	10.89	.00	.51	.99	1.000	.000	.00	1 .0
10.676	.0124				.0111		.12	.42	1.43	.42	.013	.00	.00	PIPE
574.160	10.272	.438	10.710	1.44	4.36	.29	11.00	.00	.51	.99	1.000	.000	.00	1 .0
3.989	.0124				.0098		.04	.44	1.33	.42	.013	.00	.00	PIPE
578.149	10.322	.454	10.775	1.44	4.16	.27	11.04	.00	.51	1.00	1.000	.000	.00	1 .0
1.920	.0124				.0086		.02	.45	1.24	.42	.013	.00	.00	PIPE
580.069	10.346	.471	10.816	1.44	3.96	.24	11.06	.00	.51	1.00	1.000	.000	.00	1 .0
.894	.0124				.0076		.01	.47	1.16	.42	.013	.00	.00	PIPE
580.963	10.357	.489	10.845	1.44	3.78	.22	11.07	.00	.51	1.00	1.000	.000	.00	1 .0
.267	.0124				.0066		.00	.49	1.08	.42	.013	.00	.00	PIPE


EPOOH

581.230	10.360	.508	10.868	1.44	3.59	.20	11.07	.00	.51	1.00	1.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

↑

Appendix G – NOAA La Jolla Monitoring Station Records



 NOAA is monitoring water levels and winds for Tropical Storm Kammuri (<https://tidesandcurrents.noaa.gov/inundationdb/storm/Kammuri.html>). ✕
Click to view real-time water level and meteorological data.

[Home \(/\)](#) / [Products \(products.html\)](#) / [Water Levels \(stations.html?type=Water+Levels\)](#) / [9410230 La Jolla, CA](#) [Favorite Stations](#)

[Station Info](#)

[Tides/Water Levels](#)

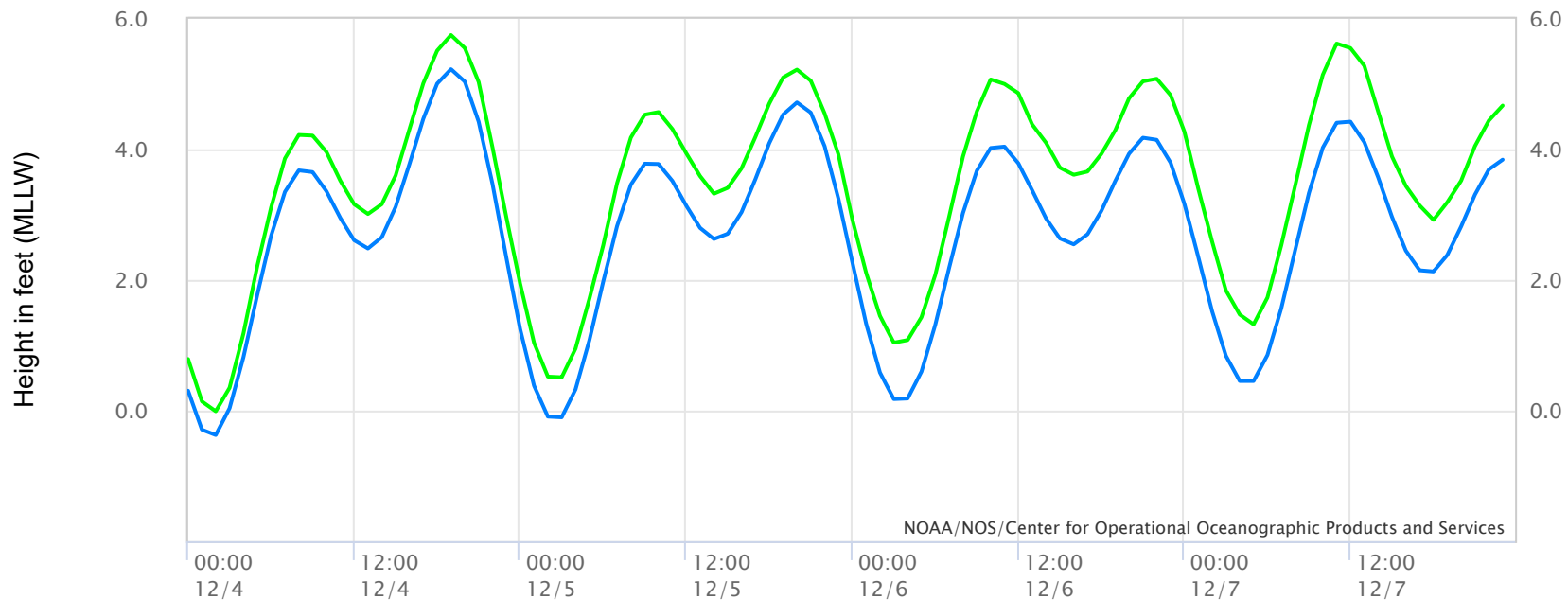
[Meteorological Obs. \(/met.html?id=9410230\)](/met.html?id=9410230)

[Phys. Oceanography \(/physocean.html?id=9410230\)](/physocean.html?id=9410230)

Notice: Data from this station between August 1, 2010 and April 30, 2017 has been reprocessed and quality assured according to NOS standards due to an identified quality control issue. Users who retrieved data prior to July 31, 2017 may wish to re-download any verified six minute water level data, hourly heights, high/low and monthly means products for the affected period. The correction resulted in a mean difference of 1.6 cm and a standard difference of 2.8 cm between the previous and corrected data.



NOAA/NOS/CO-OPS
Verified Hourly Heights at 9410230, La Jolla CA
From 1997/12/04 00:00 GMT to 1997/12/07 23:59 GMT



NOAA/NOS/Center for Operational Oceanographic Products and Services

— Predictions — Verified — Preliminary — (Observed - Predicted)

Options for

9410230 La Jolla, CA

From:

Dec 5 1997

To:

Dec 7 1997

Units

Standard

Timezone



GMT ▾

Datum (datum_options.html)

MLLW ▾

Shift dates

Back 1 Day Forward 1 Day

Interval

6 min 1 hr
H/L Day Month

Update

Plot Data Only

Hide Data Listing

Data Listing

Web Services Export to CSV

1997/12/06	23:00	3.796	-	4.83
1997/12/07	00:00	3.165	-	4.27
1997/12/07	01:00	2.355	-	3.4
1997/12/07	02:00	1.523	-	2.59
1997/12/07	03:00	0.839	-	1.84
1997/12/07	04:00	0.453	-	1.47
1997/12/07	05:00	0.453	-	1.32
1997/12/07	06:00	0.85	-	1.73
1997/12/07	07:00	1.565	-	2.53
1997/12/07	08:00	2.453	-	3.44

Show nearby stations

Products available at 9410230 La Jolla, CA

TIDES/WATER LEVELS

[Water Levels \(/waterlevels.html?id=9410230\)](/waterlevels.html?id=9410230)

[NOAA Tide Predictions \(/noaatidepredictions.html?id=9410230\)](/noaatidepredictions.html?id=9410230)

[Harmonic Constituents \(/harcon.html?id=9410230\)](/harcon.html?id=9410230)

[Sea Level Trends \(/sltrends/sltrends_station.shtml?id=9410230\)](/sltrends/sltrends_station.shtml?id=9410230)

[Datums \(/datums.html?id=9410230\)](/datums.html?id=9410230)

[Bench Mark Sheets \(/benchmarks.html?id=9410230\)](/benchmarks.html?id=9410230)

[Extreme Water Levels \(/est/est_station.shtml?stnid=9410230\)](/est/est_station.shtml?stnid=9410230)

[Reports \(/reports.html?id=9410230\)](/reports.html?id=9410230)

METEOROLOGICAL/OTHER

[Meteorological Observations \(/met.html?id=9410230\)](/met.html?id=9410230)

[Water Temp/Conductivity](#)

PORTS®

This station is not a member of PORTS®

OPERATIONAL FORECAST SYSTEMS

This station is not a member of OFS

INFORMATION

[Station Home Page \(/stationhome.html?id=9410230\)](/stationhome.html?id=9410230)

[Data Inventory \(/inventory.html?id=9410230\)](/inventory.html?id=9410230)

[Measurement Specifications \(/measure.html\)](/measure.html)

[National Oceanic and Atmospheric Administration \(http://www.noaa.gov\)](http://www.noaa.gov)

[National Ocean Service \(http://oceanservice.noaa.gov\)](http://oceanservice.noaa.gov)

[Privacy Policy \(/privacy.html\)](/privacy.html)

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[Freedom of Information Act \(https://www.noaa.gov/foia-freedom-of-information-act\)](https://www.noaa.gov/foia-freedom-of-information-act)

[Contact Us \(/contact.html\)](/contact.html)



ORANGE COUNTY PUBLIC WORKS

DAILY PRECIPITATION 1997-1998 SEASON

STATION LAGUNA BEACH OCPW NO. 100
 OBSERVATION TIME 8:00 AM OBSERVER OCPW

DAY	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	DAY
1										0.81			1
2										0.15			2
3							0.15	1.85					3
4							0.21	0.22		0.18			4
5											0.43		5
6						5.50		0.95	0.20	0.10	0.20		6
7						1.30				0.02			7
8								2.40			0.02		8
9							0.15						9
10							1.05						10
11										0.74	T		11
12					0.20						0.12		12
13					0.90		0.24		0.44	0.02	0.26	0.10	13
14					0.02	0.30		2.43	0.20		0.14		14
15							T	0.95	0.05				15
16							0.22						16
17												0.08	17
18						0.40							18
19							0.15	0.10					19
20					0.10			0.66					20
21						0.10		0.70					21
22								0.86					22
23													23
24								3.00					24
25			0.55						1.85				25
26					0.38				0.50				26
27									T				27
28									0.20				28
29							0.45		0.20				29
30					1.37		0.01						30
31							0.20						31
TOTAL	0.00	0.00	0.55	0.00	2.97	7.60	2.83	14.12	3.64	2.02	1.17	0.18	TOTAL

---LEGEND---

- A - ESTIMATED
- B - PARTIALLY ESTIMATED
- P - INCLUDED IN FOLLOWING TOTAL
- C - INCOMPLETE
- D - DATE UNCERTAIN
- NR - NO RECORD
- T - TRACE

REMARKS _____

Prepared: _____ Reviewed: _____ Approved: _____

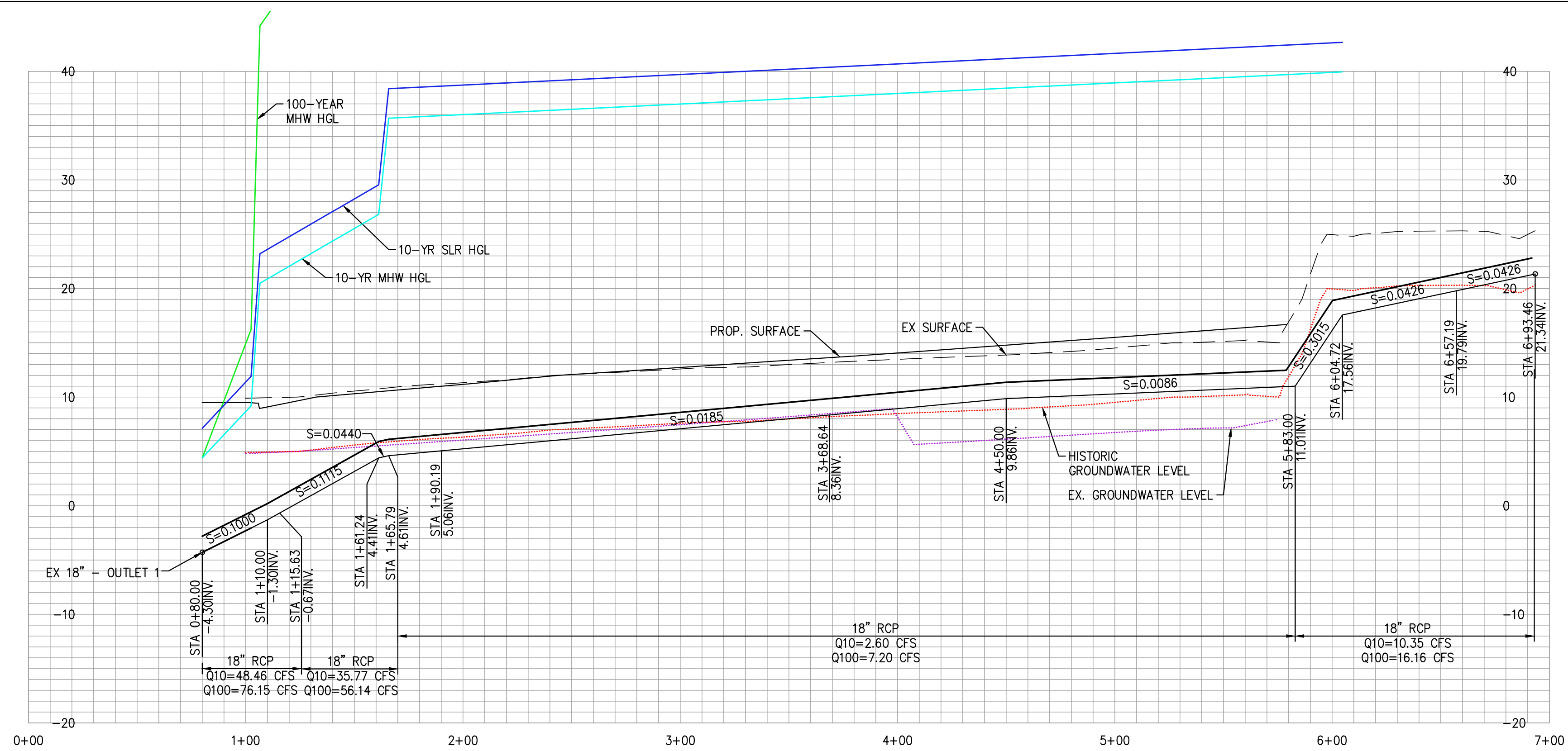
SEASON TOTAL 35.08 "

Date	Time (GMT Predicted (Preliminary Verified (ft)		
12/4/1997	0:00	0.305 -	0.79
12/4/1997	1:00	-0.292 -	0.14
12/4/1997	2:00	-0.374 -	-0.01
12/4/1997	3:00	0.037 -	0.35
12/4/1997	4:00	0.817 -	1.18
12/4/1997	5:00	1.77 -	2.21
12/4/1997	6:00	2.676 -	3.11
12/4/1997	7:00	3.349 -	3.86
12/4/1997	8:00	3.678 -	4.22
12/4/1997	9:00	3.652 -	4.21
12/4/1997	10:00	3.358 -	3.96
12/4/1997	11:00	2.95 -	3.52
12/4/1997	12:00	2.608 -	3.16
12/4/1997	13:00	2.482 -	3.01
12/4/1997	14:00	2.655 -	3.16
12/4/1997	15:00	3.119 -	3.6
12/4/1997	16:00	3.776 -	4.31
12/4/1997	17:00	4.467 -	5.01
12/4/1997	18:00	5.005 -	5.51
12/4/1997	19:00	5.227 -	5.75
12/4/1997	20:00	5.036 -	5.55
12/4/1997	21:00	4.422 -	5.03
12/4/1997	22:00	3.47 -	4.03
12/4/1997	23:00	2.342 -	2.96
12/5/1997	0:00	1.245 -	1.94
12/5/1997	1:00	0.382 -	1.04
12/5/1997	2:00	-0.092 -	0.52
12/5/1997	3:00	-0.103 -	0.51
12/5/1997	4:00	0.325 -	0.95
12/5/1997	5:00	1.076 -	1.71
12/5/1997	6:00	1.974 -	2.53
12/5/1997	7:00	2.824 -	3.48
12/5/1997	8:00	3.459 -	4.18
12/5/1997	9:00	3.78 -	4.53
12/5/1997	10:00	3.775 -	4.57
12/5/1997	11:00	3.516 -	4.31
12/5/1997	12:00	3.138 -	3.94
12/5/1997	13:00	2.797 -	3.59
12/5/1997	14:00	2.627 -	3.32
12/5/1997	15:00	2.707 -	3.41
12/5/1997	16:00	3.038 -	3.71
12/5/1997	17:00	3.544 -	4.19
12/5/1997	18:00	4.094 -	4.7
12/5/1997	19:00	4.532 -	5.1
12/5/1997	20:00	4.718 -	5.22
12/5/1997	21:00	4.562 -	5.05

12/5/1997	22:00	4.048 -	4.55
12/5/1997	23:00	3.241 -	3.92
12/6/1997	0:00	2.277 -	2.93
12/6/1997	1:00	1.331 -	2.11
12/6/1997	2:00	0.582 -	1.45
12/6/1997	3:00	0.176 -	1.04
12/6/1997	4:00	0.185 -	1.08
12/6/1997	5:00	0.597 -	1.43
12/6/1997	6:00	1.316 -	2.08
12/6/1997	7:00	2.186 -	2.97
12/6/1997	8:00	3.025 -	3.89
12/6/1997	9:00	3.672 -	4.58
12/6/1997	10:00	4.02 -	5.07
12/6/1997	11:00	4.041 -	5
12/6/1997	12:00	3.786 -	4.86
12/6/1997	13:00	3.372 -	4.38
12/6/1997	14:00	2.943 -	4.1
12/6/1997	15:00	2.636 -	3.72
12/6/1997	16:00	2.545 -	3.61
12/6/1997	17:00	2.7 -	3.66
12/6/1997	18:00	3.057 -	3.93
12/6/1997	19:00	3.514 -	4.29
12/6/1997	20:00	3.932 -	4.78
12/6/1997	21:00	4.177 -	5.04
12/6/1997	22:00	4.145 -	5.08
12/6/1997	23:00	3.796 -	4.83
12/7/1997	0:00	3.165 -	4.27
12/7/1997	1:00	2.355 -	3.4
12/7/1997	2:00	1.523 -	2.59
12/7/1997	3:00	0.839 -	1.84
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12/7/1997	5:00	0.453 -	1.32
12/7/1997	6:00	0.85 -	1.73
12/7/1997	7:00	1.565 -	2.53
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12/7/1997	10:00	4.025 -	5.14
12/7/1997	11:00	4.406 -	5.62
12/7/1997	12:00	4.423 -	5.55
12/7/1997	13:00	4.11 -	5.28
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12/7/1997	15:00	2.966 -	3.89
12/7/1997	16:00	2.449 -	3.44
12/7/1997	17:00	2.148 -	3.14
12/7/1997	18:00	2.13 -	2.92
12/7/1997	19:00	2.382 -	3.19
12/7/1997	20:00	2.819 -	3.52

12/7/1997	21:00	3.307 -	4.05
12/7/1997	22:00	3.692 -	4.44
12/7/1997	23:00	3.842 -	4.67

**Appendix H –Storm Drain Plan and Profiles
(Existing and Proposed Conditions)**

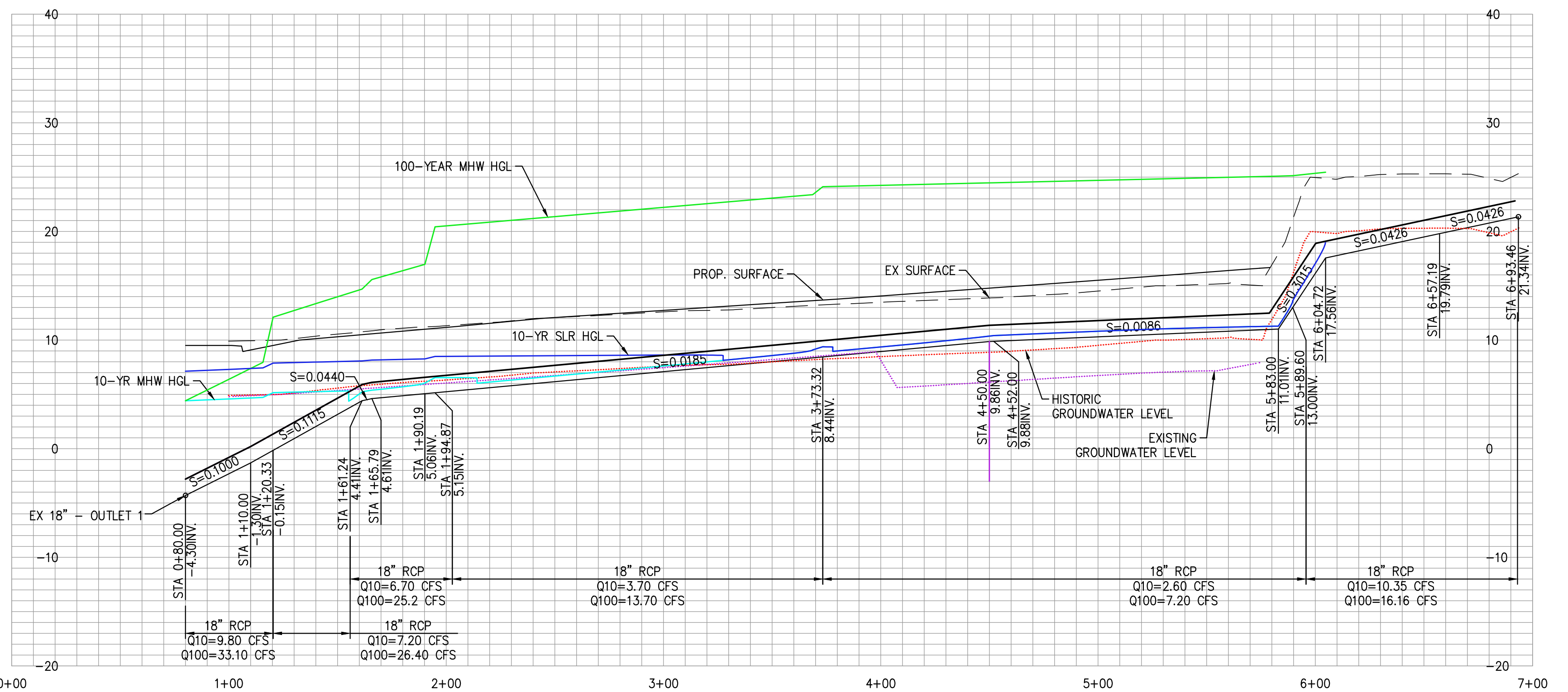


EXISTING LINE B (18"SD) - EXISTING CONDITION

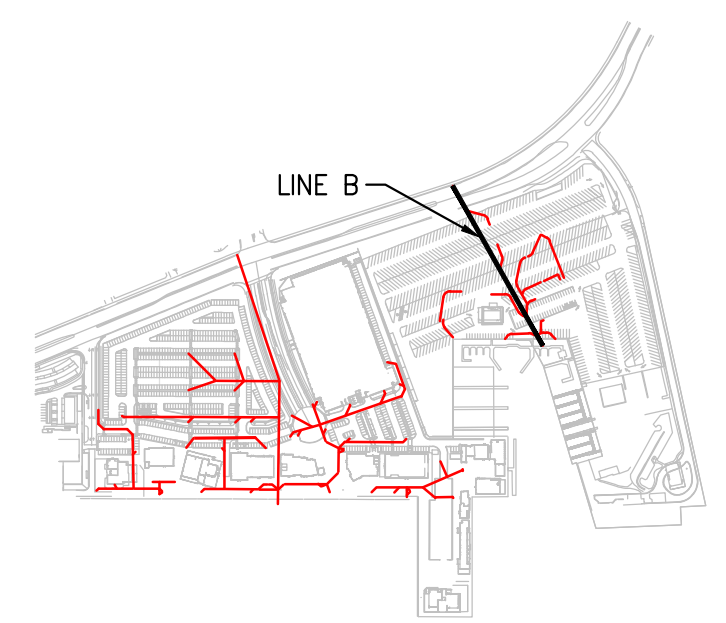
- LEGEND**
- 100-YEAR MHW HGL
 - 10-YEAR SLR HGL
 - 100-YEAR MHW HGL
 - - - EXISTING SURFACE
 - PROPOSED SURFACE
 - HISTORIC GROUNDWATER LEVEL
 - EXISTING GROUNDWATER LEVEL

* SEA LEVEL RISE PREDICTIONS PROVIDE ESTIMATES FOR SEA LEVELS. THIS STUDY USED MHHW PLUS 2'-FEET AS A CONSERVATIVE APPROACH.

- ABBREVIATIONS**
- MHW MEAN HIGH WATER
 - MHHW MEAN HIGH - HIGH WATER
 - SLR SEA LEVEL = MHHW + 2'
 - EX. EXISTING
 - PROP. PROPOSED
 - STA STATION
 - INV PIPE INVERT
 - Q10 10-YEAR PEAK FLOW
 - Q100 100-YEAR PEAK FLOW



EXISTING LINE B (18"SD) - PROPOSED CONDITION



KEY MAP

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
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DESIGNED BY:	DATE
CHECKED BY:	DATE
RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

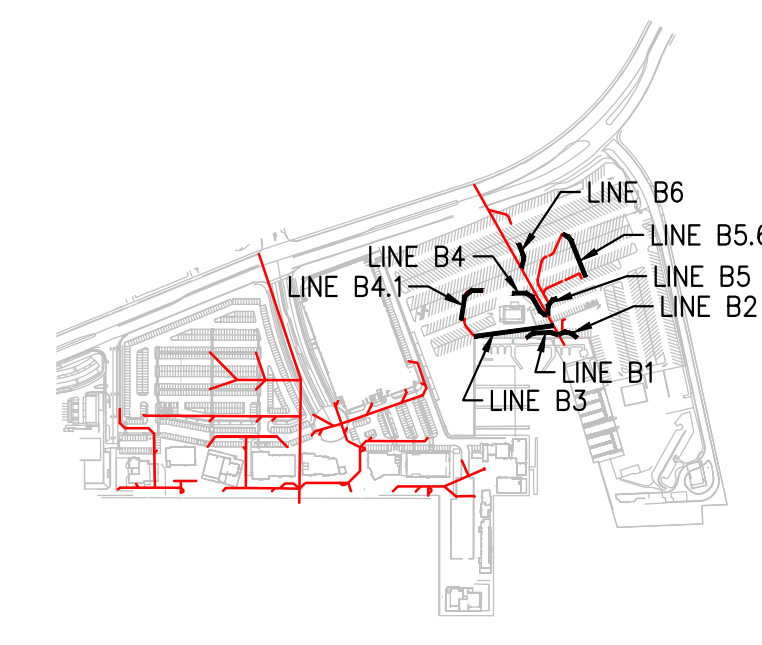
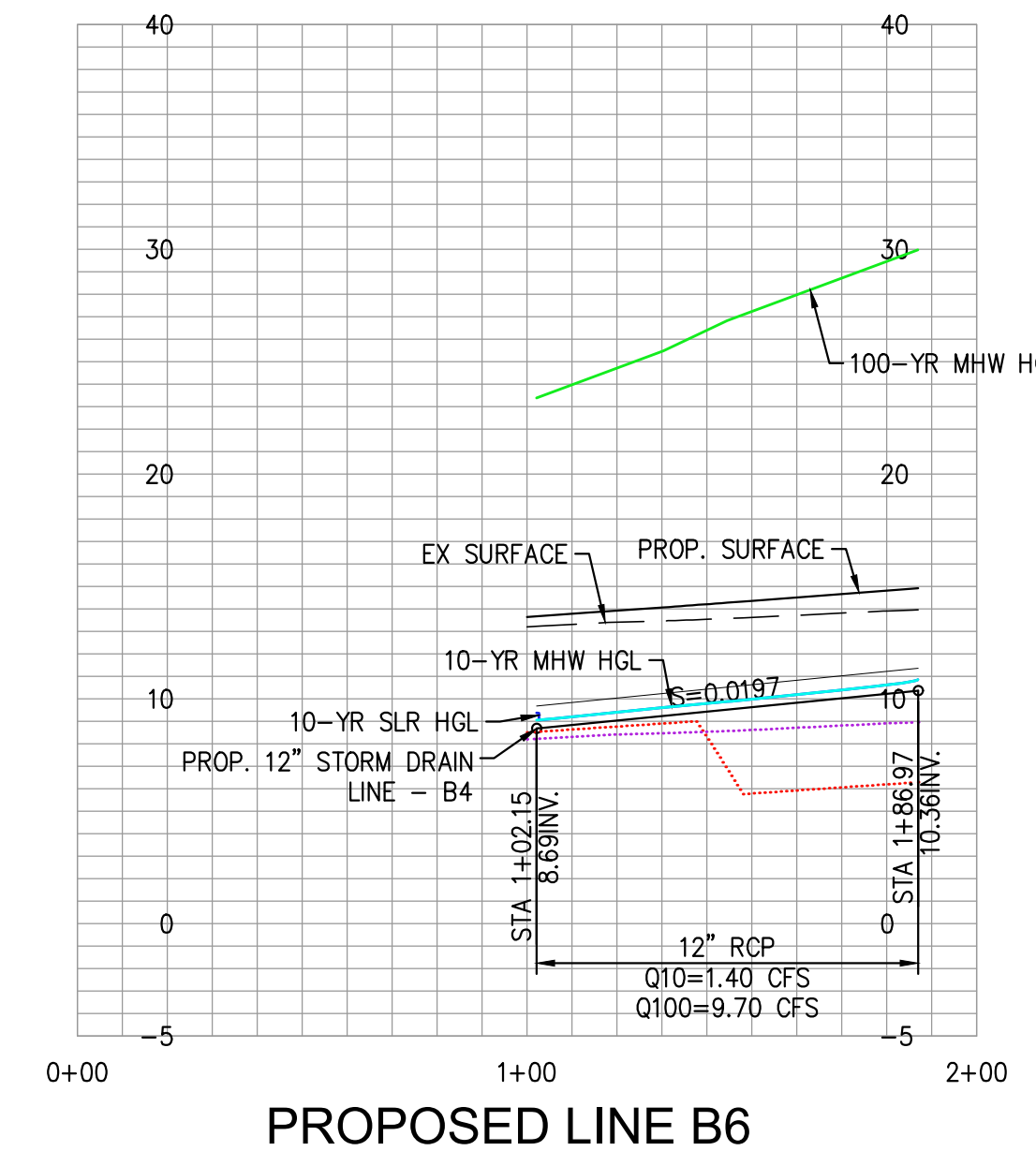
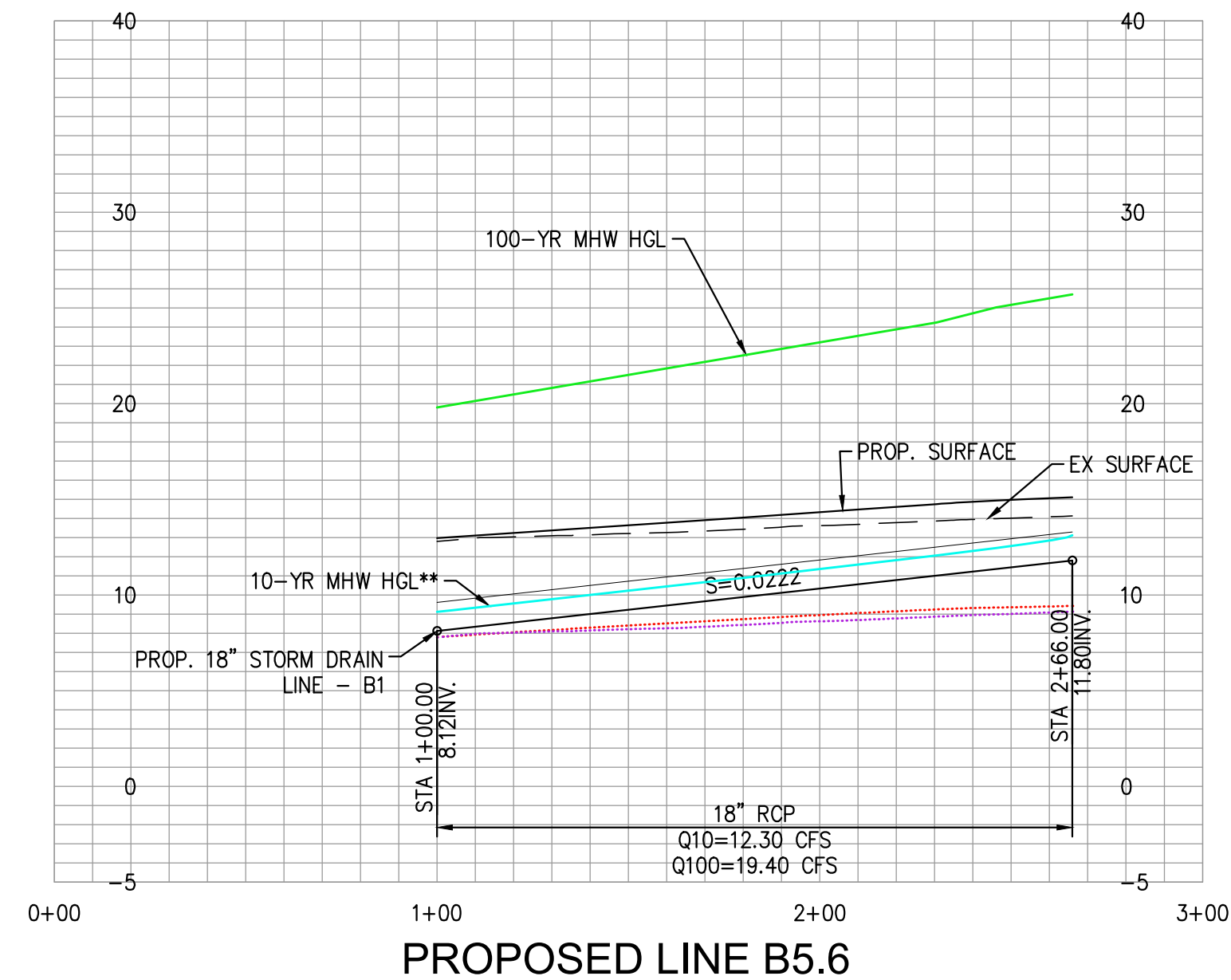
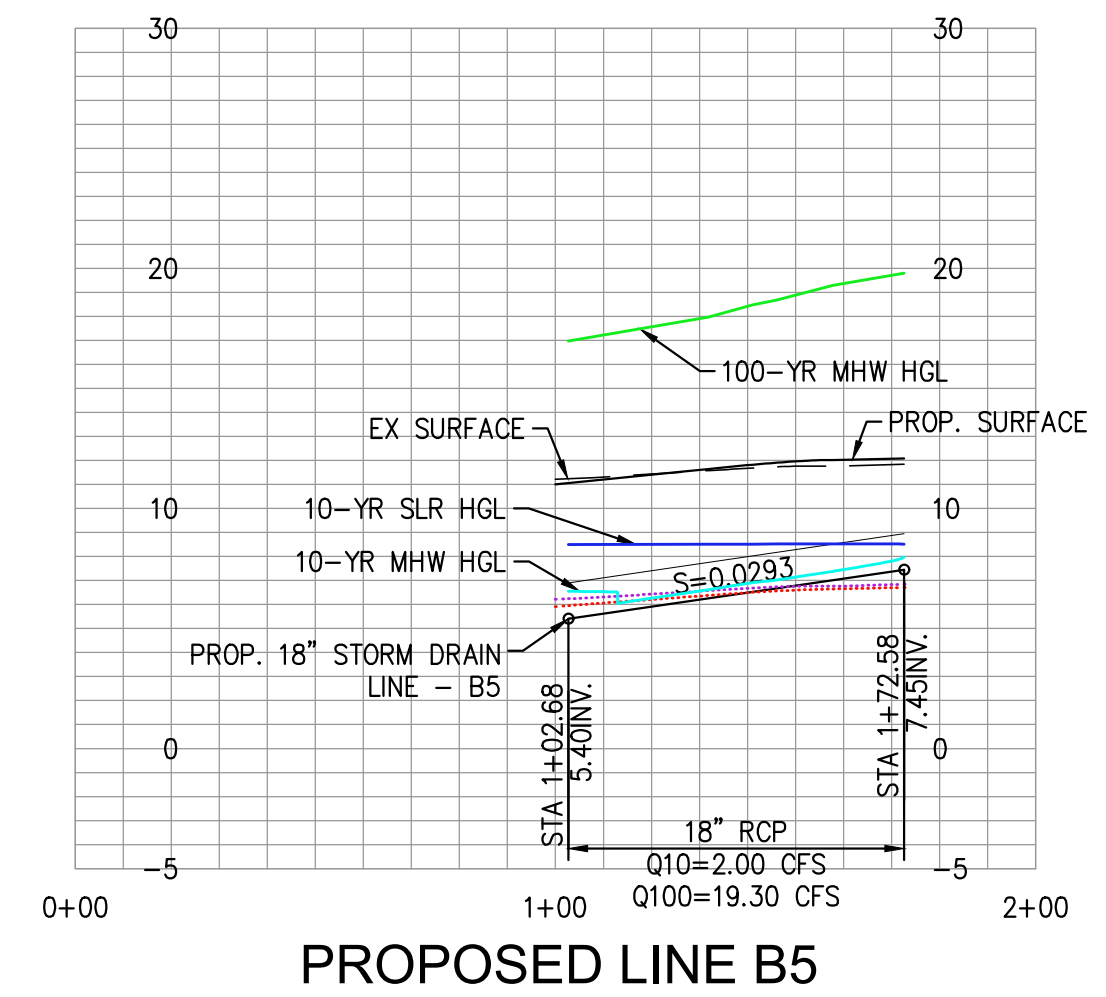
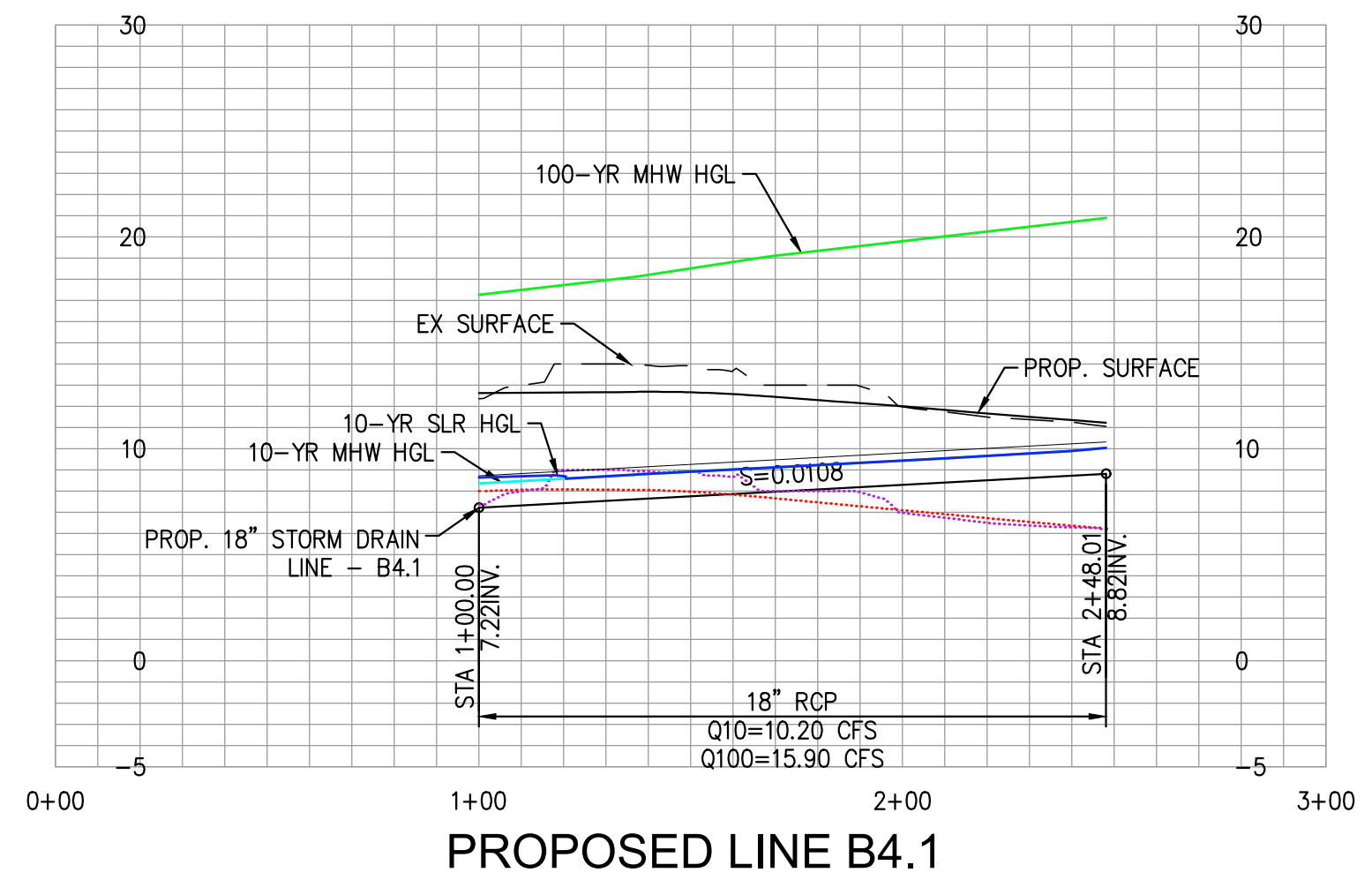
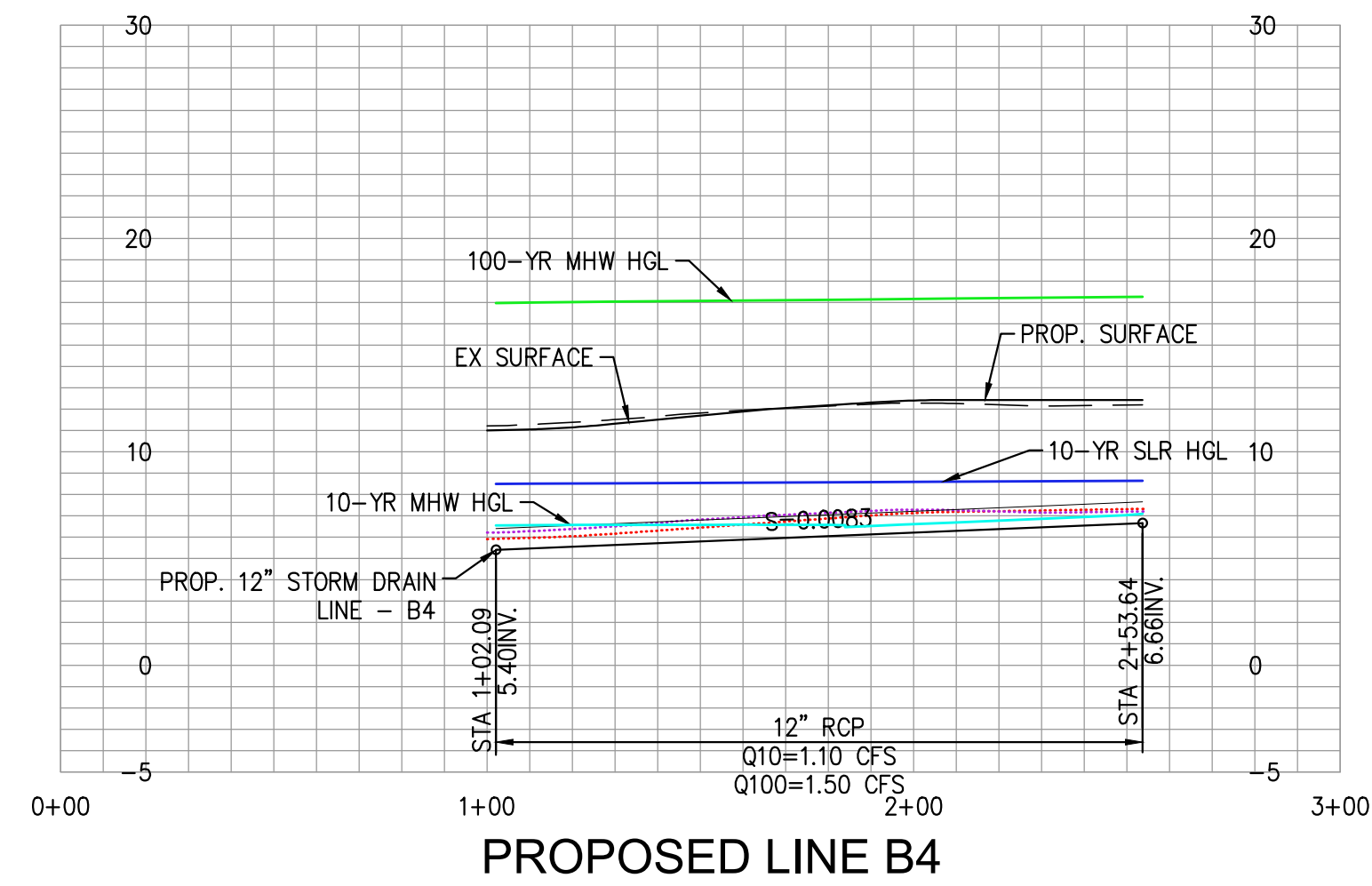
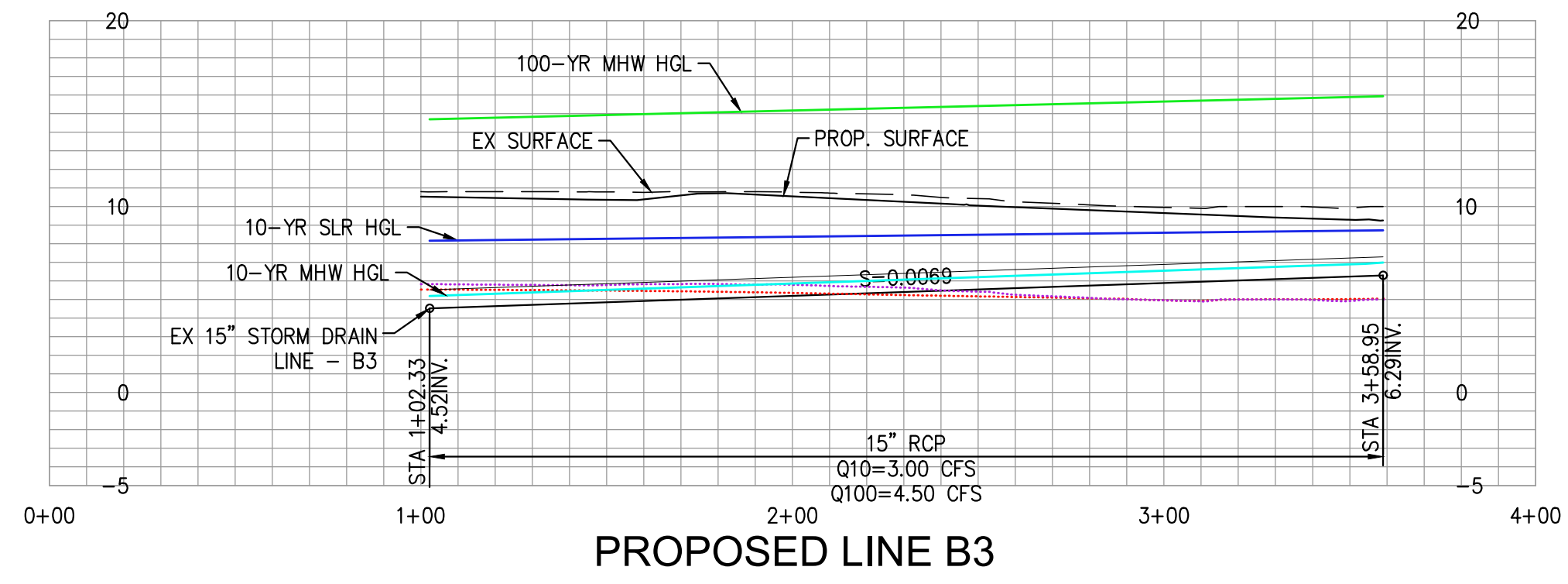
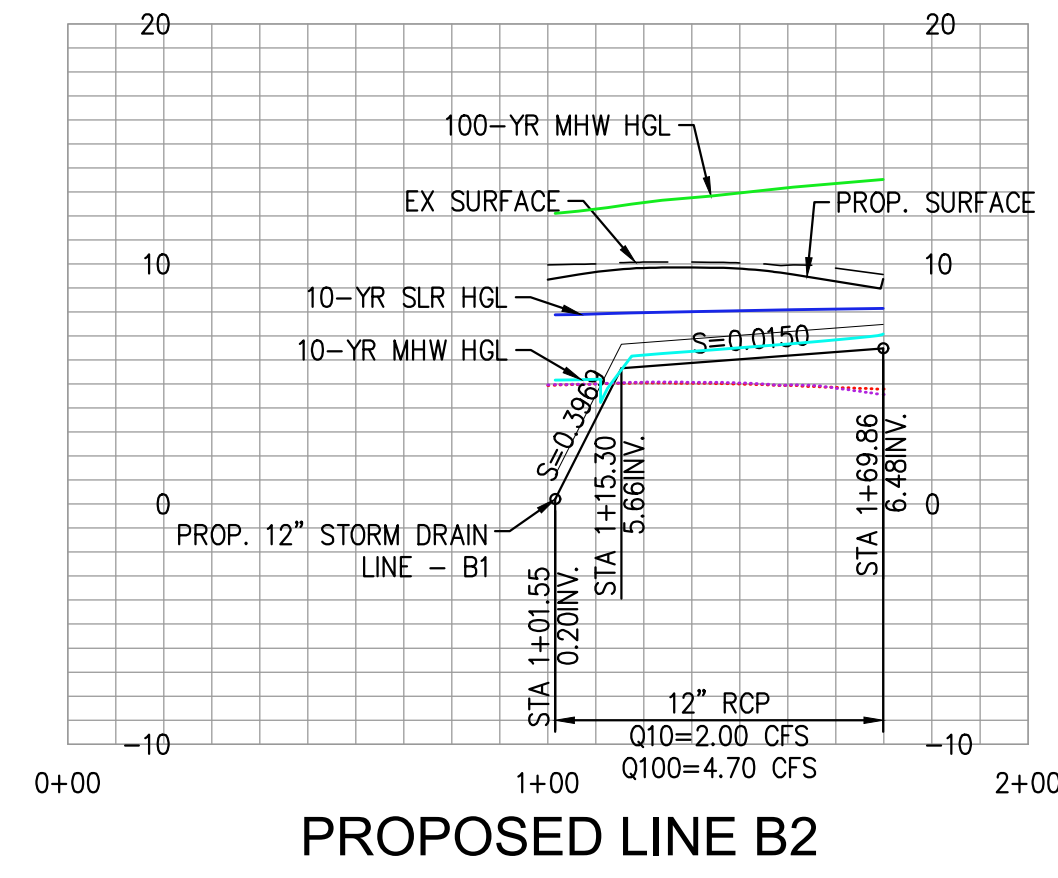
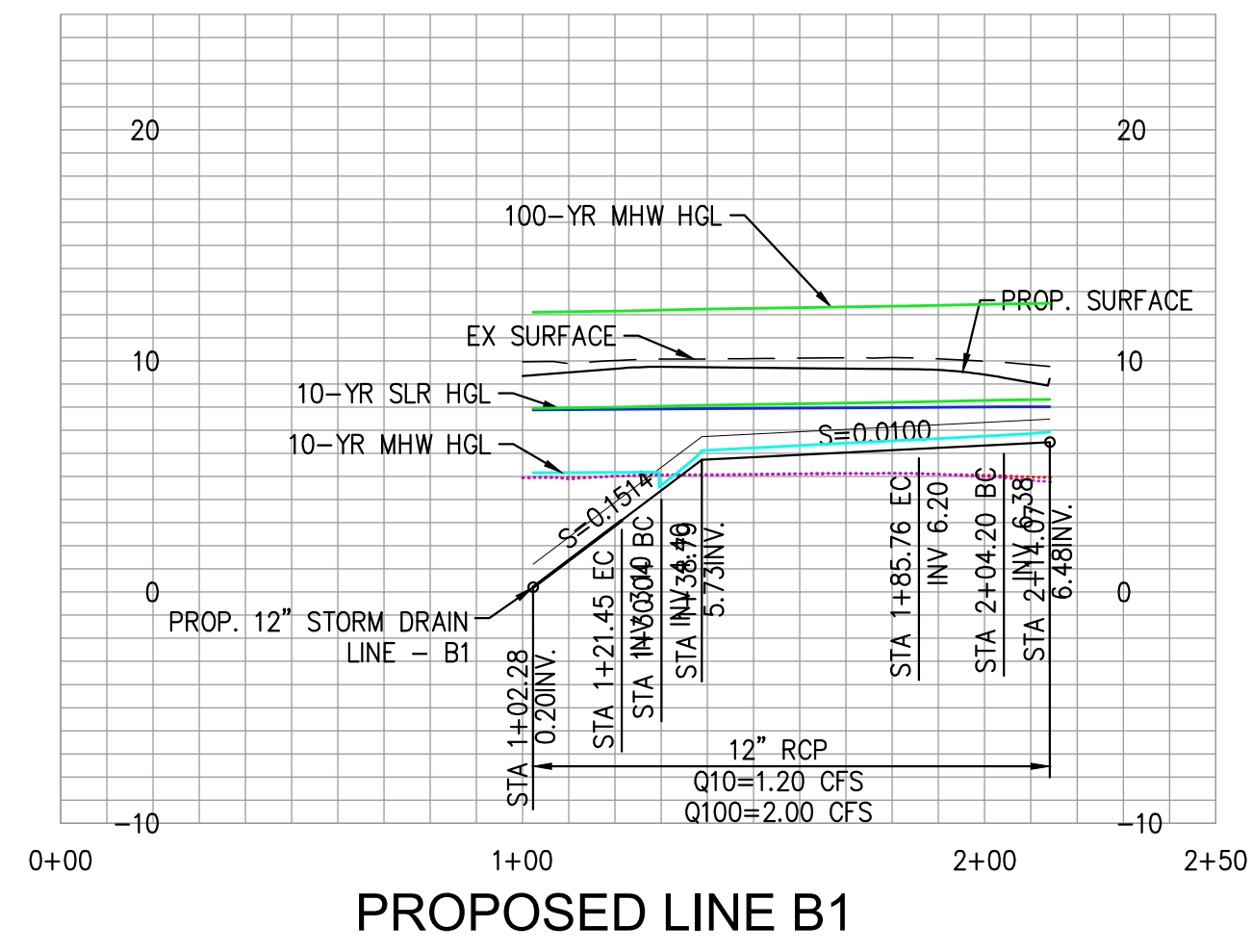
BWP BURNHAM IWARD PROPERTIES **R.D. OLSON** DEVELOPMENT **BELLWETHER** FINANCIAL GROUP

DRY STACK LEASE AREA STORM DRAIN PROFILES
LINE B

DRY STACK LEASE AREA MASTER PLAN OF DRAINAGE

SCALE
HORIZ: 1"=40'
VERT: 1"=8'

SHT 1 OF 4



LEGEND

- 10-YEAR MHW HGL
- 10-YEAR SLR HGL
- 100-YEAR MHW HGL
- - - EXISTING SURFACE
- PROP. SURFACE
- HISTORIC GROUNDWATER LEVEL
- EXISTING GROUNDWATER LEVEL

ABBREVIATIONS

- MHW MEAN HIGH WATER
- MHHW MEAN HIGH - HIGH WATER
- SLR SEA LEVEL = MHHW + 2'
- EX. EXISTING
- PROP. PROPOSED
- STA STATION
- INV PIPE INVERT
- Q10 10-YEAR PEAK FLOW
- Q100 100-YEAR PEAK FLOW

* SEA LEVEL RISE PREDICTIONS PROVIDE ESTIMATES FOR SEA LEVELS. THIS STUDY USED MHHW PLUS 2'-FEET AS A CONSERVATIVE APPROACH.

** HGL AT BASIN IS DOWNSTREAM CONTROL FOR MHW AND SLR ANALYSES

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NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

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DRAWN BY:	DATE
DESIGNED BY:	DATE
CHECKED BY:	DATE
RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

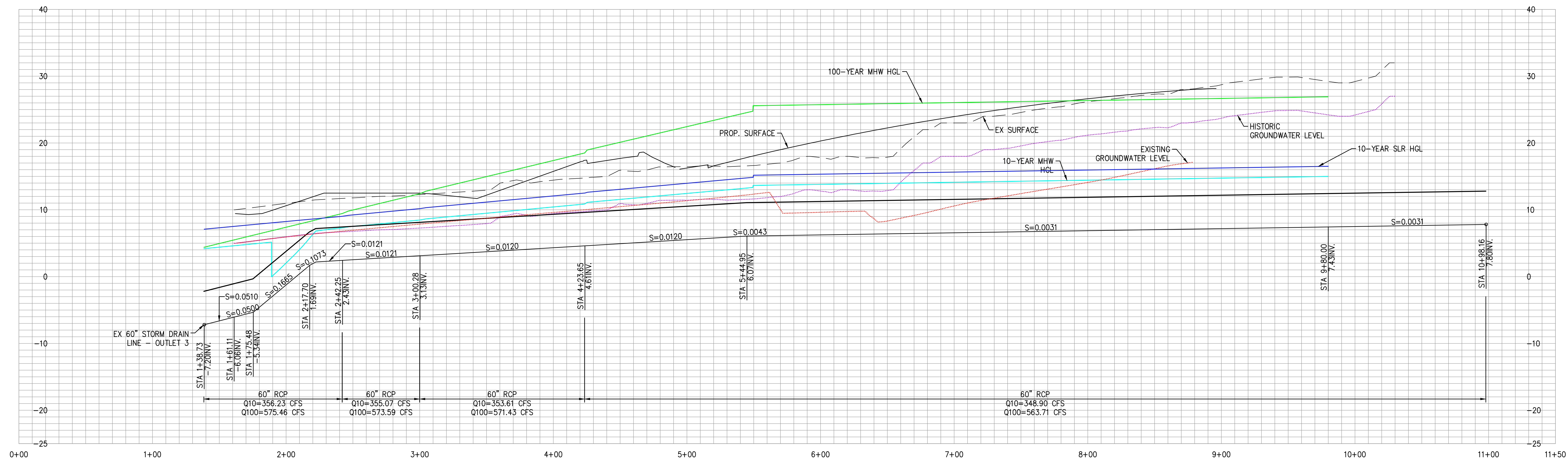
DRY STACK LEASE AREA STORM DRAIN PROFILES LINE B LATERAL LINES

DRY STACK LEASE AREA MASTER PLAN OF DRAINAGE

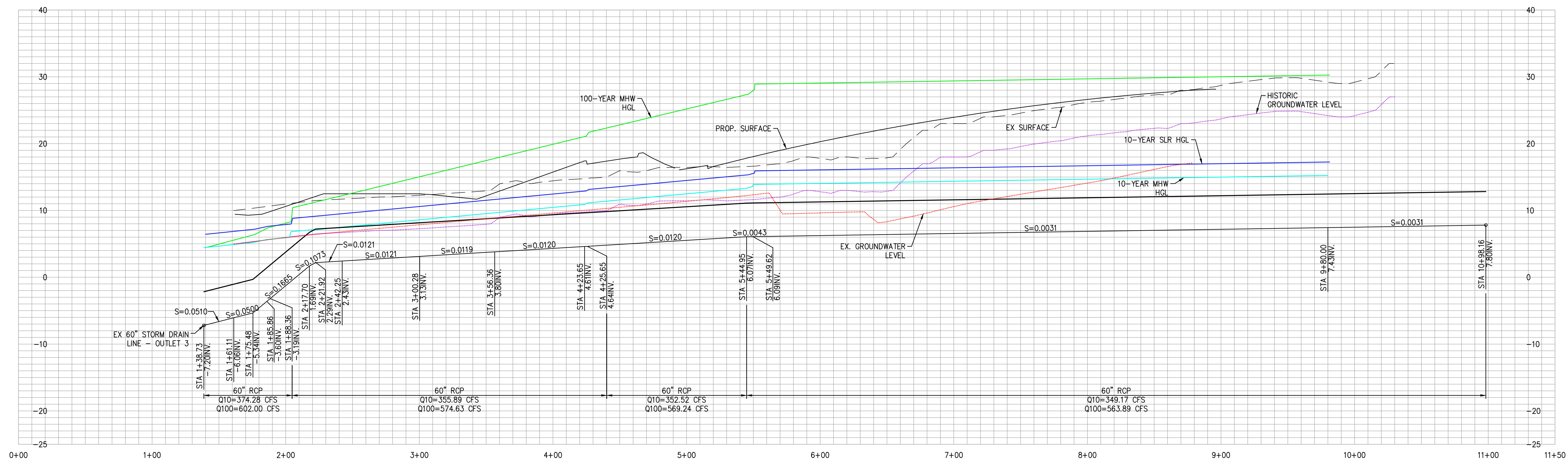
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HORIZ: 1"=40'
VERT: 1"=8'

SHT 2 OF 4

K:\Drawings\ME\WED03810 - Dana Point Harbor\ENG\Conceptual Drawings\ME03810-CG-SD Profiles - Dry Storage.dwg PLOTTED: 12/5/2019 2:19:13 PM BY: Nick Flores



EXISTING LINE C (60" SD) - EXISTING CONDITION

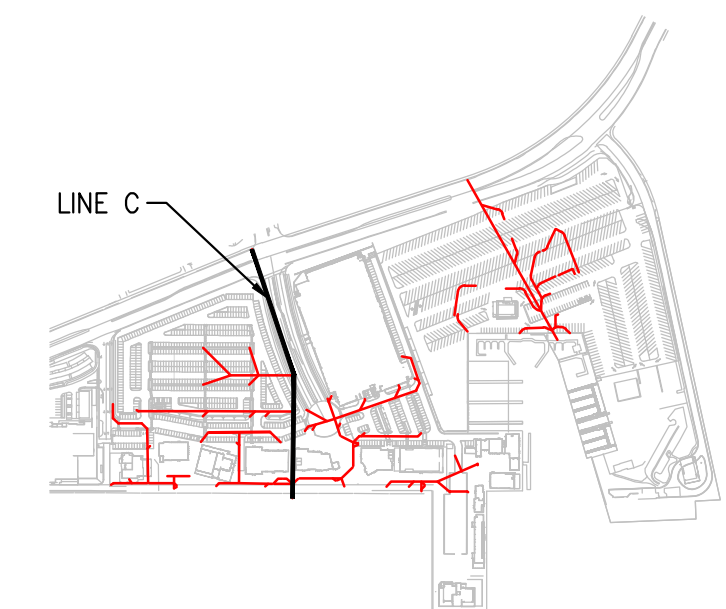


EXISTING LINE C (60" SD) - PROPOSED CONDITION

- LEGEND**
- 10-YEAR MHW HGL
 - 10-YEAR SLR HGL
 - 100-YEAR MHW HGL
 - - - EXISTING SURFACE
 - PROPOSED SURFACE
 - HISTORIC GROUNDWATER LEVEL
 - EXISTING GROUNDWATER LEVEL

* SEA LEVEL RISE PREDICTIONS PROVIDE ESTIMATES FOR SEA LEVELS. THIS STUDY USED MHHW PLUS 2'-FEET AS A CONSERVATIVE APPROACH.

- ABBREVIATIONS**
- MHW MEAN HIGH WATER
 - MHHW MEAN HIGH - HIGH WATER
 - SLR SEA LEVEL = MHHW + 2'
 - EX. EXISTING
 - PROP. PROPOSED
 - STA STATION
 - INV PIPE INVERT
 - Q10 10-YEAR PEAK FLOW
 - Q100 100-YEAR PEAK FLOW



KEY MAP

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
7					
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DRAWN BY:	DATE:
DESIGNED BY:	DATE:
CHECKED BY:	DATE:
RECOMMENDED BY:	DATE:

DANA POINT HARBOR REVITALIZATION

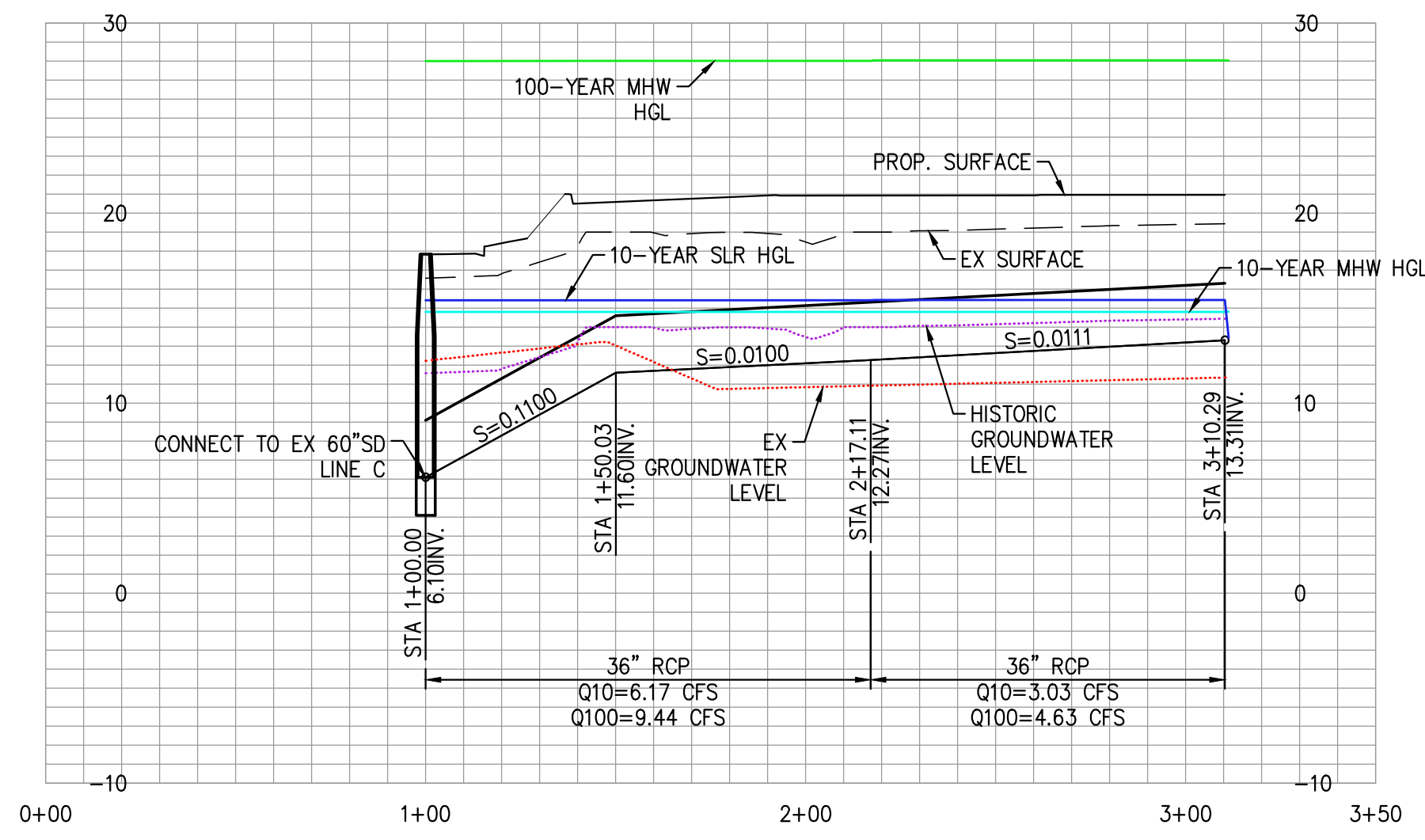
DANA POINT HARBOR PARTNERS, LLC



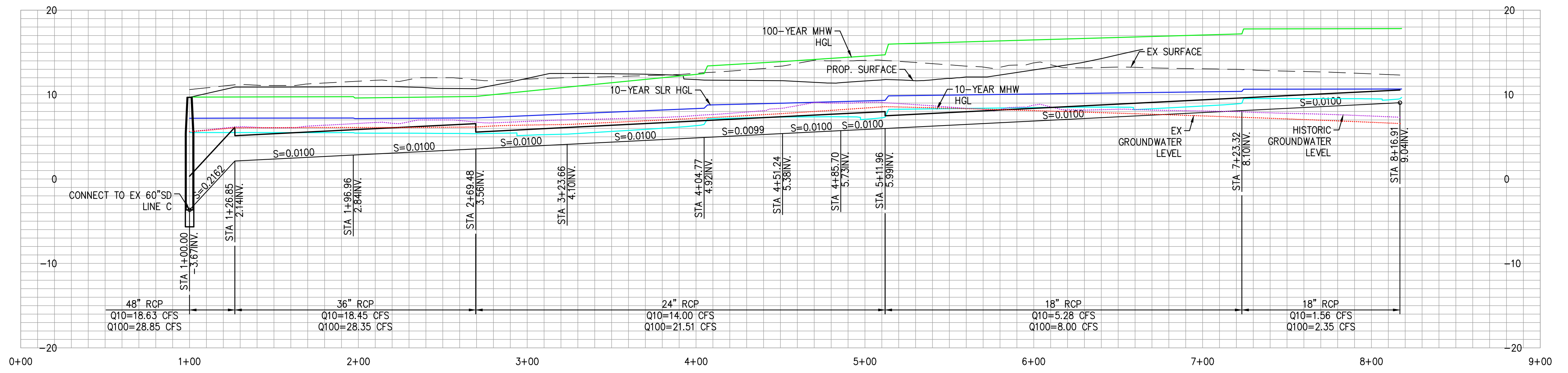
COMMERCIAL CORE RETAIL AREA STORM DRAIN PROFILES LINE C

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

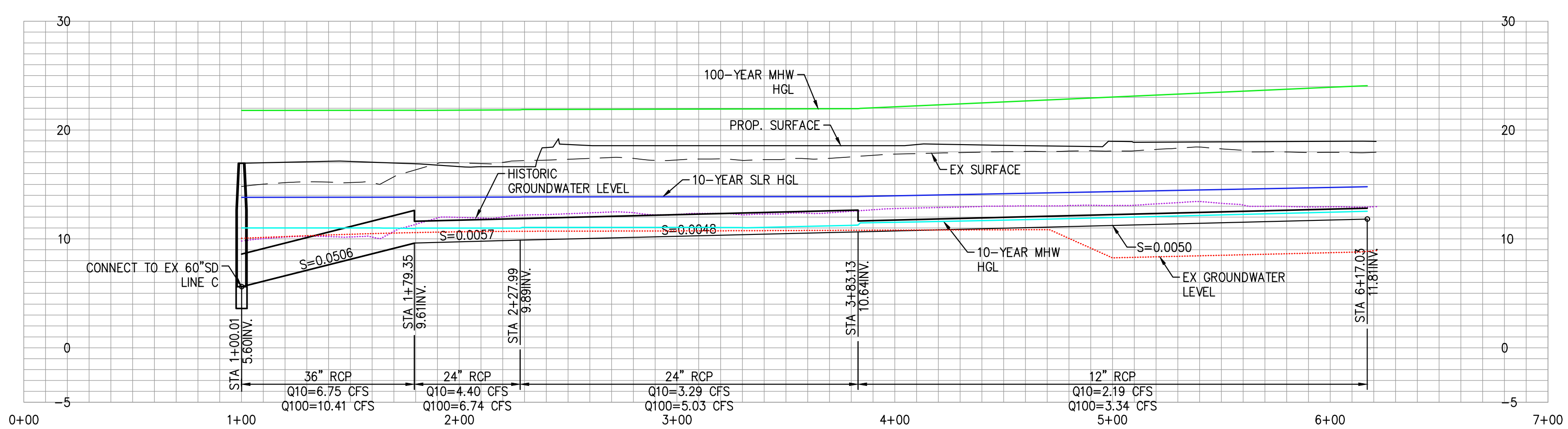
SCALE
HORIZ: 1"=40'
VERT: 1"=8'



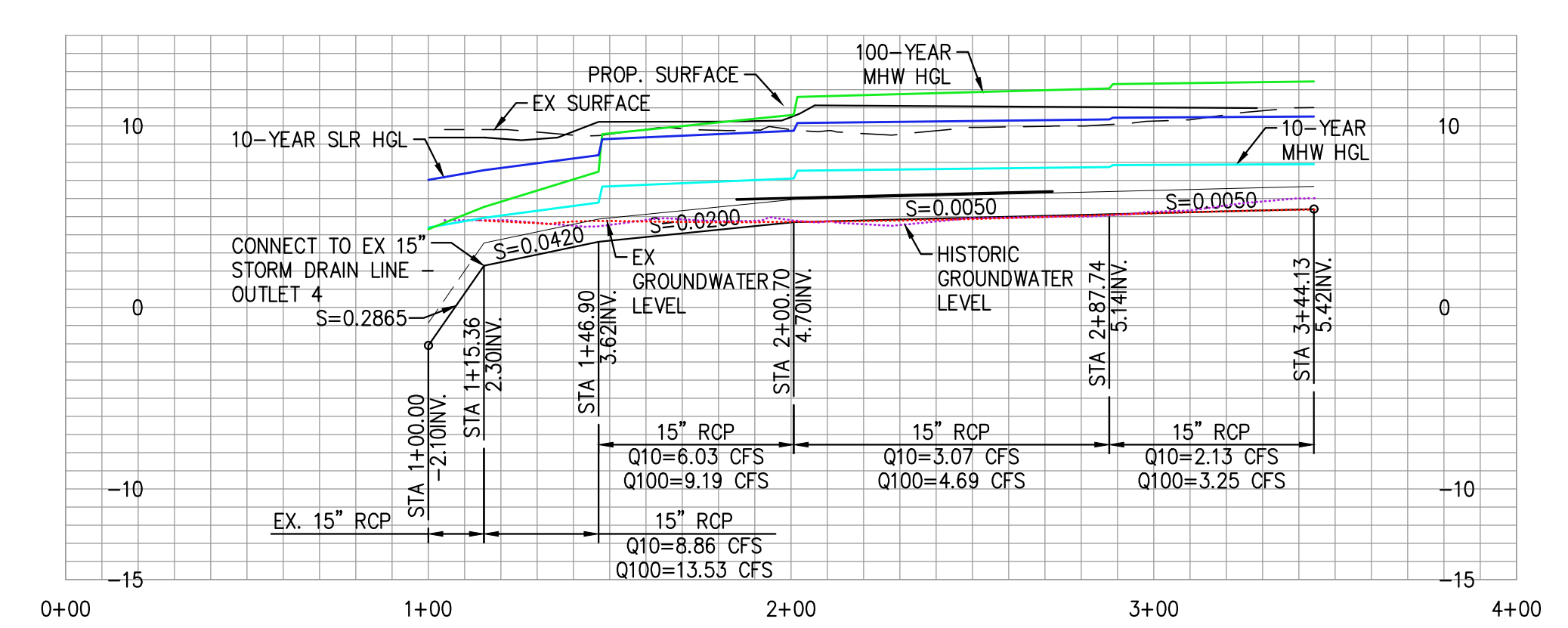
PROPOSED LINE C1



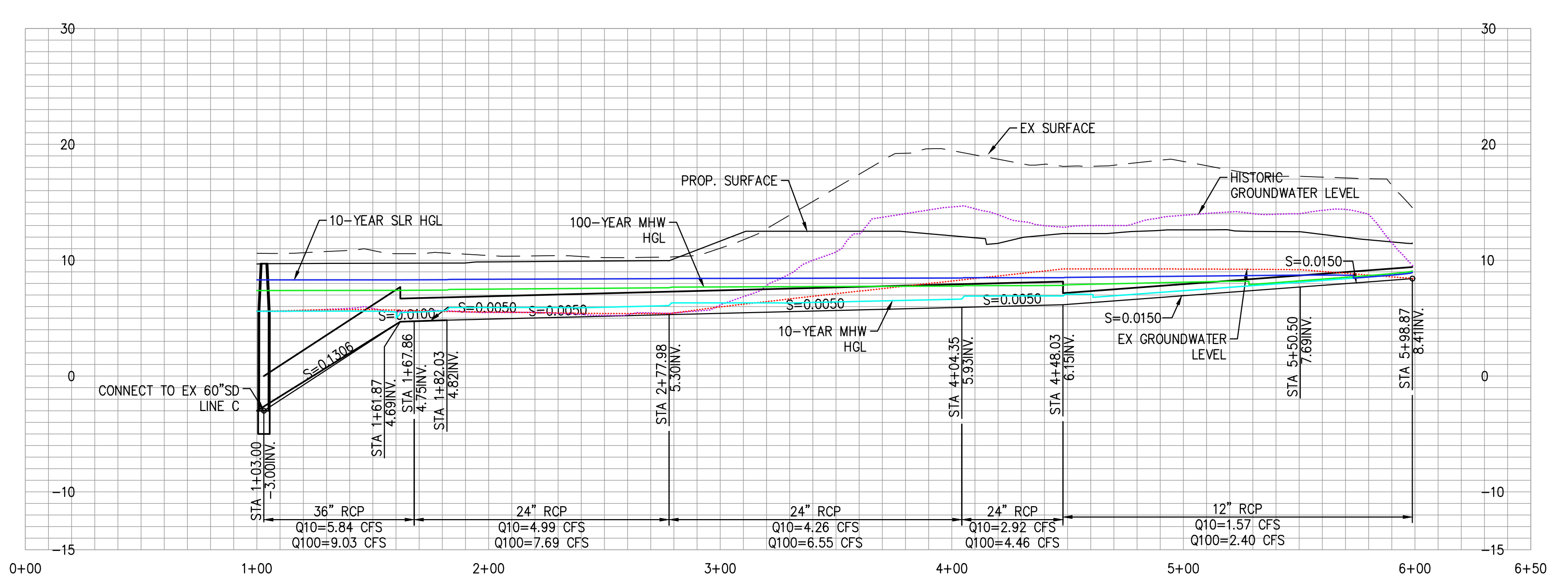
PROPOSED LINE C2



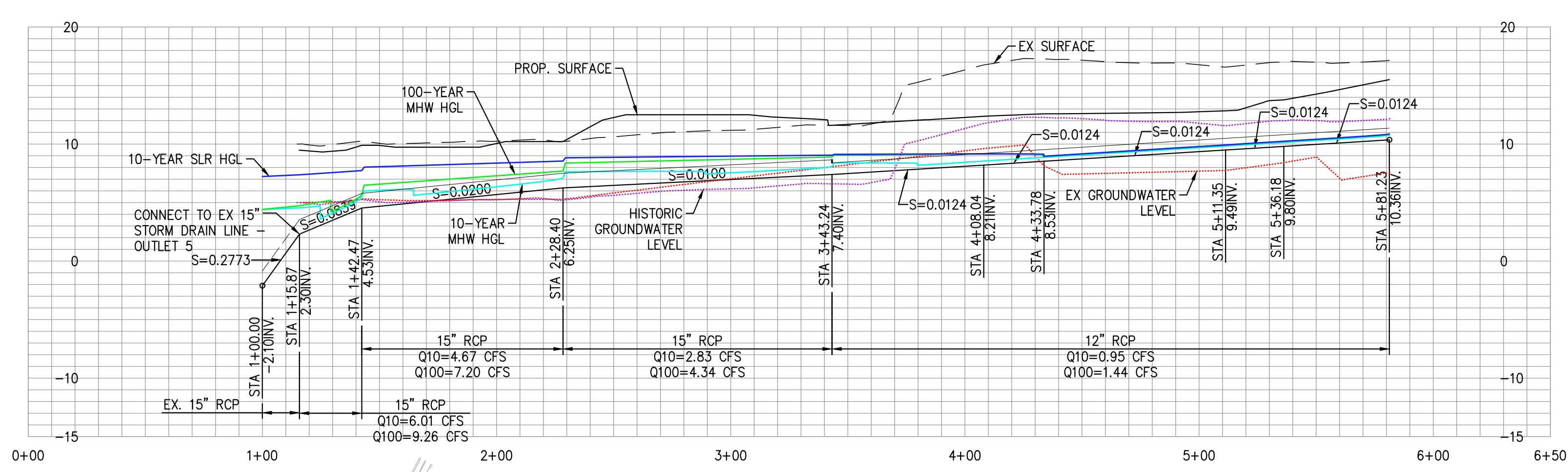
PROPOSED LINE C3



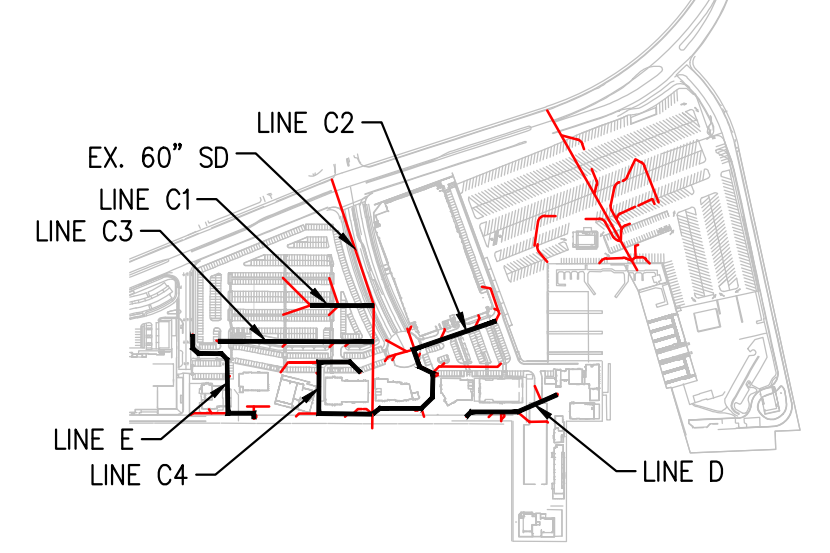
PROPOSED LINE D



PROPOSED LINE C4



PROPOSED LINE E



KEY MAP

LEGEND		ABBREVIATIONS	
	10-YEAR MHW HGL	MHW	MEAN HIGH WATER
	10-YEAR SLR HGL	MHHW	MEAN HIGH - HIGH WATER
	100-YEAR MHW HGL	SLR	SEA LEVEL = MHHW + 2'
	EXISTING SURFACE	EX.	EXISTING
	PROPOSED SURFACE	PROP.	PROPOSED
	HISTORIC GROUNDWATER LEVEL	STA	STATION
	EXISTING GROUNDWATER LEVEL	INV	PIPE INVERT
		Q10	10-YEAR PEAK FLOW
		Q100	100-YEAR PEAK FLOW

* SEA LEVEL RISE PREDICTIONS PROVIDE ESTIMATES FOR SEA LEVELS. THIS STUDY USED MHHW PLUS 2'-FEET AS A CONSERVATIVE APPROACH.

NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE
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DANA POINT HARBOR REVITALIZATION
DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM IWARD PROPERTIES **R.D. OLSON** DEVELOPMENT **BELLWETHER** FINANCIAL GROUP

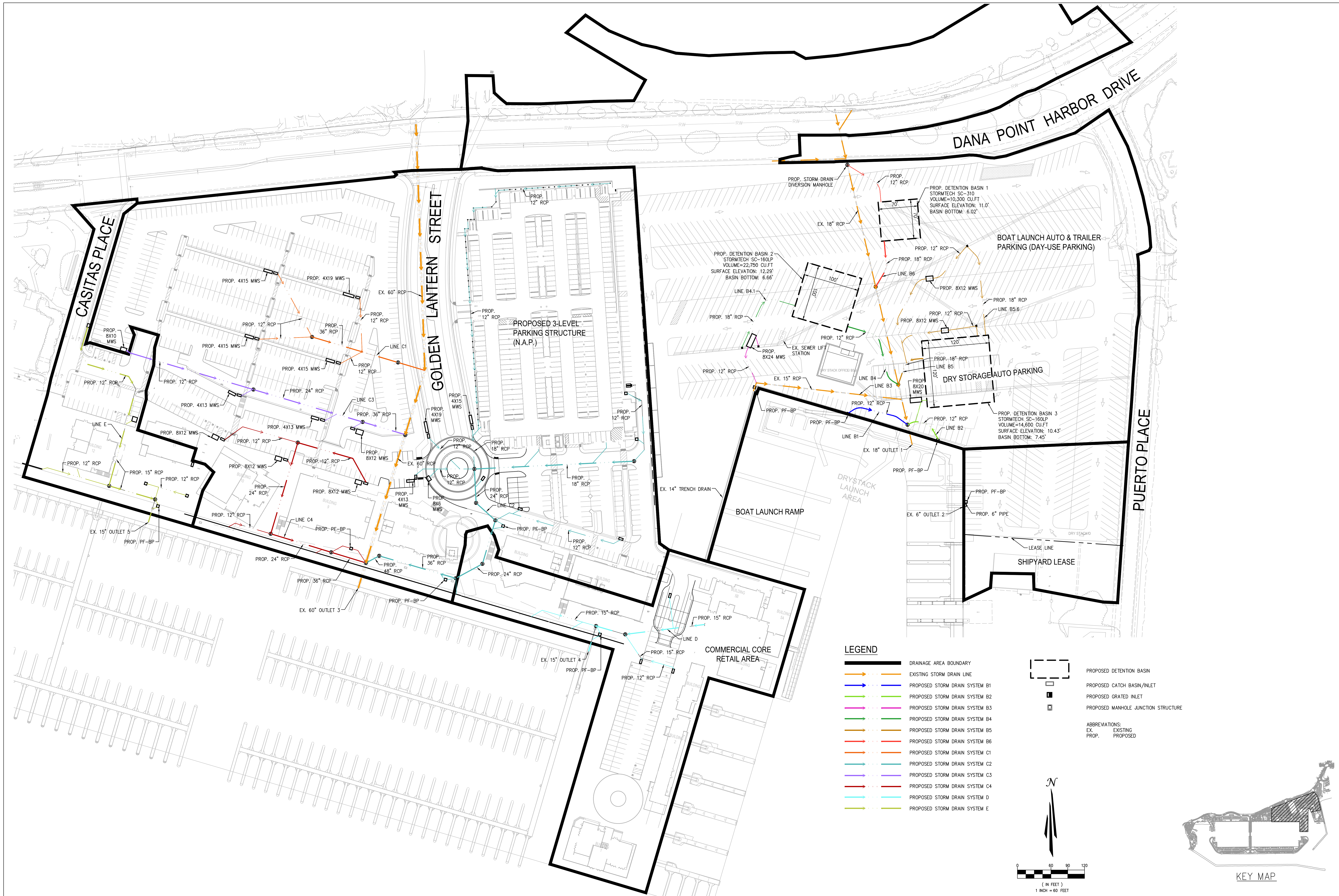
COMMERCIAL CORE RETAIL AREA STORM DRAIN PROFILES LINES C1, C2, C3, C4, D, E

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

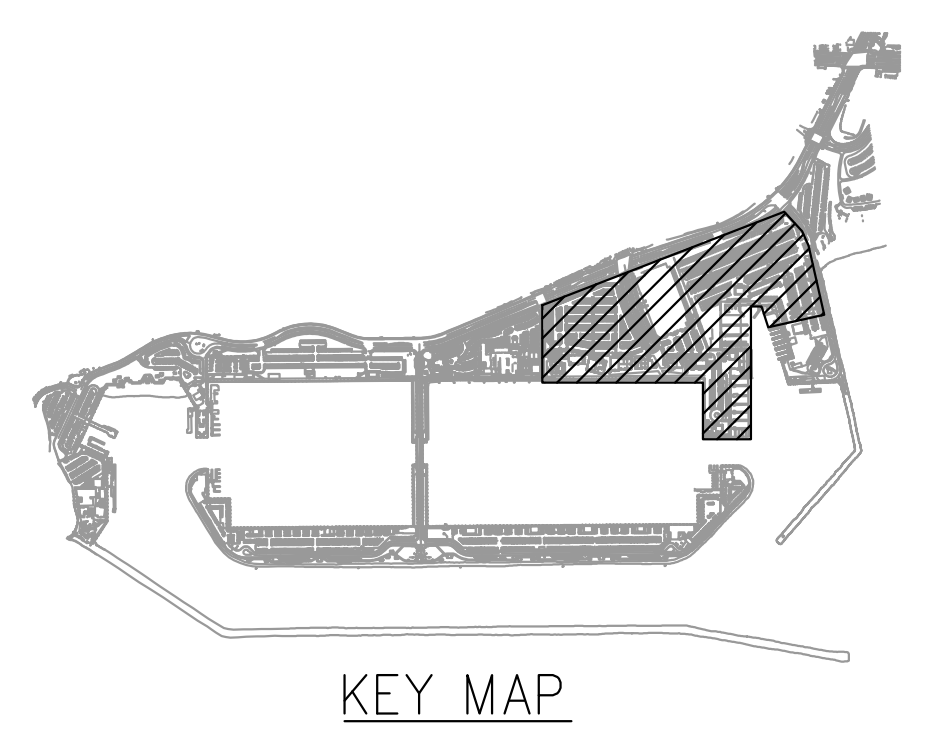
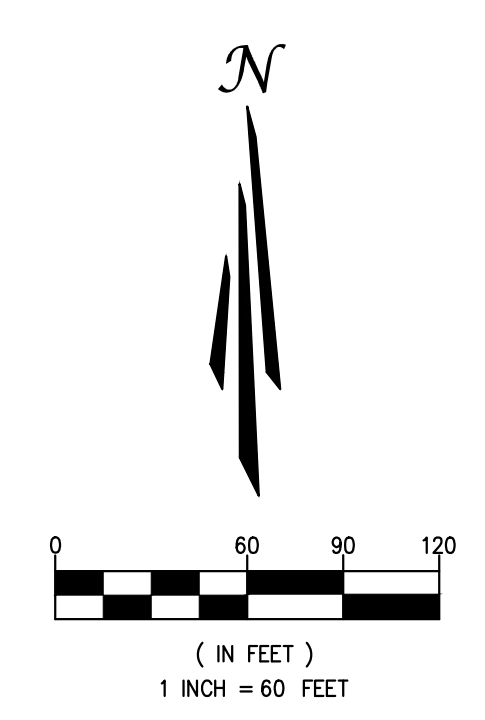
SCALE
HORIZ: 1"=40'
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SHT 4 OF 4

K:\Drawings\ME\ME03810 - Dana Point Harbor\ENG\Conceptual Drawings\ME03810-CG-SD Profiles - CCA.dwg PLOTTED: 12/15/2019 2:42:34 PM BY Nick Flores



- LEGEND**
- DRAINAGE AREA BOUNDARY
 - EXISTING STORM DRAIN LINE
 - PROPOSED STORM DRAIN SYSTEM B1
 - PROPOSED STORM DRAIN SYSTEM B2
 - PROPOSED STORM DRAIN SYSTEM B3
 - PROPOSED STORM DRAIN SYSTEM B4
 - PROPOSED STORM DRAIN SYSTEM B5
 - PROPOSED STORM DRAIN SYSTEM B6
 - PROPOSED STORM DRAIN SYSTEM C1
 - PROPOSED STORM DRAIN SYSTEM C2
 - PROPOSED STORM DRAIN SYSTEM C3
 - PROPOSED STORM DRAIN SYSTEM C4
 - PROPOSED STORM DRAIN SYSTEM D
 - PROPOSED STORM DRAIN SYSTEM E
- PROPOSED DETENTION BASIN
 - PROPOSED CATCH BASIN/INLET
 - PROPOSED GRATED INLET
 - PROPOSED MANHOLE JUNCTION STRUCTURE
- ABBREVIATIONS:
 EX. EXISTING
 PROP. PROPOSED



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NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

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DANA POINT HARBOR REVITALIZATION

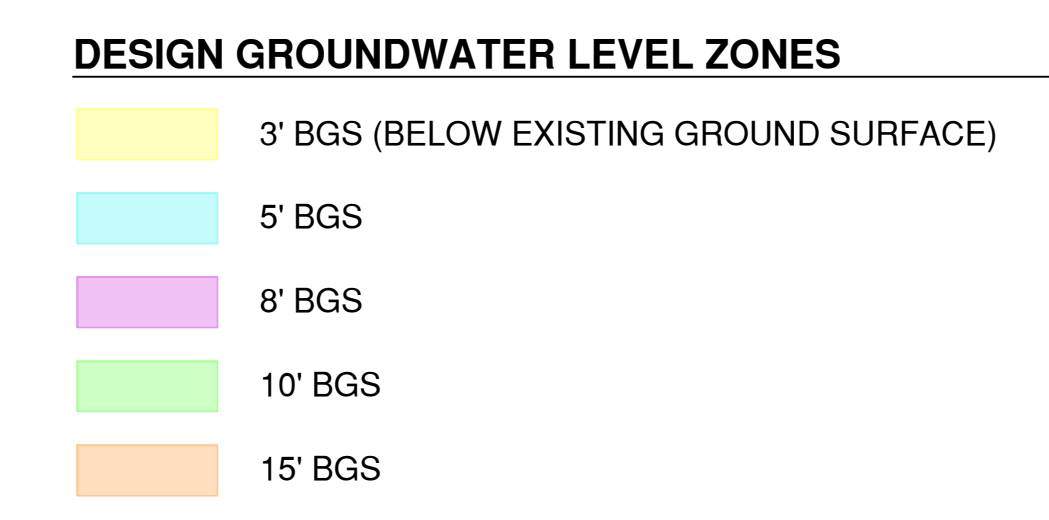
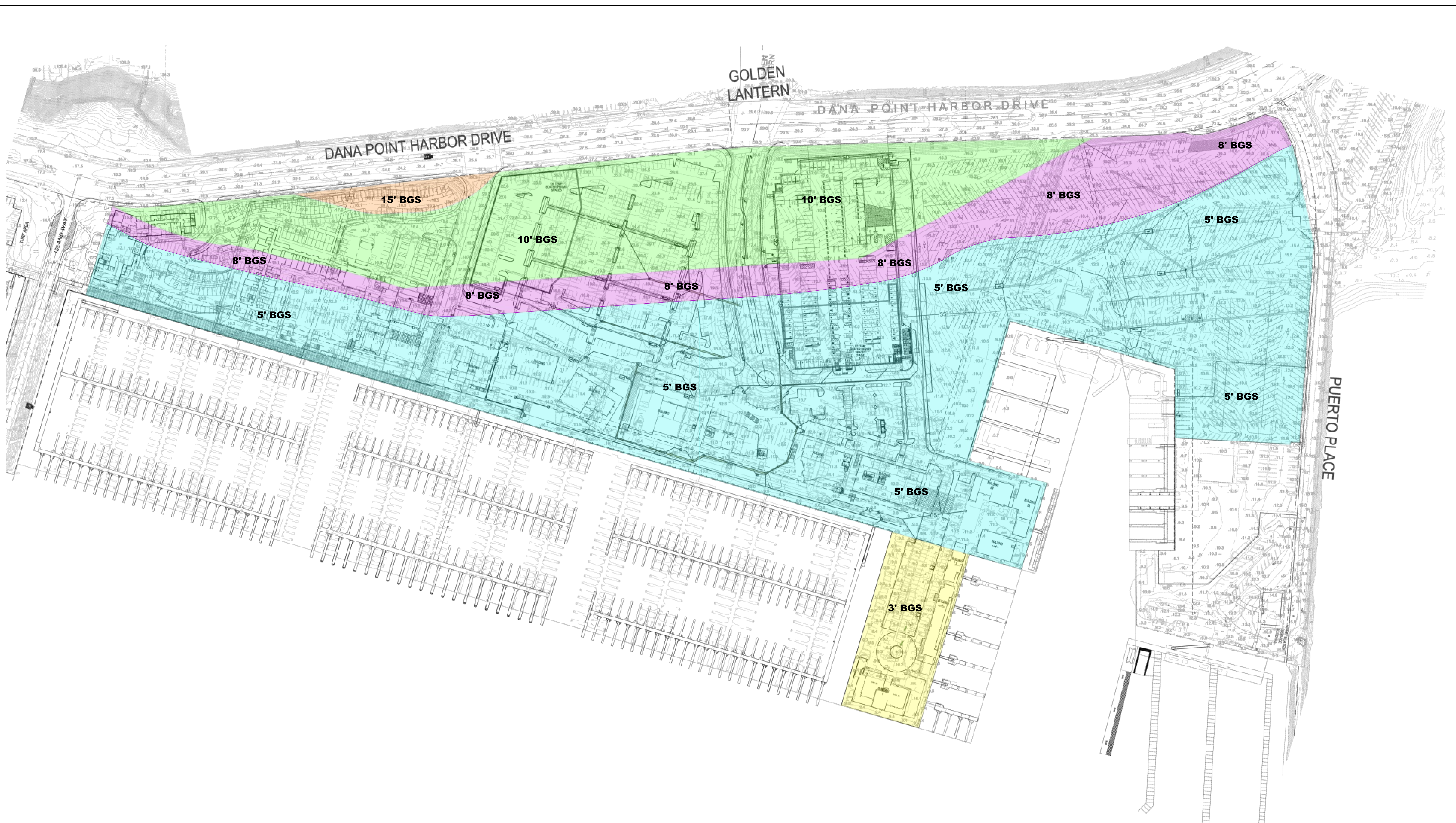
DANA POINT HARBOR PARTNERS, LLC



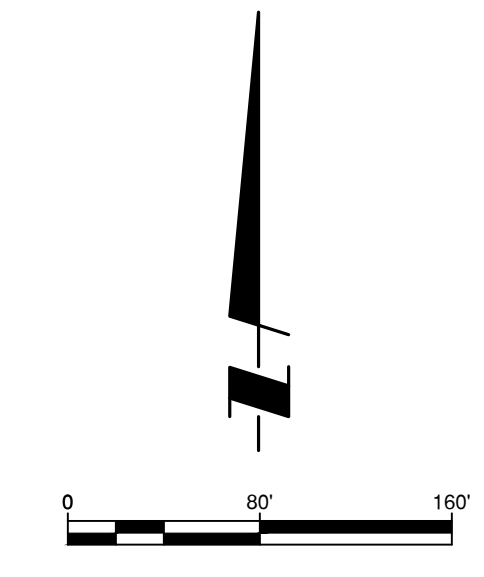
PROPOSED STORM DRAIN PLAN
 COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

K:\Drawings\ME\ME3810 - Dana Point Harbor\ENC\Hydrology\Master\ME3810B 3D Exhibit.dwg PLOTTED: 12/5/2019 9:31:44 AM BY Edwin Medina

Appendix I – Design Groundwater Level Plan



- NOTES**
1. EXISTING GROUND SURFACE IS NOTED BY SPOT ELEVATIONS ABOVE AS SURVEYED BY TAIT AND ASSOCIATES, INC. DATED NOVEMBER 2018.
 2. DESIGN GROUND WATER LEVELS DETERMINED FROM GROUNDWATER MEASUREMENT ON THE DAY OF DRILLING AND ADJUSTED TO DAILY HIGH TIDE CONDITIONS. DOES NOT CONSIDER KING TIDES, MAXIMUM HIGH TIDES, AND AFFECTS TO TIDES DUE TO CLIMATE CHANGE.



Design Groundwater Level Plan

GMU	Date: November 15, 2019	Plate
	Project No.: 17-206-02	1

PLANNING - 17-206-02.dwg 17/206/02 - 17/15/2019 2:30 PM Bx - jmc

Appendix J – Water Quality Calculation and BMP’s information

Dana Point Harbor - Dry Stack Lease Area

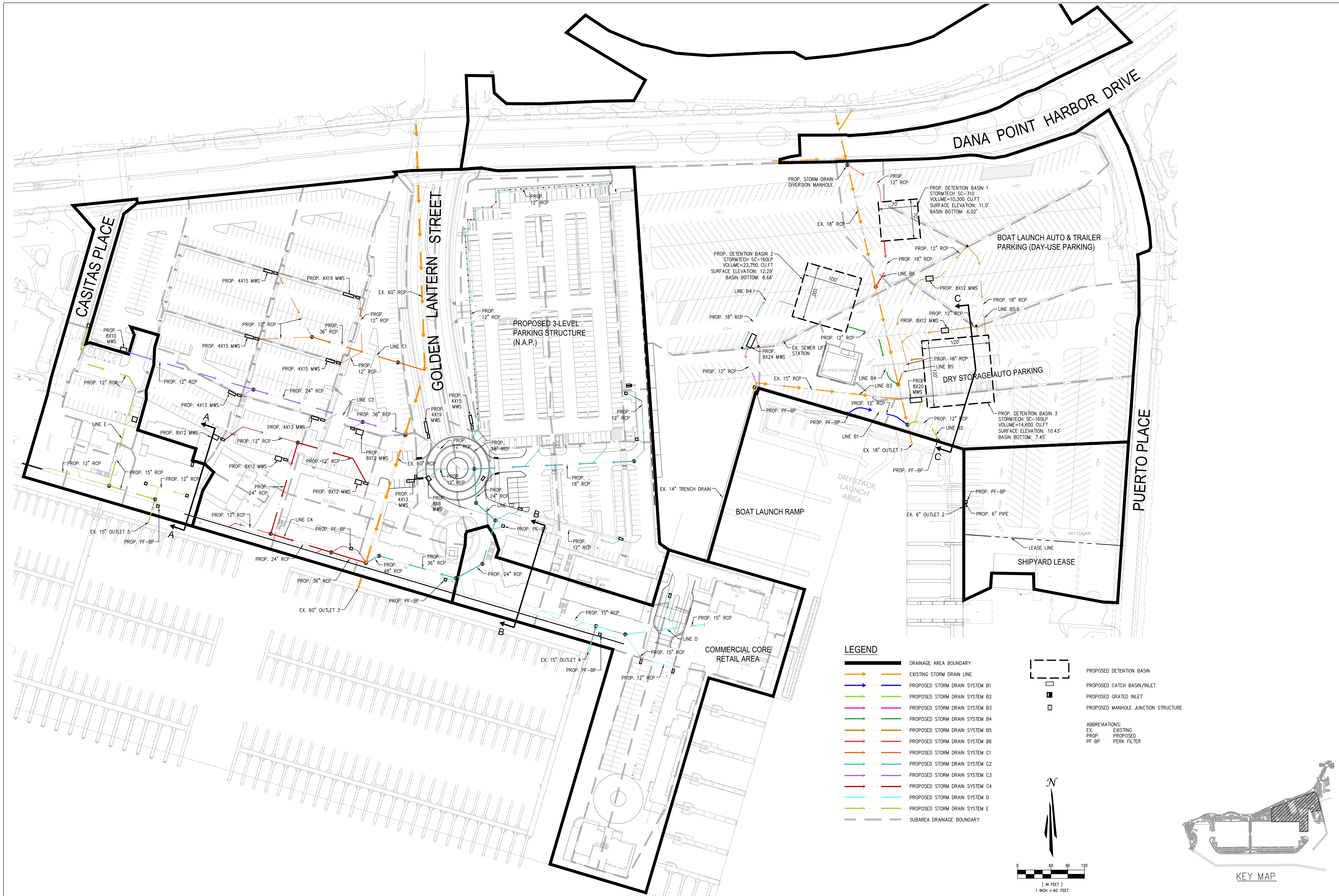
DMA Summary

Area ID	Node	Area (acres)	Tc (min)*	Intensity	Percent Impervious	Runoff Coefficient	Soil Type	Q	1.5*Q	Proprietary Device	Depth
B-1, 2, 3	30 to 34	2.79	7.05	0.23	0.90	0.83	D	0.53	0.794	MWS-L-8-24	4.47
B-12	57 to 59	1.06	6.4	0.24	0.90	0.83	D	0.21	0.315	MWS-L-8-12	3.5
B-7, 8, 10	50 to 54	1.54	8.87	0.2	0.90	0.83	D	0.25	0.381	MWS-L-8-12	3.75
B-13, 14	60 to 62	2.02	8.72	0.2	0.90	0.83	D	0.33	0.500	MWS-L-8-20	3
B-15	35 to 38	1.27	9.7	0.21	0.90	0.83	D	0.22	0.330	Storm Safe	
B-16	63 to 64	0.42	6.26	0.24	0.90	0.83	D	0.08	0.125	Storm Safe	
B-17	65 to 66	0.97	7.13	0.23	0.90	0.83	D	0.18	0.276	Storm Safe	
D-1, 2	80 to 82	1.69	5	0.25	0.90	0.83	D	0.35	0.523	Storm Safe	

Dana Point Harbor - Commercial Core Retail Area

DMA Summary

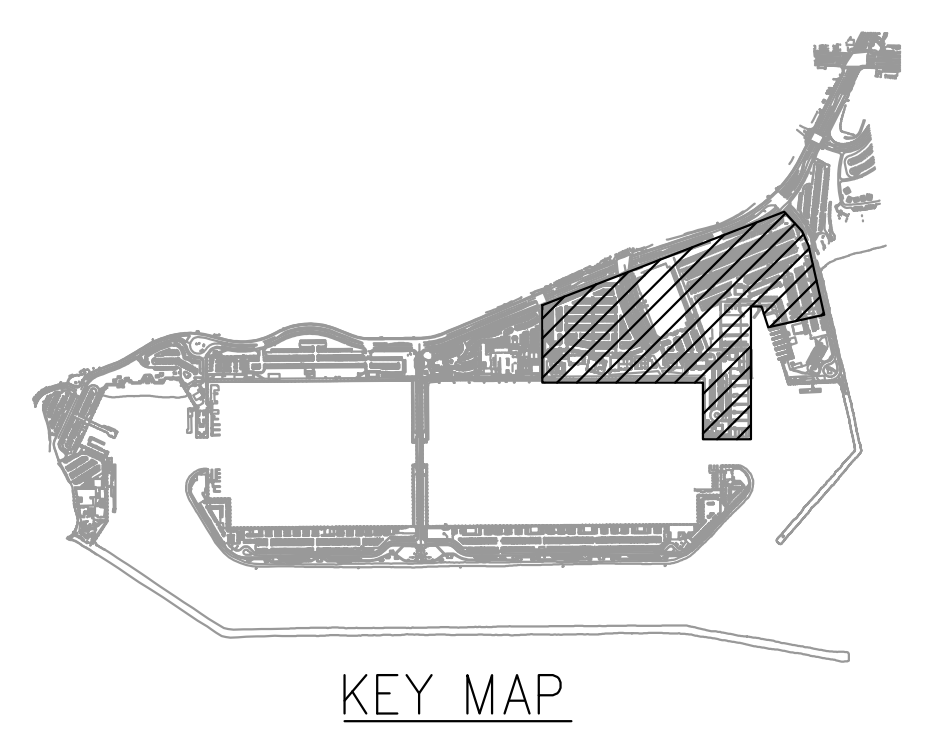
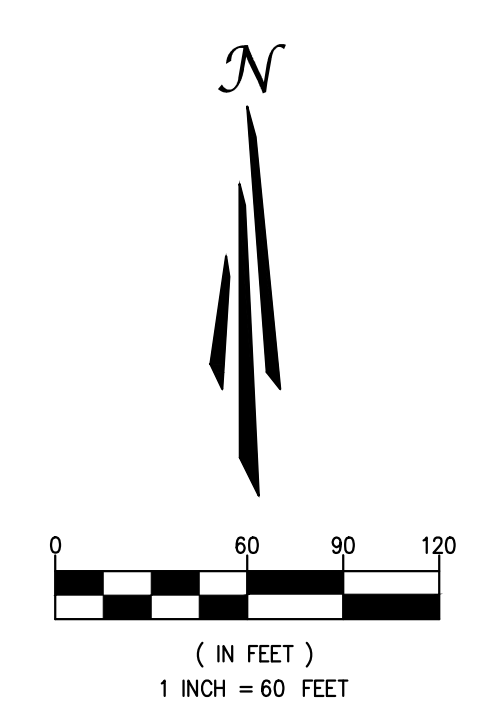
BMP No.	Area ID	Time of Concentration (min)	Design Intensity 80% capture efficiency (in/hr)	Area (ac)	Percent Impervious	Runoff Coefficient	Q80% (cfs)	Qdesign (cfs)	Q Treatment Capacity (cfs)	BMP Model
OUTFALL 3										
STORM DRAIN LATERAL LINE C1										
No. 1	C1.1	5.42	0.26	0.30	0.943	0.858	0.07	0.100	0.115	MWS-L-4-8-V (Dvert)
No. 2	C1.2	5.63	0.26	0.70	0.787	0.740	0.13	0.202	0.237	MWS-L-4-19-V (Dvert)
No. 3	C1.3	5.00	0.26	0.06	0.868	0.801	0.01	0.019	0.052	MWS-L-4-4-V (Dvert)
				1.06						
STORM DRAIN LATERAL LINE C3										
No. 4	C3.2	5.86	0.26	1.43	0.893	0.820	0.30	0.457	0.462	MWS-L-8-16-V (Dvert) HC=3.6
No. 5	C3.3	6.07	0.26	0.20	0.976	0.882	0.05	0.069	0.073	MWS-L-4-6-C
No. 6	C3.4	6.14	0.26	0.70	0.966	0.874	0.16	0.239	0.236	MWS-L-4-17-V (Dvert)
No. 7	C3.5	5.00	0.28	0.28	0.984	0.888	0.07	0.104	0.115	MWS-L-4-8-C
No. 8	C3.6	5.00	0.26	0.23	0.950	0.862	0.05	0.077	0.115	MWS-L-4-8-C
No. 9	C3.7	5.00	0.26	0.36	0.844	0.783	0.07	0.110	0.148	MWS-L-4-13-V (Dvert)
No. 9	C3.8	5.00	0.26	0.05	0.958	0.869	0.01	0.017		
No. 9	C3.9	5.00	0.26	0.07	0.898	0.824	0.01	0.022		
				3.32						
No. 14	C-5.1	5.37	0.26	0.81	0.833	0.775	0.16	0.245	0.768	StormSafe Filter (3 Pack)
No. 13	C-5.2	5.37	0.26	0.73	0.869	0.802	0.15	0.228	0.768	StormSafe Filter (3 Pack)
				1.54						
STORM DRAIN LATERAL LINE C4										
No. 10	C4.1	6.75	0.26	0.89	0.813	0.760	0.18	0.264	0.346	MWS-L-8-12-V (Dvert)
No. 11	C4.2	5.00	0.26	0.57	0.860	0.795	0.12	0.177	0.206	MWS-L-4-17-V (Dvert)
OUTFALL 4										
STORM DRAIN LATERAL LINE E										
No. 12	D-1	5.00	0.26	3.01	0.899	0.824	0.64	0.967	2.560	StormSafe Filter (10 Pack)
OUTFALL 5										
STORM DRAIN LATERAL LINE D										
No. 15	E-1	5.00	0.26	0.22	0.991	0.894	0.05	0.077	0.115	MWS-L-4-8-V (Dvert)
No. 16	E-2	5.00	0.26	0.27	0.837	0.778	0.05	0.082	0.147	MWS-L-6-8 (internal bypass = 0.98 cfs)
No. 16	E-3	5.00	0.26	0.08	0.679	0.659	0.01	0.021		
No. 16	E-4	5.00	0.26	0.08	0.909	0.832	0.02	0.026		
No. 17	E-5	5.00	0.26	0.47	0.929	0.847	0.10	0.155	0.155	MWS-L-6-8 (Dvert)
No. 18	E-6	5.00	0.26	0.68	0.890	0.817	0.14	0.217	0.768	StormSafe Filter (3 Pack)
No. 19	E-7	5.00	0.26	0.21	0.832	0.774	0.04	0.063	0.256	StormSafe Filter (1 Pack)



LEGEND

- DRAINAGE AREA BOUNDARY
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN SYSTEM B1
- PROPOSED STORM DRAIN SYSTEM B2
- PROPOSED STORM DRAIN SYSTEM B3
- PROPOSED STORM DRAIN SYSTEM B4
- PROPOSED STORM DRAIN SYSTEM B5
- PROPOSED STORM DRAIN SYSTEM B6
- PROPOSED STORM DRAIN SYSTEM C1
- PROPOSED STORM DRAIN SYSTEM C2
- PROPOSED STORM DRAIN SYSTEM C3
- PROPOSED STORM DRAIN SYSTEM C4
- PROPOSED STORM DRAIN SYSTEM D
- PROPOSED STORM DRAIN SYSTEM E
- SUBAREA DRAINAGE BOUNDARY
- PROPOSED DETENTION BASIN
- PROPOSED CATCH BASIN/INLET
- PROPOSED GRATED INLET
- PROPOSED MANHOLE JUNCTION STRUCTURE

ABBREVIATIONS:
 EX. EXISTING
 PROP. PROPOSED
 PF-BP PERK FILTER



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4					
3					
2					
1					
NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

PREPARED UNDER THE SUPERVISION OF: 701 N. Parkcenter Drive
 Santa Ana, CA 92705
TAIT
 Since 1964
 Los Angeles Sacramento San Francisco Dallas Phoenix
 Ontario San Diego Boise Denver Portland

DESIGN ENGINEER R.C.E. No. DATE

DRAWN BY: DATE
 DESIGNED BY: DATE
 CHECKED BY: DATE
 RECOMMENDED BY: DATE

DANA POINT HARBOR REVITALIZATION

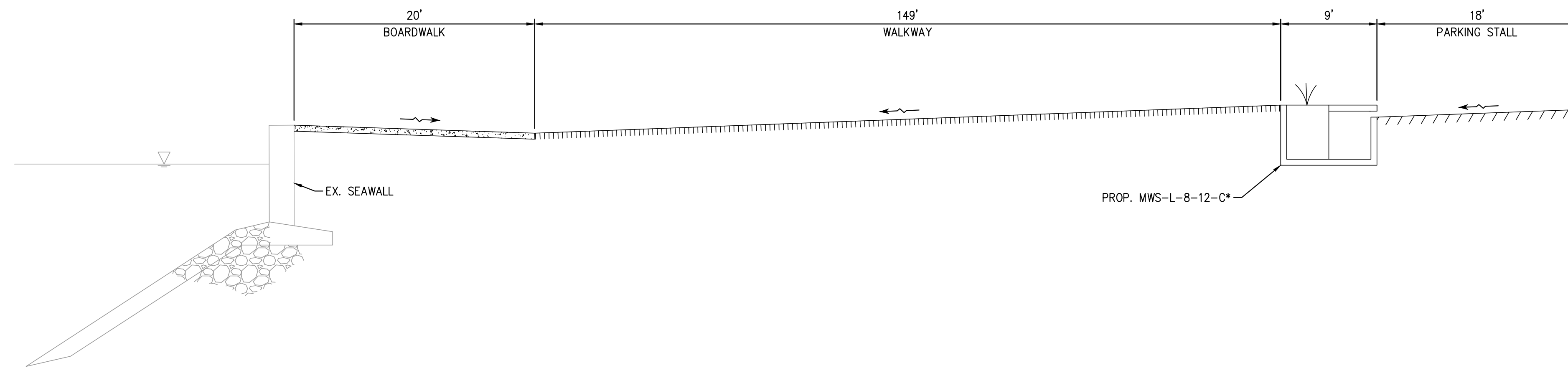
DANA POINT HARBOR PARTNERS, LLC



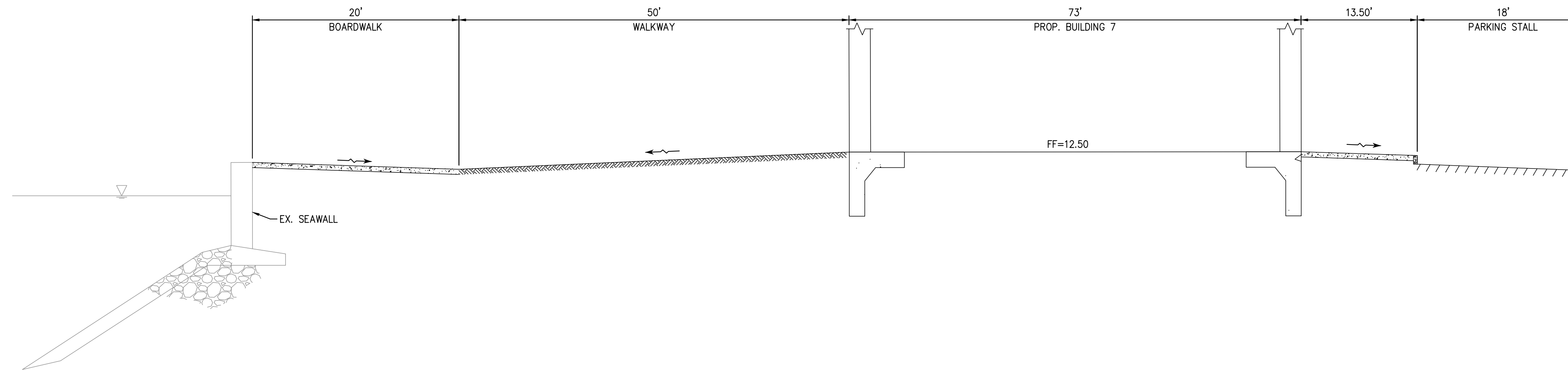
MASTER WATER QUALITY MANAGEMENT PLAN

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

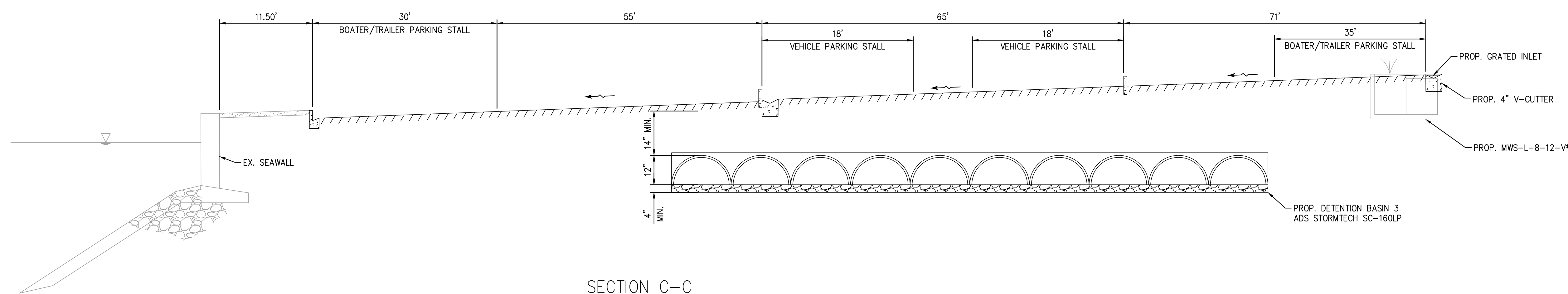
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SECTION A-A



SECTION B-B



SECTION C-C

NOTE:
ALL MWS SIZING IS PRELIMINARY. FINAL
WQMP TO PROVIDE FINAL SIZING.

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NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

PREPARED UNDER THE SUPERVISION OF:

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DESIGNED BY:	DATE
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RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION

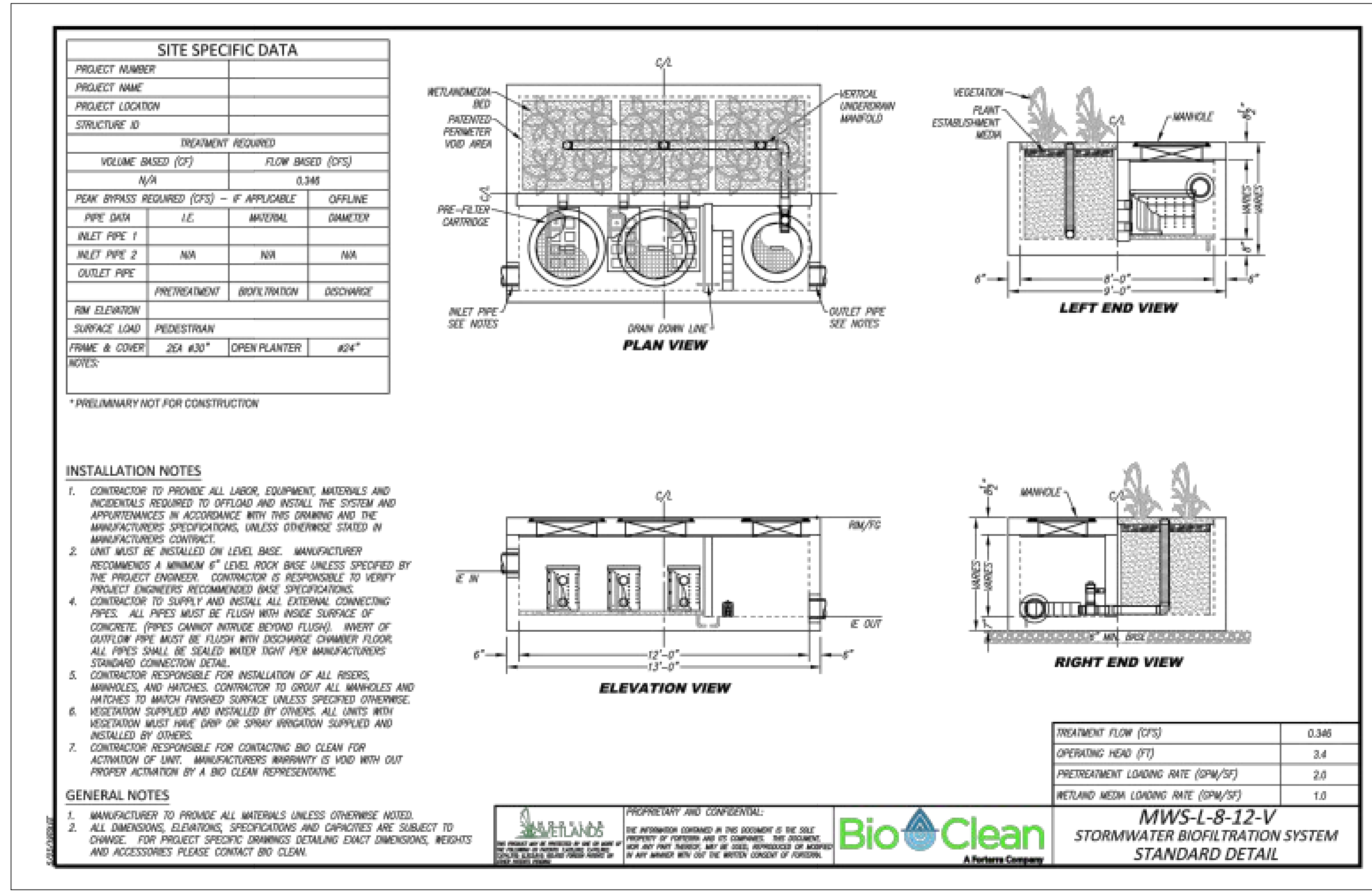
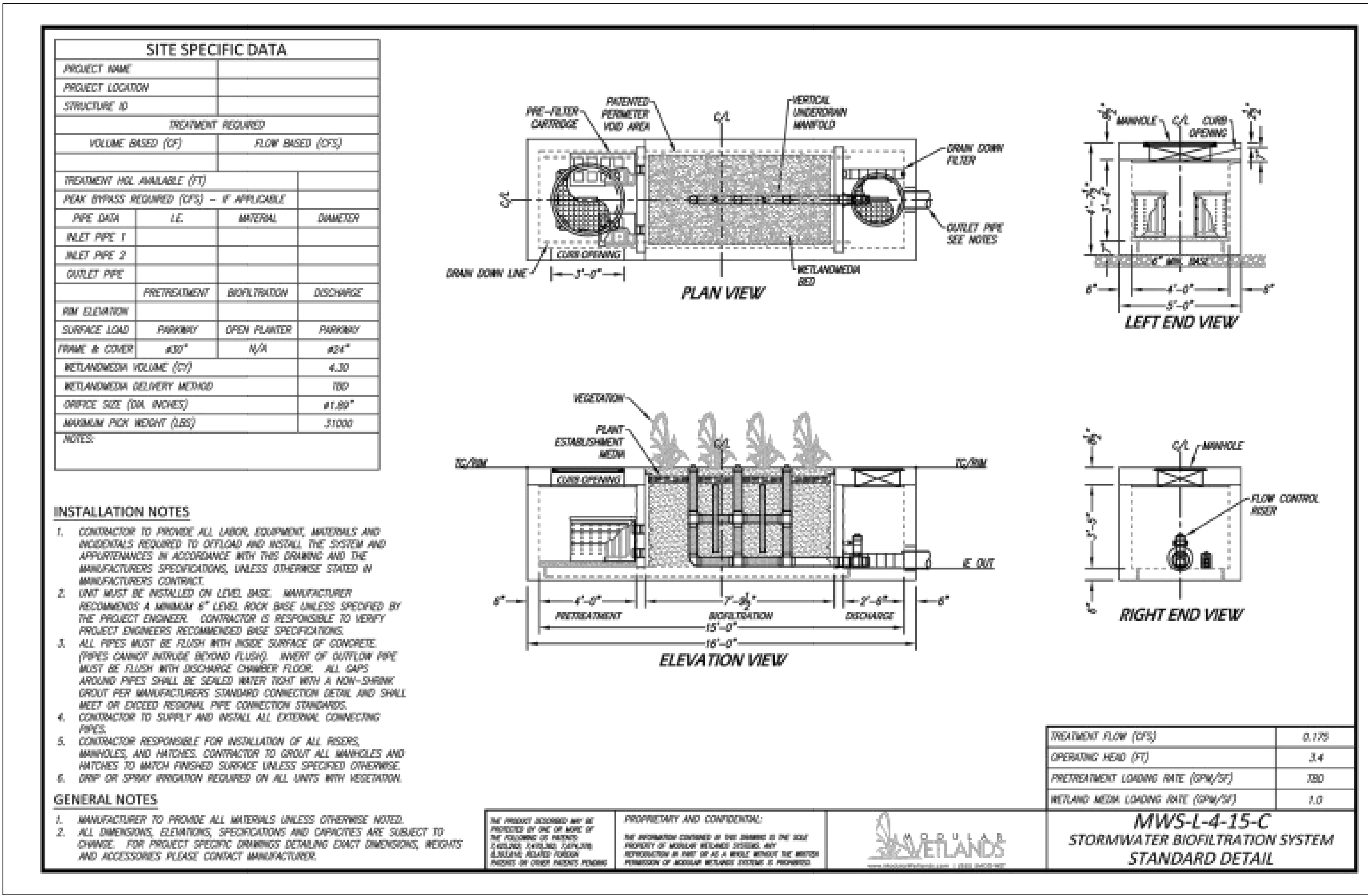
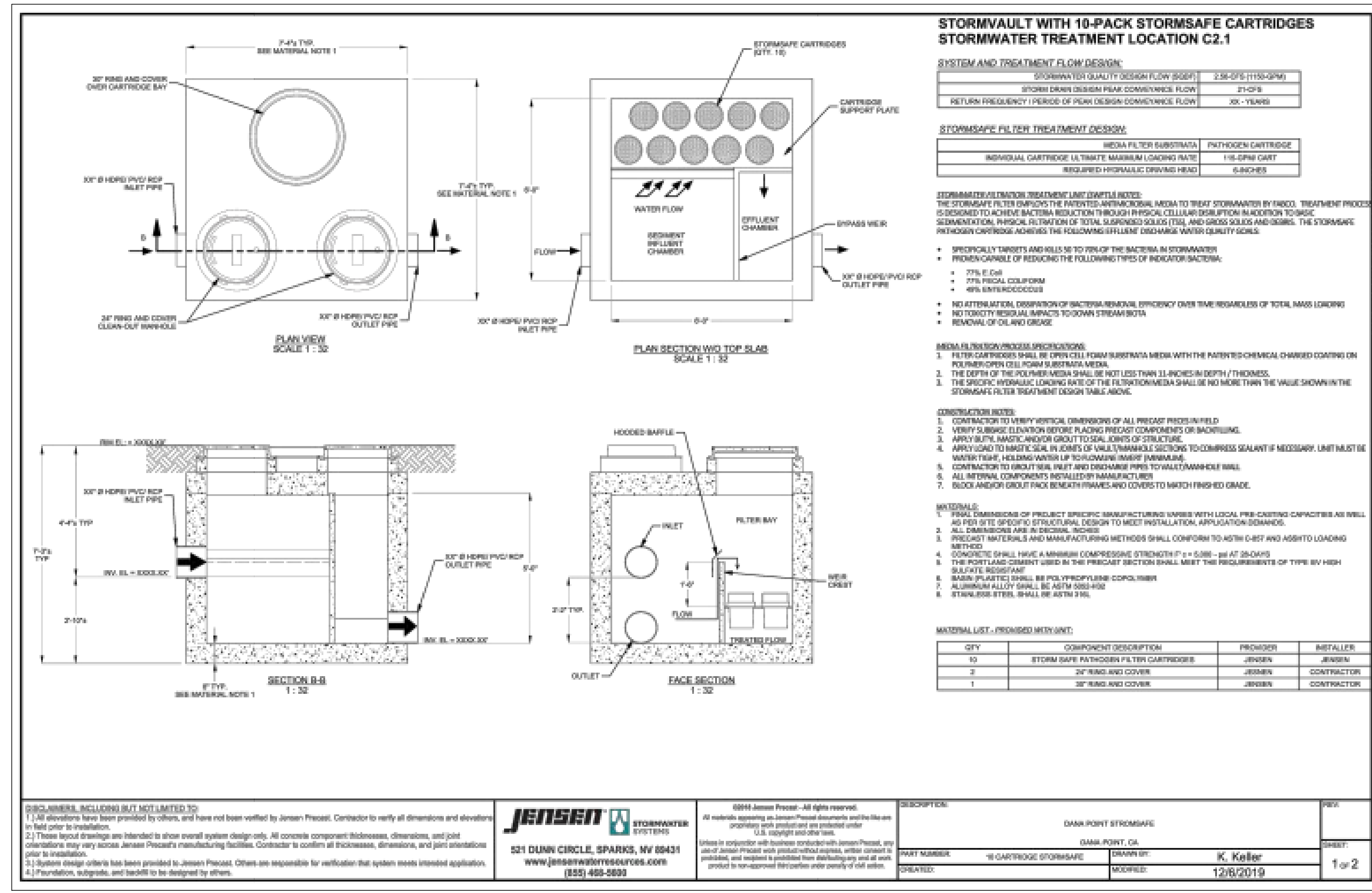
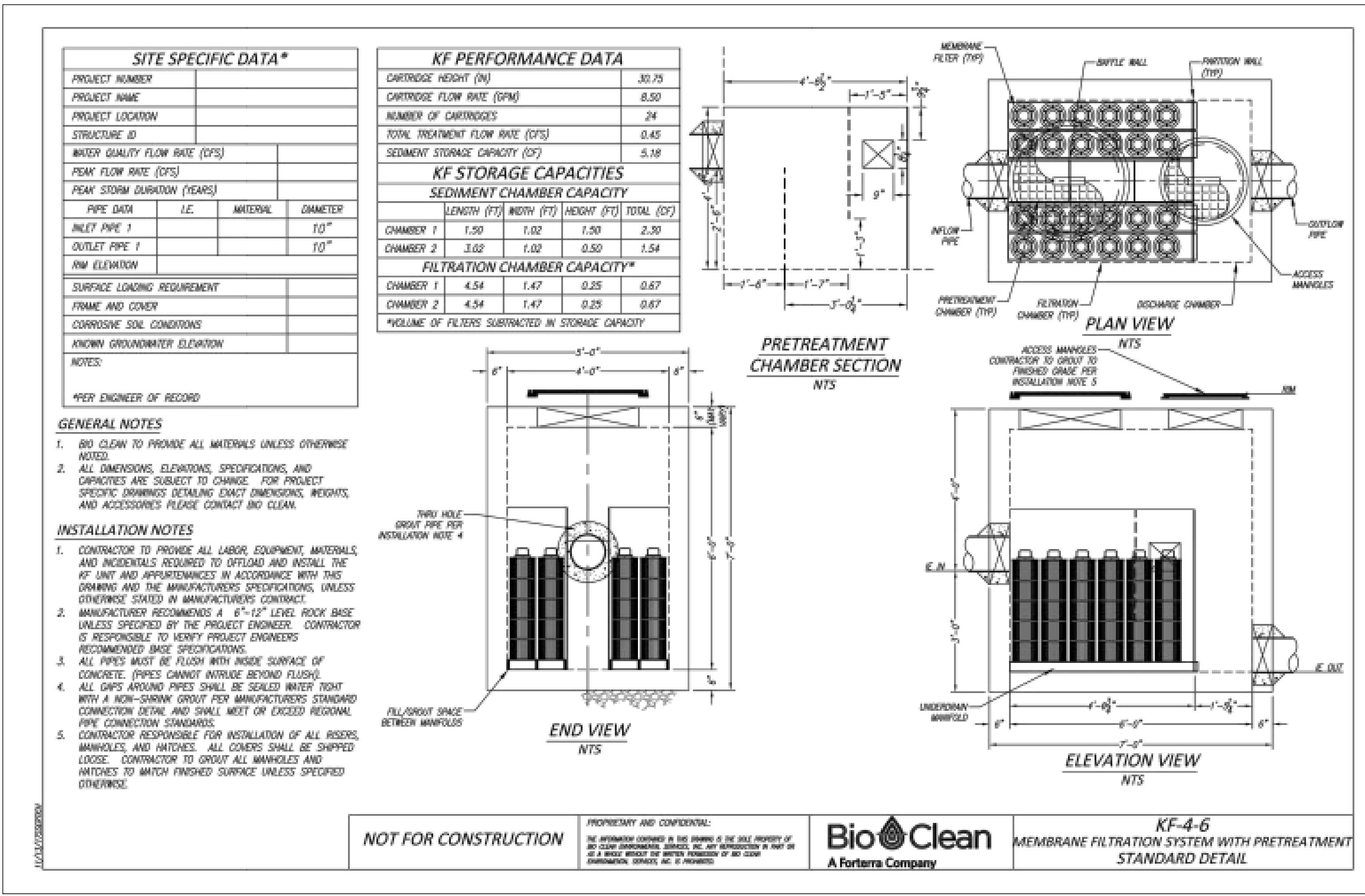
DANA POINT HARBOR PARTNERS, LLC



MASTER WATER QUALITY MANAGEMENT PLAN

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

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DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC

BWP BURNHAM IWARD PROPERTIES | **R.D. OLSON** DEVELOPMENT | **BELLWETHER** FINANCIAL GROUP

MASTER WATER QUALITY MANAGEMENT PLAN

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHT 3 OF 3

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Impaired Water Bodies

Listing a water body as impaired in California is governed by the [Water Quality Control Policy for developing California's Clean Water Act Section 303\(d\) Listing Policy](#). The State and Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the [Federal Clean Water Act](#).

Final 2014/2016 California Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report)

[2014 and 2016 Integrated Report](#)

[Map](#)

[303\(d\) List](#)

[References](#)

[Data Download](#)

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2014 AND 2016 INTEGRATED REPORT — ALL ASSESSED WATERS

Zoom to county:

All

Show county

Zoom to Regional Board:

All

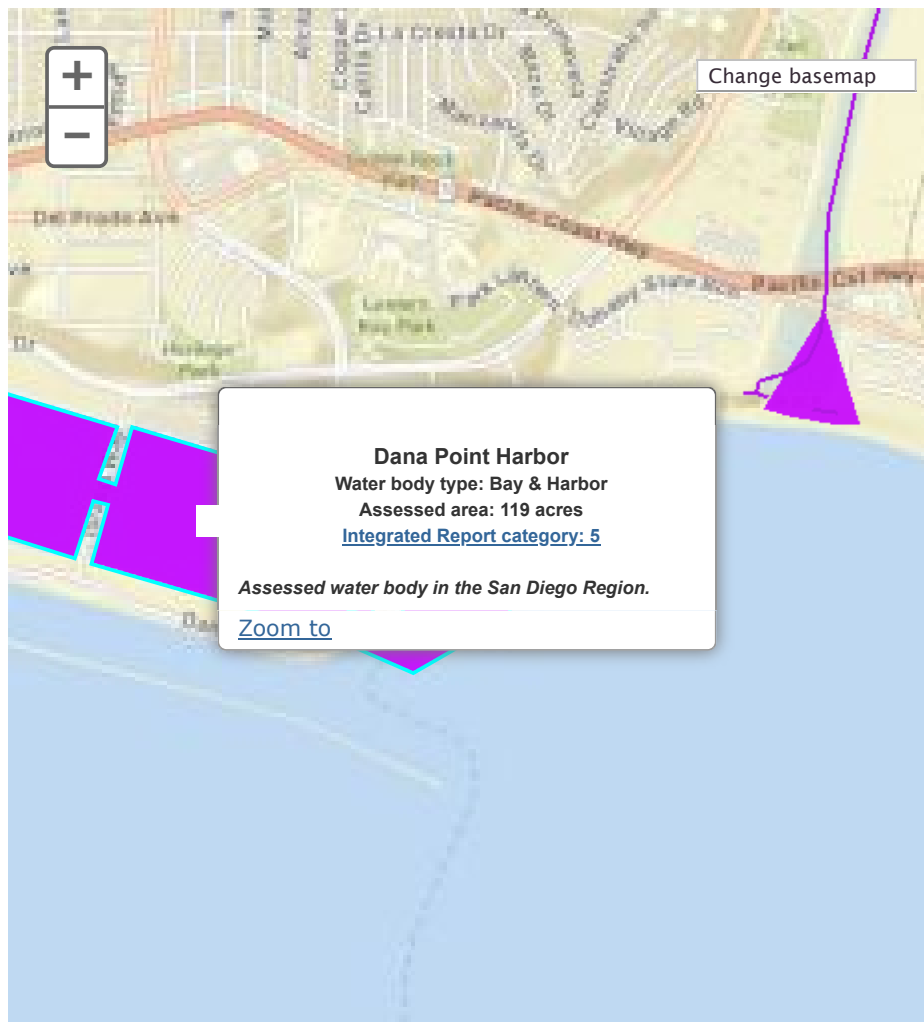
Show Regional Board

[Map Help](#)

Zoom to water body: (Filter: All)

Filter list by:

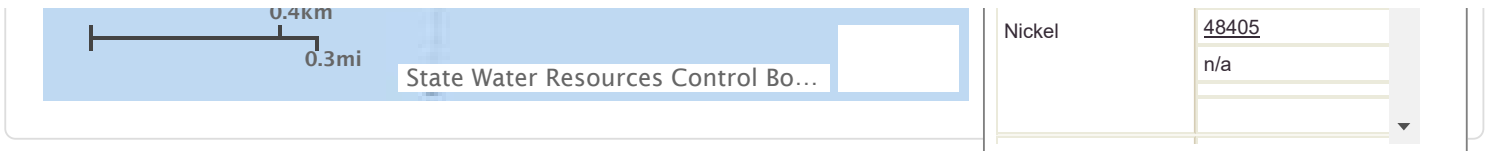
[Reset list](#)



Dana Point Harbor Pollutant assessments


[Close](#)

Pollutants	Listing Decision	Report Link	Potential Sources	Schedule	Comments
Indicator Bacteria	List on 303(d) list (TMDL required list)	34003	n/a	Est. TMDL completion: 2005	The listed indicator bacteria is total coliform for SHELL.
Lead	Do Not List on 303(d) list (TMDL required list)	48407	n/a		
Malathion	Do Not List on 303(d) list (TMDL required list)	48408	n/a		
	Do Not List on 303(d) list (TMDL required list)				



The image shows a map on the left and a data table on the right. The map features a blue rectangular area with a black line segment. Above the line, the text '0.4km' is written, and below it, '0.3mi' is written. To the right of the map is a white box containing the text 'State Water Resources Control Bo...'. The data table on the right has a header row with 'Nickel' and a value of '48405'. Below this is a row with 'n/a'. The table has a vertical scrollbar on the right side.

(Updated 4/2/19)

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The State Water Board is one of six environmental entities operating under
the authority of the California Environmental Protection Agency
[Cal/EPA](#) | [ARB](#) | [CalRecycle](#) | [DPR](#) | [DTSC](#) | [OEHHA](#) | [SWRCB](#)

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Final 2014/2016 California Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report)

[2014 and 2016 Integrated Report](#)

[Map](#)

[303\(d\) List](#)

[References](#)

[Data Download](#)

[Contact Us](#)

2014 AND 2016 INTEGRATED REPORT — ALL ASSESSED WATERS

Zoom to county:

All

Show county

Zoom to Regional Board:

All

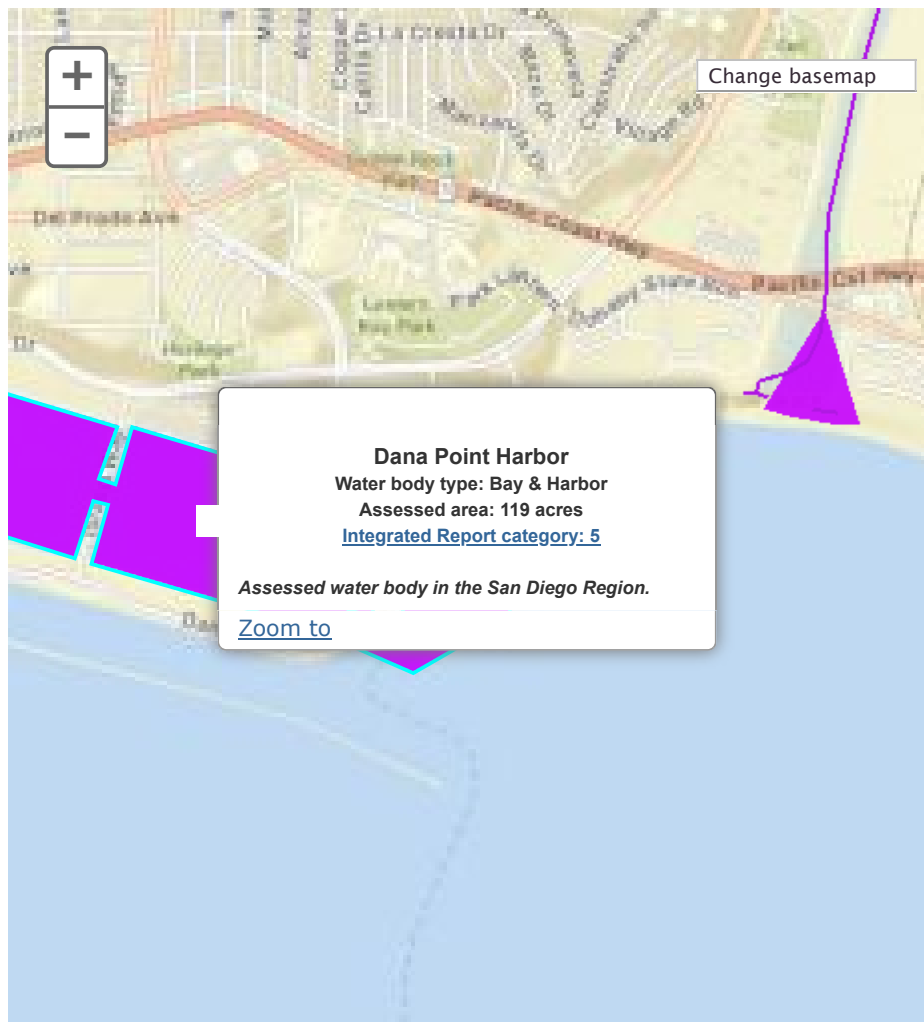
Show Regional Board

[Map Help](#)

Zoom to water body: (Filter: All)

Filter list by:

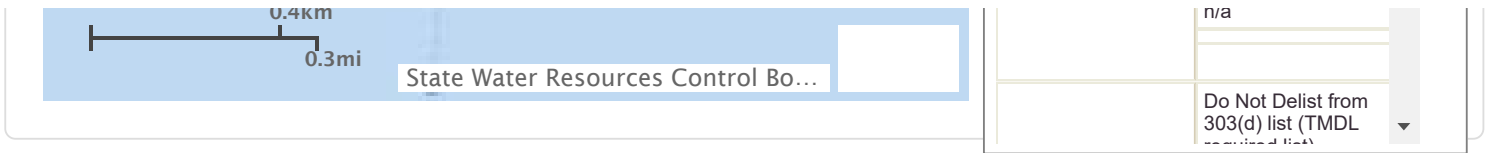
[Reset list](#)



Dana Point Harbor Pollutant assessments

[Close](#)

Pollutants	Listing Decision	Report Link	Potential Sources	Schedule	Comments
Oxygen, Dissolved	List on 303(d) list (TMDL required list)	48410	n/a	Est. TMDL completion: 2005	
pH	Do Not List on 303(d) list (TMDL required list)	48411	n/a		
Selenium	Do Not List on 303(d) list (TMDL required list)	48406	n/a		
Silver	Do Not List on 303(d) list (TMDL required list)	48409	n/a		



The image shows a map area with a scale bar indicating 0.4km and 0.3mi. Below the map is a table with a dropdown menu. The dropdown menu is currently set to 'n/a' and has a label 'Do Not Delist from 303(d) list (TMDL assigned Body)'.

n/a
Do Not Delist from 303(d) list (TMDL assigned Body)

(Updated 4/2/19)

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December 2015

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

- Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a “one size fits all” maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
- Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
 - Standing water remains in the vault between rain events, or
 - Bypass occurs during storms smaller than the design storm.
 - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
 - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.
Applicant's Address: PO. Box 869
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan: Modular Wetland system – Linear Treatment System performance Monitoring Project*, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data*, April 2014
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring*, April 2014.

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:

Download at <http://www.modularwetlands.com/>

Contact Information:

Applicant: Greg Kent
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: <http://www.modularwetlands.com/>

Ecology web link: <http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html>

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants.



Date: 11-01-17

Project: 5761 – Audi Murphy Ranch East and West Paseo

To Whom It May Concern,

The MWS Linear will be sized in accordance with its TAPE GULD approval. The system is approved at a loading rate of 1 gpm/sq ft. The MWS Linear has General Use Level Designation at this loading rate for TSS (Basic), phosphorous and dissolved metals (Enhanced). For this project design, sizing, loading will be reviewed by a Modular Wetland representative for final approval to ensure the system is sized appropriately.

For this project we are sizing the MWS units to treat a large volume. Due to this large volume we are using a 69% safety factor on our media loading rate and only sizing at a loading rate of 0.31 gpm/sf. Using a safety factor between 65% and 75% will greatly prolong the life of the Wetland MEDIA and decrease the long term maintenance costs.

If you have any questions please feel free to contact us at your convenience.

Sincerely,

John R. Hayden
Stormwater Engineer





Modular Wetlands[®] System Linear

A Stormwater Biofiltration Solution



OVERVIEW

The Bio Clean Modular Wetlands® System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands® incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands® System Linear.



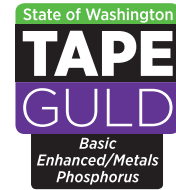
PERFORMANCE

The Modular Wetlands® continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the Modular Wetlands® has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the Modular Wetlands® harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	69% REMOVAL OF TOTAL ZINC	38% REMOVAL OF DISSOLVED COPPER	64% REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	50% REMOVAL OF TOTAL COPPER	95% REMOVAL OF MOTOR OIL	67% REMOVAL OF ORTHO PHOSPHORUS	85% REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.



Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft² loading rate. The highest performing BMP on the market for all main pollutant categories.



California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.



Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.



Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.



MASTEP Evaluation

The University of Massachusetts at Amherst - Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.



Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

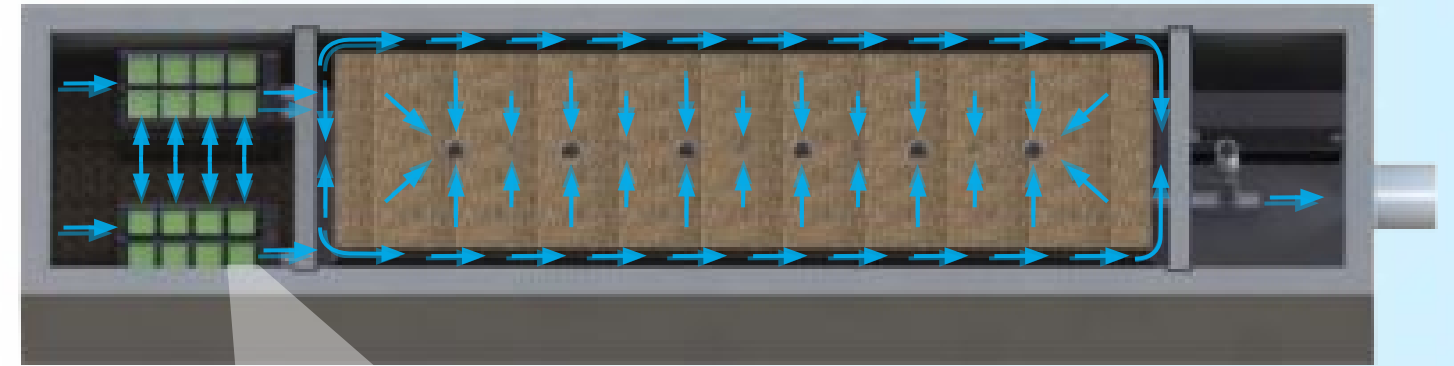


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bio retention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

PRE-FILTER CARTRIDGES

- Over 25 sq. ft. of surface area per cartridge
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

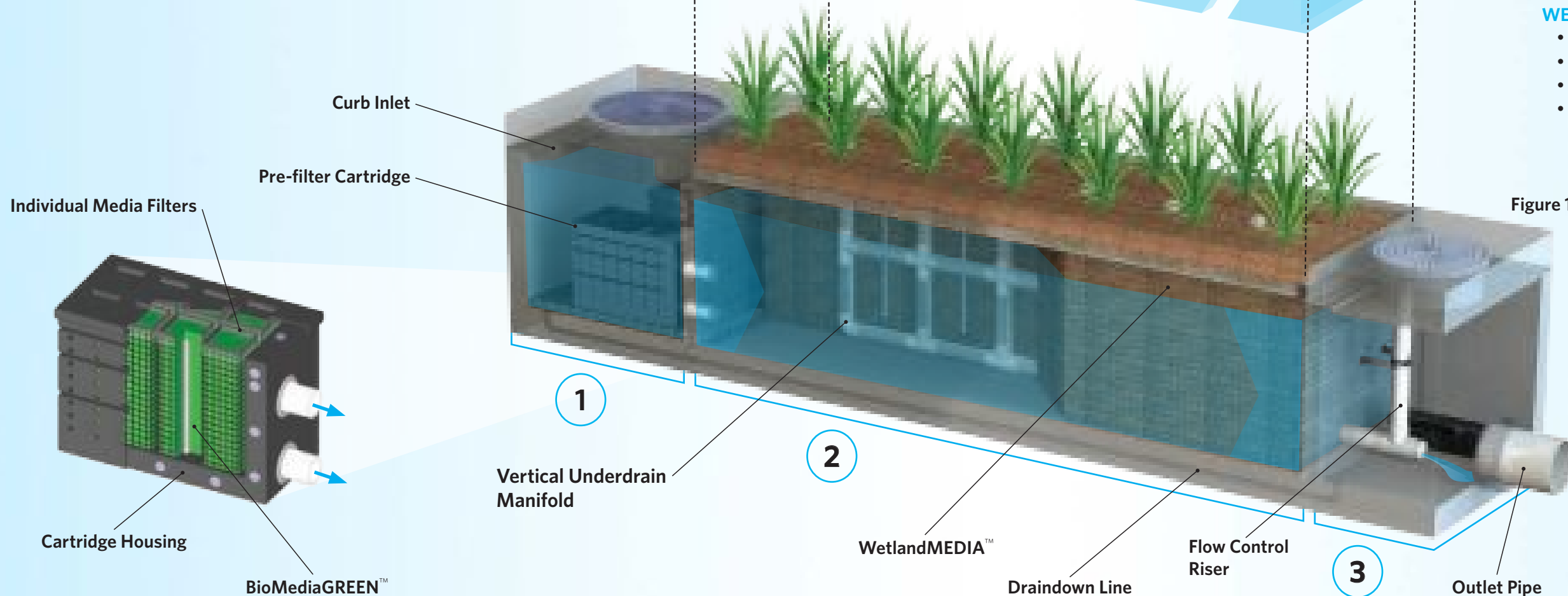


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated



CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available “pipe-in” options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



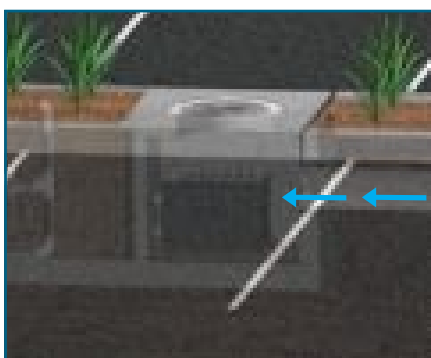
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system’s patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretenion systems. Another benefit of the “pipe-in” design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.



DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

ORIENTATIONS

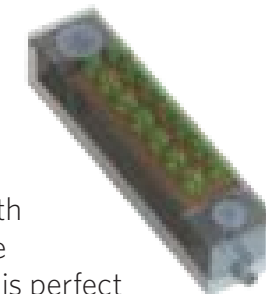
SIDE-BY-SIDE

The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



END-TO-END

The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.



BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system’s treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

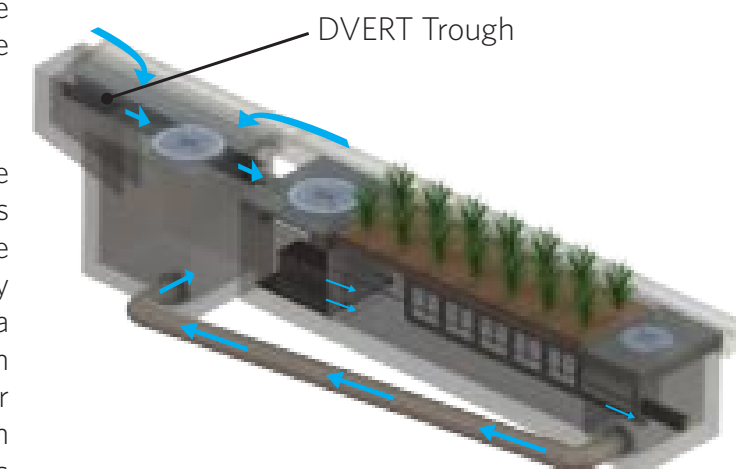
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the Modular Wetlands® for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the Modular Wetlands® and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over



to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the Modular Wetlands® to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements. Since the Modular Wetlands® is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLAND MEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4' x 4'	23	0.052
MWS-L-4-6	4' x 6'	32	0.073
MWS-L-4-8	4' x 8'	50	0.115
MWS-L-4-13	4' x 13'	63	0.144
MWS-L-4-15	4' x 15'	76	0.175
MWS-L-4-17	4' x 17'	90	0.206
MWS-L-4-19	4' x 19'	103	0.237
MWS-L-4-21	4' x 21'	117	0.268
MWS-L-6-8	7' x 9'	64	0.147
MWS-L-8-8	8' x 8'	100	0.230
MWS-L-8-12	8' x 12'	151	0.346
MWS-L-8-16	8' x 16'	201	0.462
MWS-L-8-20	9' x 21'	252	0.577
MWS-L-8-24	9' x 25'	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

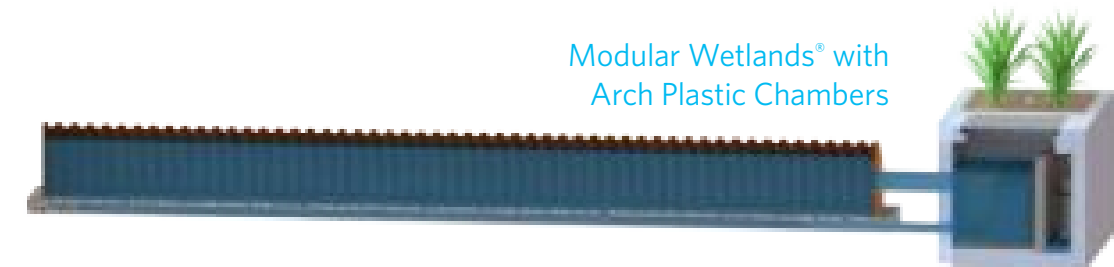
VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



Modular Wetlands® with Box Culvert Prestorage

The Modular Wetlands® System Linear offers a unique advantage in the world of biofiltration due to its exclusive horizontal flow design: Volume-Based Design. No other biofilter has the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The systems horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points. In the example above, the Modular Wetlands® is installed downstream of underground box culvert storage. Designed for the water quality volume, the Modular Wetlands® will treat and discharge the required volume within local draindown time requirements.



Modular Wetlands® with Arch Plastic Chambers

DESIGN SUPPORT

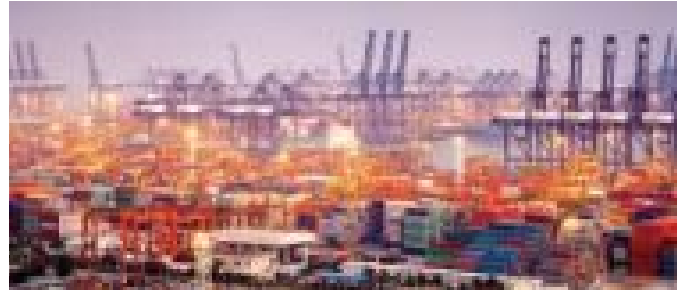
Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands®, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- BUILT-IN ORIFICE CONTROL STRUCTURE
- MEETS LID REQUIREMENTS
- WORKS WITH DEEP INSTALLATIONS

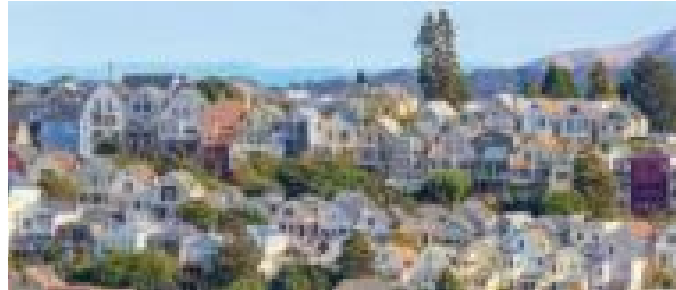
APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The Modular Wetlands® has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the Modular Wetlands®. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



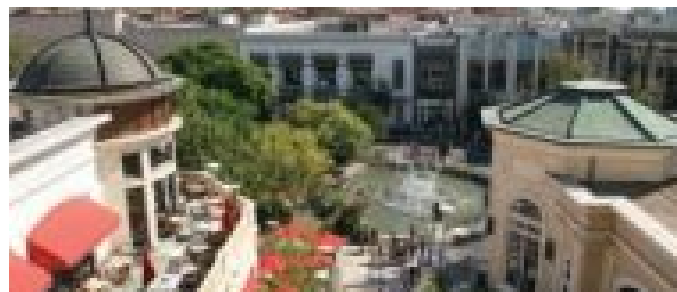
STREETS

Street applications can be challenging due to limited space. The Modular Wetlands® is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the Modular Wetlands® can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The Modular Wetlands® can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

- Agriculture
- Reuse
- Low Impact Development
- Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the Modular Wetlands®, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.



A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands®. Unlike other biofiltration systems that provide no pretreatment, the Modular Wetlands® is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



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Wetland MEDIA™

VS

TRADITIONAL BIORETENTION MEDIA



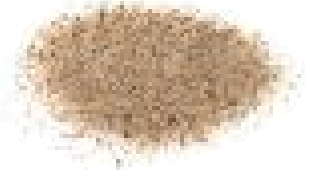
“Ideal for Phosphorus impaired water bodies and Nutrient TMDLs.”

- + No ORGANICS
- + REMOVES PHOSPHORUS
- + 48% VOID SPACE
- + GREATER SURFACE AREA
- + MAXIMUM EVAPOTRANSPIRATION
- + HIGH ION EXCHANGE CAPACITY
- + LIGHT WEIGHT

Compost (Organics)



+
Sand



- CONTAINS ORGANICS
STUDIES HAVE SHOWN THAT BIORETENTION MEDIA CAN LEACH NUTRIENTS SUCH AS PHOSPHORUS.
- MAY LEACH PHOSPHORUS
- 40% VOID SPACE
- MINIMAL SURFACE AREA

FABCO INDUSTRIES, INC
BEACH / HARBOR STORM WATER
TEST PROGRAM



Prepared by:

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350 Jericho Turnpike, Ste 300
Jericho, NY 11753
Tel: 516-433-4148

Len Emma
John Markee

Executive Summary

Under an agreement between a local municipality and Fabco Industries, a Long Island based manufacturing firm, during the summer of 2006 a series of tests were performed on the Fabco catch basin inserts to evaluate their effectiveness in reducing certain identified bacteria contained in the surface water runoff. The product testing took place over a 90 day period at a beach front parking lot with known high levels of bacterial contamination. The device being tested was Fabco's StormBasin product which was supplied with two filter cartridges configured for maximum bacteria reduction.

The testing protocol focused on collecting efficiency data under real storm conditions. Only minimal maintenance was performed during the 90 day period and the same filtering cartridges were used from start to finish in order to better represent actual conditions. Sampling was also varied so that effectiveness could be measured during first flush as well as during the storm event. The report data presented here confirms that the StormBasin product was highly effective in reducing 3 types of indicator bacteria: E.Coli (77%), Enterococcus (49%) and Fecal Coliform (77%) .

Although not reported as part of the test, the StormBasin also collected considerable trash and debris such as plastic bottles and caps, candy wrapper, cigarette butts, and other material that would have been directed into the harbor.

FABCO INDUSTRIES, INC BEACH / HARBOR STORM WATER TEST PROGRAM

Introduction:

Rainwater flowing over paved surfaces can accumulate a variety of pollutants that in many cases are then transported and deposited in a storm sewer system. The more common pollutants associated with this runoff water include: sediments from simple erosive actions; oils, grease and even heavy metals such as chrome, zinc and cadmium from motor vehicles; nutrients, pesticides and other chemicals from agricultural activities, and potentially pathogenic organisms including bacteria that are released into the environment from poor land use, flawed waste disposal practices and other sources. In many cases this contaminated water finds its way to local rivers, lakes and estuaries, which results in the degradation of water quality. In fact, the EPA identifies surface water runoff as the leading contributor to water pollution.

Under section 303d of the Federal Clean Water act, each state is required to generate a list of impaired water ways that do not meet the water quality standards for their intended use. Currently, the EPA lists over 38,000 impaired waters in the United States. The top 5 impairments are: Mercury, Pathogens, Sediments, heavy metals (other than mercury) and nutrients.

This study focuses on the Fabco Industries StormBasin filter and its effectiveness in treating bacteria in surface water runoff. For these trials, Fabco StormBasin filters were installed in catch basin drains located in the parking field of a small public beach. This particular coastal area was selected based on a history of high bacterial counts following rain events, which may have contributed to beach closings and a prohibition of shell fishing in the area.

Background:

The Fabco Industries StormBasin is a water-filtering system that installs below the iron grate of an existing storm water sewer. The StormBasin can be installed into most existing grated storm water drains without construction or other modifications. In this position the StormBasin intercepts and treats many of pollutants suspended and/or contained in surface water runoff including: sediments, trash and debris; oils, grease and other toxic hydrocarbon-based chemicals as well as potentially harmful bacteria

Related articles on bacteria, pathogens and the impact from storm water can be found on line at www.oasisdesign.net and at the Federal EPA website: <http://www.epa.gov/beaches/>

The Technology:

The Fabco StormBasin system consists of a large tub for the collection of raw water, sediments and debris and one or more filtering cartridges located at the bottom of the tub, which treat and discharge the clean water into the storm water system.

The StormBasin cartridges are selected based on actual pollutant loads and are user replaceable when required. Currently there are 4 different cartridge configurations to choose from: general purpose, hydrocarbons (oils & grease), bacteria and heavy metals. Each of the cartridge types applies one or more technologies in varying degrees to treat specific pollutants. For bacteria, the Fabco filter consists mainly of polymer foam treated with a proprietary antimicrobial technology.

The patented antimicrobial technology is applied as a liquid to the polymer foam material to form a colorless, odor-less, positively charged coating which chemically bonds, in a virtually irremovable manner, to the treated surface. At the microscopic level it resembles a layer of electrically charged stiff fibers or swords extending outward in all directions. When a microorganism comes in contact with the treated surface, the swords puncture the cell membrane and an electrical charge shocks the cell. Since nothing has been transferred to the now dead cell, the antimicrobial treatment doesn't lose strength and is ready for the next organism to contact it.

Site description:

The sewer drain selected for the study had a 24"x48" grate and featured a rear open box inset into the concrete curb. Depth of the vault below the grate was approximately 40".

The drain was located in the Northeast corner of the parking field and serviced approximately 5900 square feet of black top paving. The parking field was slightly sloped towards the drain causing considerable accumulations of sediments, trash and debris.

Fabco Industries installed a 22"x 44" StormBasin (p/n 9731- 1E) which was configured for the rear open curb box. This configuration features a formed rubber flap that extends from the back edge of the tub into the rear open box. This flap enhances the unit's ability to capture the very low flows that are generated typically during the first flush period of a storm. The StormBasin selected featured two (2) Bacteria filtering cartridges p/n 9718-2 (Yellow ring)



Objectives:

These field studies involved several major objectives. The most important of these was the evaluation of the effectiveness of the StormBasin filters to remove various bacteria contained in stormwater.

Secondly, as an integral part of the analysis of bacteria in stormwater, these studies were designed to provide valuable information with respect to the use of automatic/remote sampling systems Vs manual grab sampling. This aspect of the trials was of special interest in that very little comparative information was available concerning field sampling during storm events.

Thirdly, these trial runs were also focused on understanding the operational characteristics and effectiveness of the StormBasin when exposed to actual field conditions. Most importantly, while it was assumed that the unit would function in a first flush condition, based on static laboratory evidence, would it continue to be effective over an extended time and during continuous flow conditions that exist during a storm event.

A list of beaches listed under the National Beach Act can be found at <http://www.epa.gov/waterscience/beaches/list/list-of-beaches.pdf>. Information on Bacterial water quality standards can be found at: <http://www.epa.gov/waterscience/beaches/local/statrept.pdf>

Methods:

The sampling protocol called for the simultaneous collection of both an untreated and treated sample during a single rain event. The samples collected were evaluated by an independent laboratory¹ for reductions in the common indicator organisms: Fecal Coliform, E. coli and Enterococcus bacteria.

The monitoring would take place over an indefinite time period with little or no maintenance being performed on the unit during the monitoring period.

This report includes data accumulated during a 3-month period starting in August and ending in November of 2006. Samples were collected on 5 occasions. In total the site experienced 32 separate storm events where rain accumulations exceeded 0.01”

**Total rain events and accumulations
(Observed daily data Long Island Mac Arthur AP)**

Time period	No# of days with precip	Time period	No# of days with precip
Aug. 14 – 31 Total 5.58	8 >= .01 6 >= 0.1 4 >= 0.5 2 >= 1.0 1 >= 2.0	Sept. 1 – 30 Total 4.29”	9 >= .01 7 >= 0.1 1 >= 0.5 1 >= 1.0 1 >= 2.0”
Oct. 1 – 31 Total 7.09”	12 >= .01 8 >= 0.1 4 >= 0.5 2 >= 1.0 2 >= 2.0	Nov. 1 – 8 Total 1.9”	3 >= .01 3 >= 0.1 1 >= 0.5 1 >= 1.0

Monitoring duration: 87 days / 32 storm events with >= 0.01” of rain
Total rain fall >= 18.86” – See appendix D for monthly weather data

Sampling dates and collection methods

Sampling Date	Rain fall: 24 hrs	Collection method	Event
August 15	.09"	Auto	New cartridge/1 st flush
August 25	1.58"	Auto	Used Cartridge/ 1 st flush
September 14 (2 sets)	.58"	Auto & Manual	1 st flush / In process
October 20	.34"	Manual	In process
Nov 8	1.67"	Manual	In process

A new StormBasin was installed on August 14th at the start of the monitoring process. Weather data confirmed there had been no rain events for the first 14 days of the month.

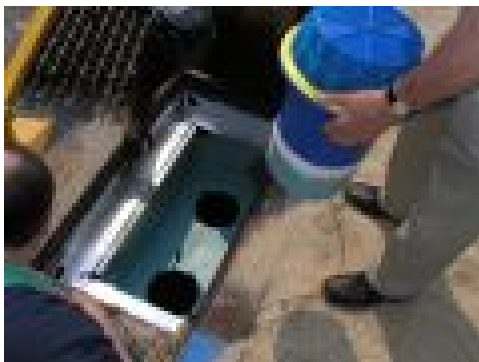
Water samples would be collected either automatically or manually using a battery powered, Global Water, Model SS201 Storm water sampler (appendix F) and two standard bacteria cartridges.



The Global unit features a large, watertight plastic case and dual individually controlled peristaltic sampling pumps with 2 sample bottles. For this test, the standard 1-gallon sampling bottles were replaced with smaller 1 liter bottles. Use of the smaller bottles allowed us to insert refrigerated “cool” packs inside the case to refrigerate the samples. With this method adequate cooling as prescribed by EPA testing protocols could be maintained for about 12 to 16 hours.

To collect the water samples leaving the StormBasin special collection “pails” or “buckets” were designed to attach and seal directly to the bottom of the standard Fabco Cartridge body. In the image below, the standard cartridge body is dark blue. The collection pail area is a light green color and is sealed to the cartridge body with white tape.

Collection pail features:



- 1) A vertical over-flow pipe – To maintain approximately 2 liters of water in the pail while allowing excess water to escape.
- 2) A quick connect coupling – Connects pail to the supply line of the peristaltic pump and sample bottle.
- 3) A sensor switch - Activates pumps when the minimum level of water has accumulated in the pail.

Two collection pails were fabricated. The first was attached to the standard Fabco filtering cartridge. The second was attached to an empty cartridge- no filtering media. These two filters were then installed into the bottom of the StormBasin unit with the supplies lines routed to the Global Sampler.



Sampling:

During a storm event surface water enters the StormBasin, flows into and through the cartridges and collects in the pails. In automatic operation when approximately, 2 liters of water has collected, the sensor switch activates the pumps and two **First Flush** water samples are collected. The cartridge with the media left in place would supply a sample of treated water. The empty cartridge would collect a sample of untreated raw water.

Operational note: Prior to automatic testing on August 25 and September 14th the sampling cartridges were removed from the StormBasin in order to drain and clean the collection pails. During removal of the cartridges, collected sediments and debris were left undisturbed.

Manual samples were taken on September 14th, October 20th and on November 8th. These samples were acquired during the rain event and represent a snap shot of the treatment process. Manual samples were taken by pushing the ON button for each pump long enough to fill a sampling bottle. These samples were taken somewhere between 1 and 6 hours from the start of the storm. The filtering cartridges were not removed / cleaned before the manual sampling procedure as any water collected in the pails previous to the storm event would have been displaced.

Results:

The daily results of the monitoring study are presented in the attached tables A, B & C. In summary:

Bacteria	Min reduction	Max Reduction	Average
Fecal Coliform	64%	92%	77%
E.coli	64%	85%	77%
Enterococcus	11%	81%	49%

¹ Sample analysis provided by: EcoTest Laboratories Inc, 377 Sheffield Ave, North Babylon, NY 11703

Tel: 631 422 5777 See Appendix E for individual daily reports

The StormBasin efficiency on Fecal Coliform and E.coli during the field study was somewhat expected based on previous dynamic cartridge studies performed for Fabco in local testing laboratories. These laboratory tests consistently showed a greater than 80% reduction in both bacteria types. However, these previous “bench studies” did not simulate real world conditions especially in terms of the actual water composition, suspended solids, flow rates and sampling difficulties. The results of these field studies, on the other hand, demonstrate that the cartridges are effective in the field and can continue to treat bacteria at high efficiency over time even with minimal maintenance.

This study also represents Fabco’s first testing on the Enterococcus bacteria. Compared to the results for E.coli and Fecal Coliform the cartridge does not seem as effective for this bacteria strain. But it is important to recognize here that there were unexplained large fluctuations in the reported results for enterococci that had a significant impact on the final results. It’s possible that the testing and/or sampling protocols need to be modified or reevaluated to better report on this type of bacteria. However we shouldn’t

lose sight that a 49% reduction of this bacteria combined with the nearly 80% reductions recorded for Fecal Coliform and E.coli does indicate good reductions in potentially pathogenic single cell bacteria overall.

Conclusion:

In summary, it is apparent that the Fabco StormBasin can provide significant reductions in the bacteria normally associated with stormwater.

This is particularly significant in view of the fact that the unit operated at a uniform level of efficiency for 3 months during which 32 individual storm events deposited nearly 19 inches of rain on the paved surfaces surrounding this drain. Moreover, the attendant accumulation of over 15 pounds of sediment and debris in the StormBasin did not have any measurable impact on the operational efficiency of the unit.

In general, good results were achieved with the use of the auto-sampling equipment. Analytical results indicated that samples collected with the equipment in the automatic mode were comparable to those collected manually.

Table A: Fabco Industries, StormBasin: effectiveness on E. coli bacteria

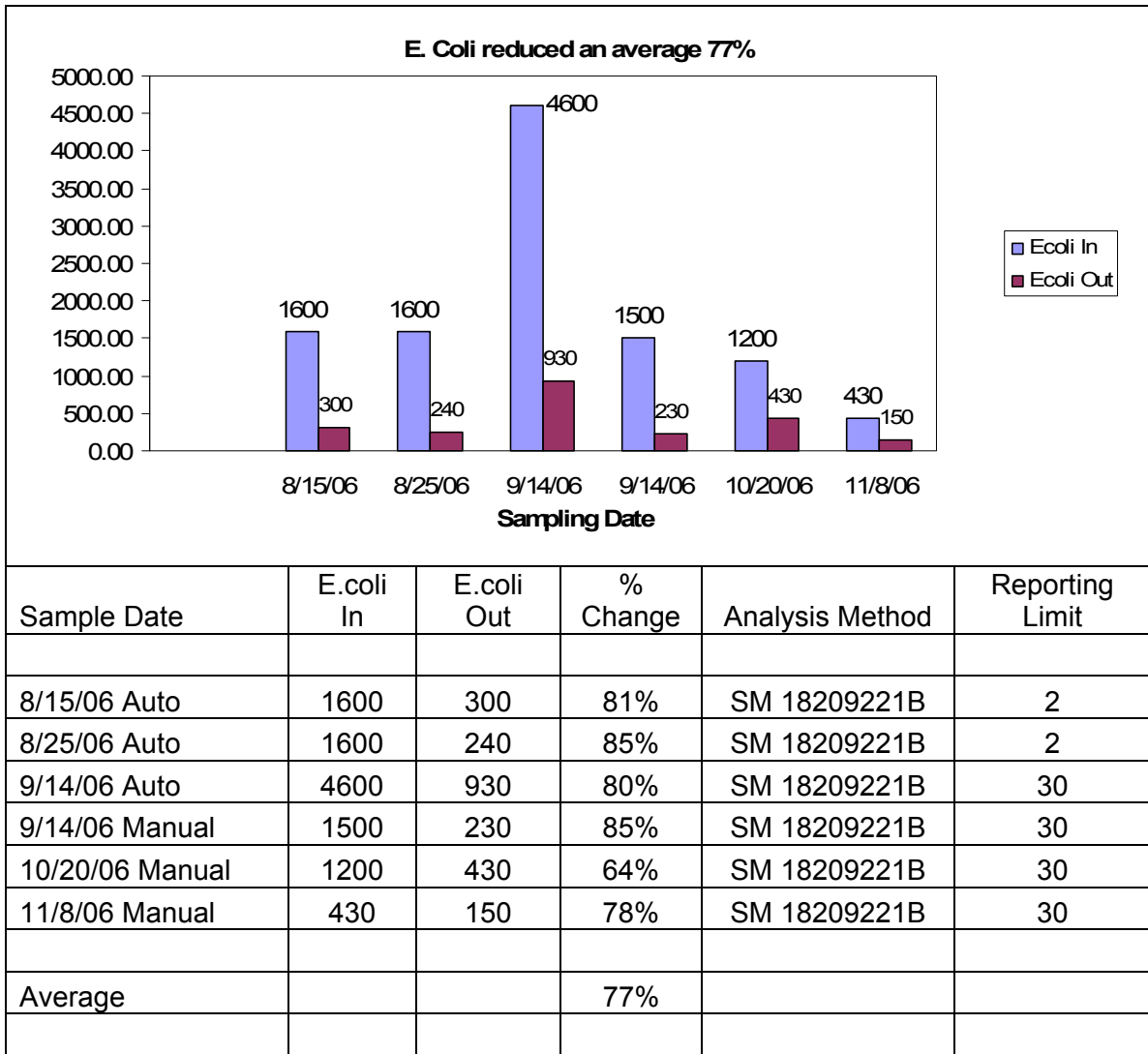


Table B: Fabco Industries, StormBasin: effectiveness on Fecal coliform bacteria

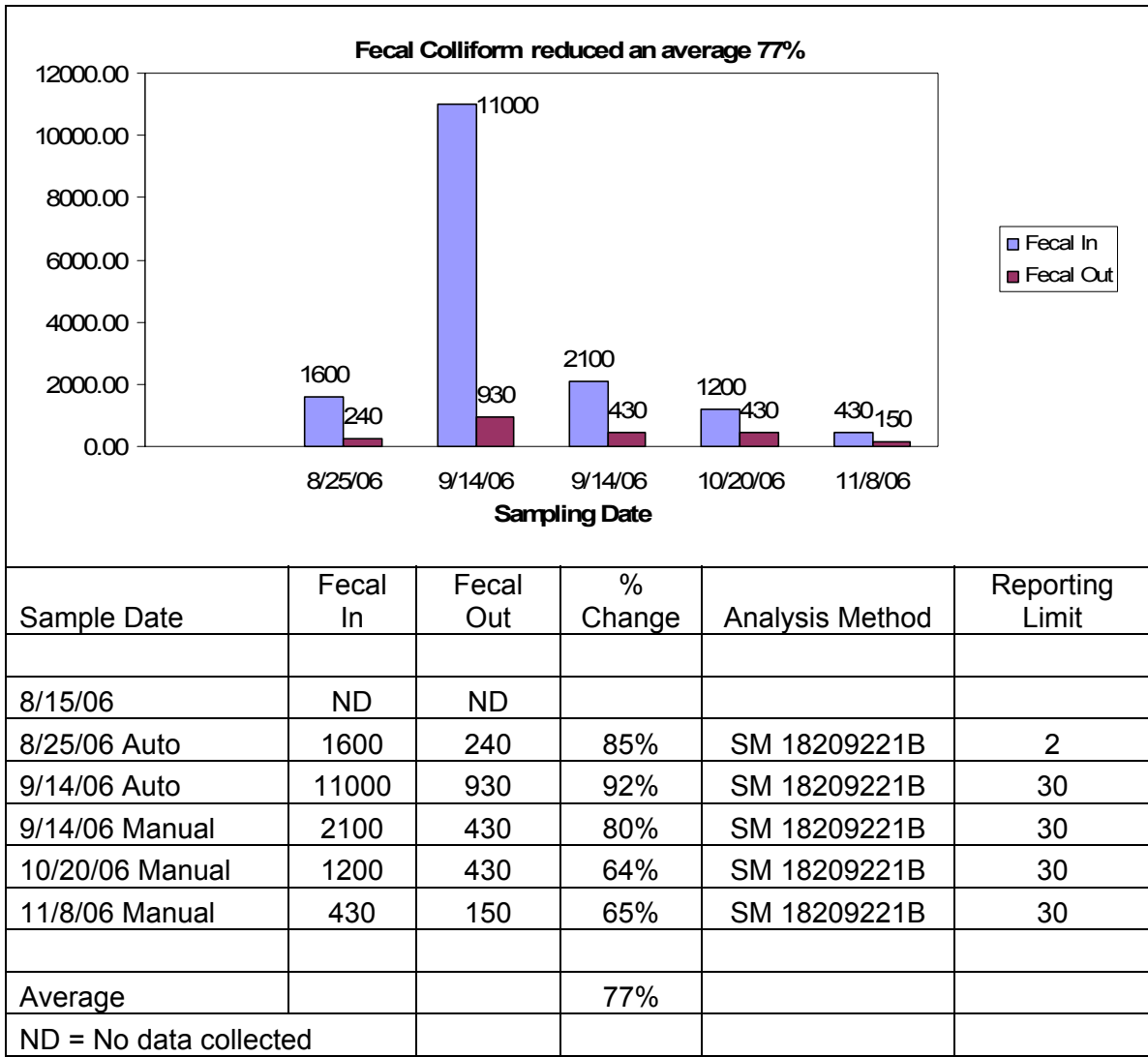
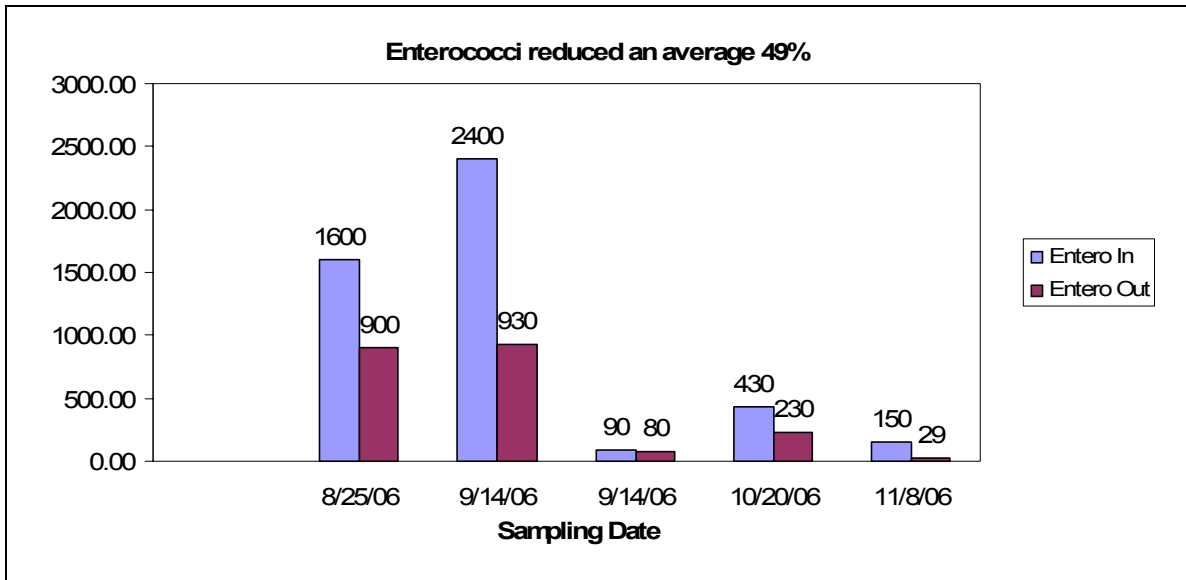


Table C: Fabco Industries, StormBasin: effectiveness on Enterococci bacteria



Sample Date - Method	Enterococci In	Enterococci Out	% Change	Analysis Method	Reporting Limit
8/15/06	ND	ND			
8/25/06 Auto	1600	900	44%	Enterolert	2
9/14/06 Auto	2400	930	61%	Enterolert	30
9/14/06 Manual	90	80	11%	Enterolert	30
10/20/06 Manual	430	230	47%	Enterolert	30
11/8/06 Manual	150	29	81%	Enterolert	30
Average			49%		
ND = No data collected					

References

Articles, papers, websites and guidance documents
used in the preparation of the testing protocol

United States Environmental Protection Agency, Office of Science and Technology, Document EPA/821/R-97/004, March 2000: **Improved Enumeration Methods for Recreational Water Quality Indicators: Enterococci and Escherichia Coli**

United States Environmental Protection Agency, Office of Water (EN-336), Document 833-B-92-001, March 1992: **NPDES Storm Water Sampling Guidance Document**

Washington State Department of Ecology, Publication #02-10-071, December 2002 (rev. 1/05): **How to do Stormwater sampling, A guide for industrial facilities.**

United States Environmental Protection Agency, Office of Research and Development National Exposure Research Laboratory, Cincinnati, OH 45268, August 2005, Larry J. Wymer, Kristen P. Brenner, John W. Martinson, Walter R. Stutts, Stephen A. Schaub, Alfred P. Dufour: **The EMPACT Beaches Project: Results from a study of Microbiological Monitoring in Recreational Waters**

United States Environmental Protection Agency, Office of Science and Technology, Document 823-R-99-002, March 1999: **Review of Potential Modeling Tools and Approaches to Support the BEACH Program**

United States Environmental Protection Agency, Office of Water Regulations and Standards, Criteria and Standards Division, Washington D.C, Document EPA440/5-84-002, January 1986: **Ambient Water Quality Criteria for Bacteria- 1986**

Forester Communications Inc., PO Box 3100, Santa Barbara, CA 93130, Stormwater Magazine, January/February 2002, Volume 3 Number 1, Author: Johnny Barron: **Sampling 101**

NOAA, National Oceanic and Atmospheric Administration, National Weather Service Forecast office, Observed Weather and NOWdata, View on the web at <http://www.weather.gov/climate/index.php?wfo=okx>

Websites for information on bacteria and testing

Eagles to the Nest, <http://www.iub.edu/~bradwood/eagles/fecal.htm>, Fecal Coliform Test, Class Room Activity

Switzerland County High School's Advanced Placement Environmental Science Class, Fecal Coliform: <http://www.switzerland.k12.in.us/watershed/fecal.html>

Oasis Designs, Fecal Coliform Bacteria Counts: What They Really Mean about water quality, <http://www.oasisdesign.net/water/quality/coliform.htm>

Specifications for the StormSafe-Cartridge Vault

Project Name _____

Project Location _____

Contract Number _____

PART 1 GENERAL

1.1 Description

The Contractor shall furnish and install the StormSafe-Cartridge stormwater treatment system, complete and operable as specified herein and in accordance with the requirements of the plans and contract documents.

The StormSafe-Cartridge stormwater treatment system shall consist of an underground precast structure that houses passive downflow media filtration cartridges. The cartridges shall provide a tortuous path for stormwater to travel. Each filter cartridge shall operate at a predetermined flow rate with the aid of a headwall and be capable of treating suspended pollutants such as sediment, oils and grease, pathogens, heavy metals and nutrients. The recommended hydraulic drop between inlet and outlet pipe invert is 2.17 ft (0.66 m), and assumes free discharge conditions and negligible inlet pipe submergence. Lesser drop is allowed and would result in a backwater being imposed on the upstream drainage system. Filter medium shall be designed to be non-leaching, non-biodegradable and safe for outdoor use.

1.2 Manufacturer

The StormSafe-Cartridge stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of three (3) years. The StormSafe-Cartridge stormwater treatment system shall be supplied by Fabco Industries located at 66 Central Ave, Farmingdale, NY 11735 (+1 631-393-6024) or an authorized representative\distributor, without exception.

1.3 Related Sections

A. Section []:

1.4 Submittals

- A. Fabco Industries, or authorized supplier, to submit shop drawings for StormSafe-Cartridge stormwater treatment system showing the vault, cartridge filters and internal appurtenances. Drawings shall include performance characteristics, principal

dimensions, maximum pick weight, filter placement, location of piping and unit foundation.

B. Fabco Industries, or authorized supplier, shall submit an Operation and Maintenance Manual.

C. Buoyancy and structural calculations available on request

PART 2 PRODUCTS

2.1 Internal Components

All internal components including cartridges, support deck\assembly plate, baffle hood and associated mounting hardware shall be provided by Fabco Industries.

A. Cartridge (housing): Polypropylene/Polyethylene Copolymer

B. Support Deck\Assembly Plate: CRES 300 series plate with Aluminum sub-frame

C. Oil Water and Floatables Baffle Hood: 12 Gauge 304-2B Stainless Steel

2.2 Precast Concrete Vault Components

A. Precast concrete vault structure shall be designed to meet or exceed H-20 load rating

B. Vault joint sealant shall be CONSEAL CS-101 or approved equal.

C. If interior concrete head walls are provided, they shall be sealed to the interior vault walls and floor with a polyurethane construction sealant rated for use below the waterline, SikaFlex 1a or equal. Contractor to provide sealant material and installation unless completed prior to shipment.

D. Frames and covers shall be gray cast iron and shall meet AASHTO H-20 loading requirements. East Jordan Iron Works (EJIW) #1581 and #1480 castings are recommended for repeated vehicular traffic.

2.3 Contractor Provided Components

All contractor-provided components shall meet the requirements of this section, the plans specifications and contract documents. In the case of conflict, the more stringent specification shall apply.

- A. Crushed rock base material shall be six-inch minimum layer of ¾-inch minus rock. Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content. Unsuitable material below sub-grade shall be replaced to engineer's approval.
- B. Concrete shall have an unconfined compressive strength at 28 days of at least 3000 psi (20 MPa), with ¾-inch (19 mm) round rock, a 4-inch (102 mm) slump maximum, and shall be placed within 90 minutes of initial mixing.
- C. Silicone Sealant shall be pure RTV silicone conforming to Federal Specification Number TT S001543A or TT S00230C or Engineer approved.
- D. Grout shall be non-shrink grout meeting the requirements of Corps of Engineers CRD-C588. Specimens molded, cured and tested in accordance with ASTM C-109 shall have minimum compressive strength of 6,200 psi (43 MPa). Grout shall not exhibit visible bleeding.
- E. Backfill material shall be ¾-inch (19 mm) minus crushed rock, or approved equal.

PART 3 EXECUTION

3.1 Precast Concrete Vault

- A. Set precast vault on crushed rock base material that has been placed in maximum 12 inch (300 mm) lifts, loose thickness, and compacted to at least 95-percent of the maximum dry density as determined by the standard Proctor compaction test, ASTM D698, at moisture content of +/-2% of optimum water content.
- B. Vault floor shall slope 1/4 inch (6.35 mm) maximum across the width and slope downstream 1 inch (25 mm) per 12 foot (3.65 m) of length. Vault top finish grade shall be even with surrounding finish grade surface unless otherwise noted on plans.
- C. Inlet and outlet pipes shall be stubbed in and connected to precast concrete vault according to Engineer's requirements and specifications.

- D. If grout is used, Contractor to grout all inlet and outlet pipes flush with or protruding up to 2 inches (51 mm) into interior of vault.

3.2 Ballast

- A. When required, ballast shall be placed to the dimensions specified by the engineer and noted on the data block. Ballast shall not encase the inlet and/or outlet piping.

3.3 Energy Dissipation

- A. Each stormwater filtration system shall include an inlet diffuser to spread the trajectory and reduce the velocity of the inlet flow as well as provide for floatables control and gravity settling of coarse particulates in the pretreatment chamber.

3.4 Headwall

- A. Each stormwater filtration system shall include a headwall to control the rate of flow entering the filters and to provide a bypass mechanism when flows exceed the capacity of the filters (clean or exhausted with pollutants).

3.5 Clean Up

- A. Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the engineer. All filter components shall be free of any foreign materials including concrete and excess sealant.

3.6 Cartridge Filters

- A. Cartridge filters shall be delivered with the vault. Contractor shall take appropriate action to protect them from sediment and other debris during construction. Methods for protecting the cartridges include but are not limited to:
 1. Remove cartridge filters from the vault and store on dry ground and under cover. Cartridge filter elements shall be reinstalled to operate according to Section 3.6 B.
 2. Leave cartridge filters in the vault and plug inlet and outlet pipe to prevent stormwater from entering the vault. The method ultimately selected shall be at Contractor's discretion and Contractor's risk.

- B. Cartridge filters shall not be placed in operation until the vault is clean and the project site is clean and stabilized (construction erosion control measures no longer required). The project site includes any surface that contributes storm drainage to the StormSafe-Cartridge. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manholes and pipes shall be free of dirt and sediments. Contact Fabco Industries to assist with system activation and/or inspect the system for proper installation once site is clean and stabilized.

PART 4 PERFORMANCE

Each StormSafe-Cartridge stormwater treatment system shall contain one or more media filter cartridges as described below.

4.1 Cartridge Media

- A. Cartridge filters area designed to provide maximum filtration of stormwater while allowing reasonable flow rates to be maintained. The cartridges are designed to filter out floatables, sediment, pathogens, hydrocarbons and nutrients using a combination of proprietary non-toxic, non-leaching treatment media as generally described below. Seven (7) standard cartridge filters are described in the table below along with their treatment capacities at 6 inches (150 mm) of driving head.
1. Sediment and Particulate Media – Layers of open cell foam that are subjected to a proprietary process using heat and pressure to create a flexible skeletal foam structure without cell membranes. The resulting open-pore foam can then be produced in a range of precisely controlled pore sizes which contain void volumes of up to 98 percent and surface areas of 150 to 200 ft²/ft³ (492 to 650 m²/m³). Various pore sizes, typically from 4 through 100 pores per inch (25 mm), enable the material's use in sediment or particulate filtration; they also help control permeability, rigidity and add design flexibility. Among the benefits of reticulated foam are easy fabrication and chemical resistance; high tensile, elongation, and tear properties. The foam also is impervious (non-nutrient) to microbial organisms.
 2. Bacteria Media – FabGuard Antimicrobial Shield treated open cell foam.
 3. Hydrocarbon and Oil & Grease Media
 - a. A very efficient, non-polar and lightweight oil absorbent fabric material known as X-TEX, that absorbs 10 to 20 times its weight in oils, greases or hydrocarbons.

- b. A patented polymeric surfactant technology known as MYCELX that is infused and homogenously dispersed to our open cell foam. It is hydrophobic and instantly bonds to hydrocarbons in the water matrix.
4. Heavy Metals Media – A proprietary blend of natural zeolites, which have been selected based on their ion exchange and absorptive properties and crystal structures, having a unique negative electrical charge, which attracts positively charged particles, called “ions”, to the structure.
 5. Nutrient Media – proprietary filtering media that can significantly reduce the concentration of both soluble, Ortho-phosphates and nitrogen compounds in stormwater runoff. Media consists of a synthetic base fibrous material shaped in small cubes and coated with ferrous based compound.

Part Number	Description	Color Code	Flow Rate Per Cartridge at 6 inches (150 mm) of driving head
9718-1-000	Standard Cartridge	Red Ring	115 gpm (0.26 cfs) 435 lpm (7.3 lps)
9718-2-000	Pathogens Cartridge	Yellow Ring	115 gpm (0.26 cfs) 435 lpm (7.3 lps)
9718-3-000	Hydrocarbon Cartridge	Blue Ring	115 gpm (0.26 cfs) 435 lpm (7.3 lps)
9718-4-000.	Heavy Metals Cartridge	Grey Ring	60 gpm (0.13 cfs) 227 lpm (3.7 lps)
9718-5-000	Standard Short Cartridge	Mint Ring	115 gpm (0.26 cfs) 435 lpm (7.3 lps)
9718-6-000	Nutrient Cartridge	Green Ring	100 gpm (0.22 cfs) 379 lpm (6.3 lps)
9718-7-000	Standard High Flow Cartridge	Red Ring with Black HDPE Mesh Cover	260 gpm (0.58 cfs) 984 lpm (16.4 lps)

4.2 Cartridge Operation

A. Flow Capacity:

The cartridge specified shall effectively filter the design water quality flow as specified by the Engineer or local stormwater management design criteria and shall provide at least one mode of bypass to prevent scouring and washout.

4.3 System Performance

- A. StormSafe-Cartridge stormwater treatment system shall be tested by the manufacturer in the field and the laboratory in order to demonstrate pollutant removal efficiency for flow rates at or near the cartridge clean filtration capacity. Manufacturer may be required to submit test data to the Municipality or agency indicating the proposed device has been shown to achieve removal rates within the ranges specified in the table below.

Performance Parameter	Percent Removal Range for a Standard Cartridge
Sediment removal Based on U.S. Silica OK 110	at least 80 %
Hydrocarbons, Oils and Grease	at least 80 %
Total Phosphorus	40 to 60%
Nitrogen Compounds	30 to 50 %
Bacteria	50 to 70%
Heavy Metals	40 to 60%

END OF SECTION

STORMSAFE STORMWATER FILTER

FEATURING HELIX FILTER TECHNOLOGY

Fabco Industries Inc, 66 Central Ave, Farmingdale, NY 11735
 Tel: 631-393-6024 Fax: 631-501-5528 www.fabco-industries.com

Pathogens in Stormwater

Stormwater runoff flowing over paved and unpaved surfaces picks up many types of contaminants including; oils, grease, heavy metals, nutrients and even potentially harmful organisms and bacteria such as E.coli, fecal coliform and Enterococcus.

These potentially harmful microorganisms are released primarily from fecal matter deposited on the surfaces by birds, wild animals or pet cats and dogs. Once they are assimilated into the water stream, they are easily transported through existing stormwater systems that can empty directly into local streams, lakes or estuaries. Here they can significantly impact the water quality causing both beach and shellfish area closings.

Treatment Media Technology

Fabco Industries a world leader in filtration media research and development with over 10 years experience in applying its proprietary treatment technologies to both industrial wastewater and storm water applications has introduced a new filter media named FabGuard, which has demonstrated significant effectiveness in reducing bacteria in stormwater.

FabGuard is a flexible, open pore foam material, with no intercellular membranes. The open skeletal structure can



Escherichia Coli

be manufactured with up to 98% open void volume providing high permeability for water transport. The foam is non-biodegradable, provides high tensile, elongation and tear properties and is extremely chemical resistant. It can be supplied in various shapes and sizes including: pads, socks and even chopped pieces. Fabco modifies this foam base material using a unique process to make it antimicrobially active.

FabGuard benefits:

1. Reduces bacteria by >50%
2. Antimicrobial treatment last the life of the foam
3. Safe – Non leaching – Non poisonous
4. Cost effective

FabGuard can be used as a pre-filter for other treatment media products to prevent biological fouling or by itself for maximum bacteria reductions.

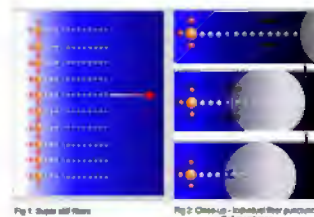
FabGuard Antimicrobial Filter Media

FABGUARD Antimicrobial Shield is a patented chemical technology, that when applied to Fabco's proprietary foam base material, forms a colorless, odorless, positively charged polymer coating, which chemically bonds, virtually irremovable, to the foam surface. The FABGUARD Antimicrobial Shield becomes an integral part of the foam and will not wash out, or leach into the environment. You could think of it as a layer of electrically charge swords or super stiff fibers extending outward perpendicular to the surface. Microorganisms that subsequently contact the fibers are neutralized and slough off leaving the surface ready for the next organism.

Conventional Antimicrobial products penetrate living cells and kill by way of poisoning the organism. This poisoning technology is applied to a host media where it slowly leaches, out creating a "killing field or zone" around the surface into which targeted microorganisms pass. They are

designed to act quickly and dissipate quickly in order to avoid adverse effects to humans and animals due to their toxic ingredients.

The FABGUARD Antimicrobial Shield takes a totally unique approach. The treated surface reduces bacteria by mechanical methods as opposed to chemical poisoning. It provides an effective initial microbial reduction, like the conventional methods, but the non-dissipating treatment also provides long-term growth control for the life of the treated product.



Bacteria that contacts the surface are neutralized and slough off leaving the surface ready for the next organism

FabGuard Antimicrobial Filter Media from page 1

Testing

Initial bench scale testing of FabGuard was performed by New York Product Testing & Services¹ on Long Island.

A test solution containing a minimum concentration of between 2400 MPN/100ml and 3000 MPN/100ml of E.Coli bacteria was prepared. The solution was poured through two filter cartridges and the filtered solution was collected and analyzed for E.Coli concentrations. In both cases E.Coli concentrations were reduced to below 2 MPN/100 ml; a greater than 95% reduction.

While repetitions of this test yielded comparable results Fabco recognized that laboratory testing can not duplicate the actual stormwater matrix, flow rates and field conditions. Further verification testing would have to take place in the field. For this study it was decided to use Fabco's StormBasin Catch Basin Insert filter as a carrier device for the FabGuard media.

¹ New York Product Testing & Services, 110 Colin Drive, Holbrook, NY 11741

FabGuard Field Study – Catch Basin Inserts

In many cases, the common catch basin or storm sewer drain is the first stop for contaminated stormwater flows. Effective filtration at this entry point would limit the mixing of possibly clean water with contaminated, yielding the greatest potential benefit. Although a number of catch basin insert filters are being sold, very few claim to treat more than oils & grease.

The Fabco StormBasin is a retro-fitable filtering device that installs into an existing catch basin drain by placing it across the inlet opening, just behind the grate; No modification or construction is required. All the water that would normally go through the grate is directed into the StormBasin filter.

The StormBasin uses the latest in plastic molding and metal forming technologies to provide leading edge features such as adjustable mounting kits, covered by-pass, and light weight corrosion resistant construction at an economical price. But its greatest feature is its ability to use replaceable filter cartridges that can be configured with five (5) different Fabco filter media products.

Selection of Treatment Media Solutions

Fabco has developed and manufactures 5 different media types that can be used in various configurations within the cartridge: FabMax for oil sheen, FabSorb for higher concentration of oils and grease such as raw spills; FabPhos for soluble phosphates and nutrients, Fablite for heavy metals and for the bacteria testing project, our highly effective antimicrobial filter media, FabGuard.



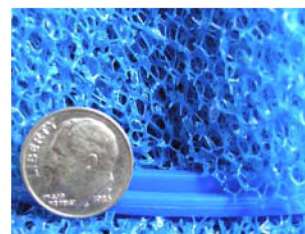
StormBasin bacteria testing at a beach parking lot

StormBasin BEACH / HARBOR STORM WATER TEST PROGRAM Executive Summary

Under an agreement between a local municipality and Fabco Industries during the summer of 2006, a series of tests were performed on the Fabco catch basin inserts to evaluate their effectiveness in reducing certain identified bacteria contained in the surface water runoff. The product testing took place over a 90 day period at a beach front parking lot with known high levels of bacterial contamination. The device being tested was Fabco's StormBasin product which was supplied with two filter cartridges configured for maximum bacteria reduction.

The testing protocol focused on collecting efficiency data under real storm conditions. Only minimal maintenance was performed during the 90 day period and the same filtering cartridges were used from start to finish in order to better represent actual conditions. Sampling was also varied so that effectiveness could be measured during first flush as well as during the storm event. The report data presented here confirms that the StormBasin product was highly effective in reducing 3 types of indicator bacteria: E.Coli (77%), Enterococcus (49%) and Fecal Coliform (77%).

The tests performed during this beach program confirmed that an environmentally safe antimicrobial agent could be applied to polypropylene foam filter material in a simple cost effective manner. The treated foam performed extremely well in its role as a pre-filter, keeping coarse matter from entering the filter, while maintaining long term antimicrobial effectiveness with very little evidence



FabGuard open cell foam material

StormBasin Test program continued from page 2

of degradation or physical breakdown. Additionally FabGuard was shown to be effective on stormwater flowing at approx. 70 to 100 gpm. This was something that could not be simulated in the laboratory bench scale testing.

While FabGuard performed very well in the StormBasin filter cartridges, catch basin inserts represent a single type of stormwater BMP. Following the StormBasin testing, Fabco began to investigate the application of FabGuard in larger systems such as underground vaults.

Helix Filter Technology

Improving Filter Technology

FABGUARD Antimicrobial technology forms an antimicrobial coating on all external and internal surfaces of the foam filter material. In order to treat the flow rates expected in an underground vault, interstitial surface volume in the foam must be maximized by increasing one of more of the following parameters: number of pads, pad thickness or pad density. However, these changes have a detrimental effect on flow. Additionally, coarse solids such as sediments, trash and debris contained in stormwater also collect in the filter further compounding the reduction in flow. In order to maintain high flow rates with maximum effectiveness, a change in the filter process beyond the FabGuard filter media was needed.

Two Step Treatment Process

Existing stormwater filters combine large concrete vaults with vast numbers of slow flowing filter cartridges. These units attempt to capture sediments, trash and debris on top of the cartridges while only a trickle of water is allowed through the filter. These units are large and expensive; while future servicing and cleaning between a multitude of cartridges is difficult, time consuming and costly. Fabco takes a different approach.

To reduce clogging from sediments, debris and trash the Fabco filter is designed as a secondary vault following behind primary sediment separation. The idea is similar to the multi step wastewater treatment process. All the coarse material is captured in a vault designed solely for that purpose. A sediment separator: treats more water at a higher flow rates; can be serviced from surface level with a Vac-truck and the pre-treated water will keep the Fabco filters cleaner maintaining flow rates and effectiveness while requiring minimal service.

Patented Helix Filter Technology

To treat high flow rates of water Fabco developed a new dual-helix FabGuard filter held horizontally in a plastic pipe.

The horizontal pipe design provides great flexibility for selecting the appropriate filter length and diameter. The dual helix filter element functions like a multiple disk filter providing tremendous surface volume for treatment.

The spiral form also supplies multiple flow paths through the filter continuously exposing new surfaces while significantly reducing clogging potential.



Fig. 1
Helix Filter segment: A multi spoke frame is used as a skeleton to hold the FabGuard material in a disk-like shape. The design provides two (2) open channels or pathways through the filter to reduce clogging.



Fig. 2
A complete Helix Filter column consists of 3 or more Helix Filter segments inserted horizontally into a smooth lined plastic corrugated pipe. Each Helix Filter column will treat approximately 2.5 CFS.

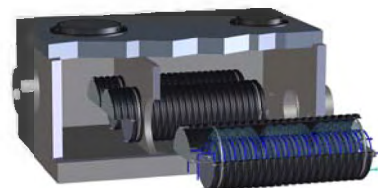


Fig. 3
The final stormwater treatment system is completed by installing one or more Helix Filter columns inside a concrete vault

Helix Filter Technology continued from page 3

Flow Testing the Helix Filter

Testing of a completed Helix Filter column began with flow testing at close to maximum rates. In this test, a single, 30 inch diameter column filter, featuring 3 helical segments was inserted into an ADS-Nyloplast plastic pipe. A vertical riser was added to the horizontal pipe to accept the water and measure head pressure.

The complete assembly was moved to a nearby lake where it was connected to a large pump capable of more than 4.0 CFS flow rates.

During the test, flow rates were increased up to a maximum of 1350 gpm/ 3CFS and held at that rate for nearly two hours. At the end of the testing, nearly 300,000 gallons of water passed through the filter with virtually no increase in head pressure.

Field Testing the Helix Filter

Having completed flow testing the next field trial would measure bacteria reduction efficiencies.

For bacteria testing, two (2) 10" diameter Helix Filter columns featuring 4 and then 5 in-line filter segments were selected. Again each filter column was connected to a vertical riser which would allow us to measure head pressure change.

The unit was transported to a local lake where it was plumbed to a 1000 gallon collection tank. The tank featured a 4 inch diameter outlet pipe from the bottom with an in-line mechanical flow gauge.

Using a separate collection tank allowed us to pump a known volume of water from the lake into the tank to use as a reservoir during the test. Previous testing using a pump directly had shown that bacteria levels could vary significantly from one grab sample to the next. Using the tank allowed us to grab multiple samples from this single source allowing better characterization of the average value for the influent introduced to the Helix Filter.

Likewise, the outlet from the Helix Filter was allowed to collect in a 75 gallon plastic bin. Sampling of the effluent was performed using disposable Coliwassas samplers which provided us with a vertical cross-sectional sample of the water from top to bottom. Five (5) discrete samples of influent and effluent were used to develop the average value used in the test.

For the purpose of this test only Total Coliform and Fecal Coliform indicator organisms were measured.

System flow rate during test was regulated to approx. 50 gpm. Although seemingly low, a simple mathematical model demonstrated that 50 gpm in a 10" Helix Filter was equivalent to more than 1200 gpm in a 30" Helix Filter.



Field testing result summary

4 Segment Helix Filter	Total Coli	Fecal Coli
Influent (MPN/100 ml)	3120	2780
Effluent (MPN/100 ml)	1220	1000
% Reduction	61%	64%
5 Segment Helix Filter	T. coli	Fecal
Influent (MPN/100 ml)	4388	3948
Effluent (MPN/100 ml)	1360	934
% Reduction	69%	76%

Summary

The results of the Helix Filter testing confirmed that the FabGuard technology was transferable from the vertical StormBasin cartridge to a horizontal Helix Filter configuration. During field trials the two systems reduced coliform bacteria by a nearly identical 70%.

When combined with a primary sediment separator the StormSafe provides an excellent long term solution to the problem of pathogens and bacteria contamination in stormwater flows. The StormSafe offers high flow rates, an anti-clog self cleaning action and long term effectiveness in a user replaceable filter cartridge.

Currently, Fabco offers Helix Filter cartridges for pathogens/bacteria as well as a special filter for oils, grease and other hydrocarbons. For the future, the Helix Filter configuration offers many avenues for upgrading its effectiveness. For example, the pitch of the helix could be varied increasing the number of disks per segment; or the density of the foam could be increased which would increase the surface volume aiding FabGuard effectiveness. Both of these aspects could be used to treat higher levels of bacterial contamination. Fabco is also investigating the use of its FabPhos media for reducing orthophosphates and other soluble nutrients.

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www.fabco-industries.com

STORMSAFE, MODEL 2-C TRENCH TYPE VAULT

SYSTEM AND TREATMENT FLOW DESIGN:

STORMWATER QUALITY DESIGN FLOW (SQDF)	0.12-CFS (54-GPM)
STORM DRAIN DESIGN CONVEYANCE FLOW	4.0-CFS
RETURN FREQUENCY / PERIOD OF PEAK DESIGN CONVEYANCE FLOW	XX-YRS

STORMSAFE FILTER TREATMENT DESIGN:

MEDIA FILTER SUBSTRATA	ANTIMICROBIAL
INDIVIDUAL CARTRIDGE ULTIMATE MAXIMUM LOADING RATE	229-GPM/CART
REQUIRED HYDRAULIC DRIVING HEAD	5-INCHES
DEBRIS STORAGE CAPACITY	8.8-FT ³

STORMWATER FILTRATION TREATMENT UNIT (SWFTU) NOTES:

THE STORMSAFE FILTER EMPLOYS THE PATENTED FABGUARD ANTIMICROBIAL MEDIA TO TREAT STORMWATER. TREATMENT PROCESS IS DESIGNED TO ACHIEVE BACTERIA REDUCTION THROUGH PHYSICAL CELLULAR DISRUPTION IN ADDITION TO BASIC SEDIMENTATION, PHYSICAL FILTRATION OF TOTAL SUSPENDED SOLIDS (TSS), AND GROSS SOLIDS AND DEBRIS. THE FOLLOWING EFFLUENT DISCHARGE WATER QUALITY GOALS OF:

- SPECIFICALLY TARGETS AND KILLS 50 TO 70% OF THE BACTERIA IN STORMWATER
- PROVEN CAPABLE OF REDUCING THE FOLLOWING TYPES OF INDICATOR BACTERIA:
 - 77% E.Coli
 - 77% FECAL COLIFORM
 - 49% ENTEROCOCCUS
- NO ATTENUATION, DISSIPATION OF BACTERIA REMOVAL EFFICIENCY OVER TIME REGARDLESS OF TOTAL MASS LOADING
- NO TOXICITY RESIDUAL IMPACTS TO DOWN STREAM BIOTA
- REMOVAL OF OIL AND GREASE

MEDIA FILTRATION PROCESS SPECIFICATIONS:

- FILTER CARTRIDGES SHALL BE OPEN CELL FOAM SUBSTRATA MEDIA WITH THE PATENTED CHEMICAL CHARGED COATING ON POLYMER OPEN CELL FOAM SUBSTRATA MEDIA.
- THE DEPTH OF THE POLYMER MEDIA SHALL BE NOW LESS THAN 11-INCHES IN DEPTH / THICKNESS.
- THE SPECIFIC HYDRAULIC LOADING RATE OF THE FILTRATION MEDIA SHALL BE NO MORE THAN 65-GPM/CARTRIDGE.

CONSTRUCTION NOTES:

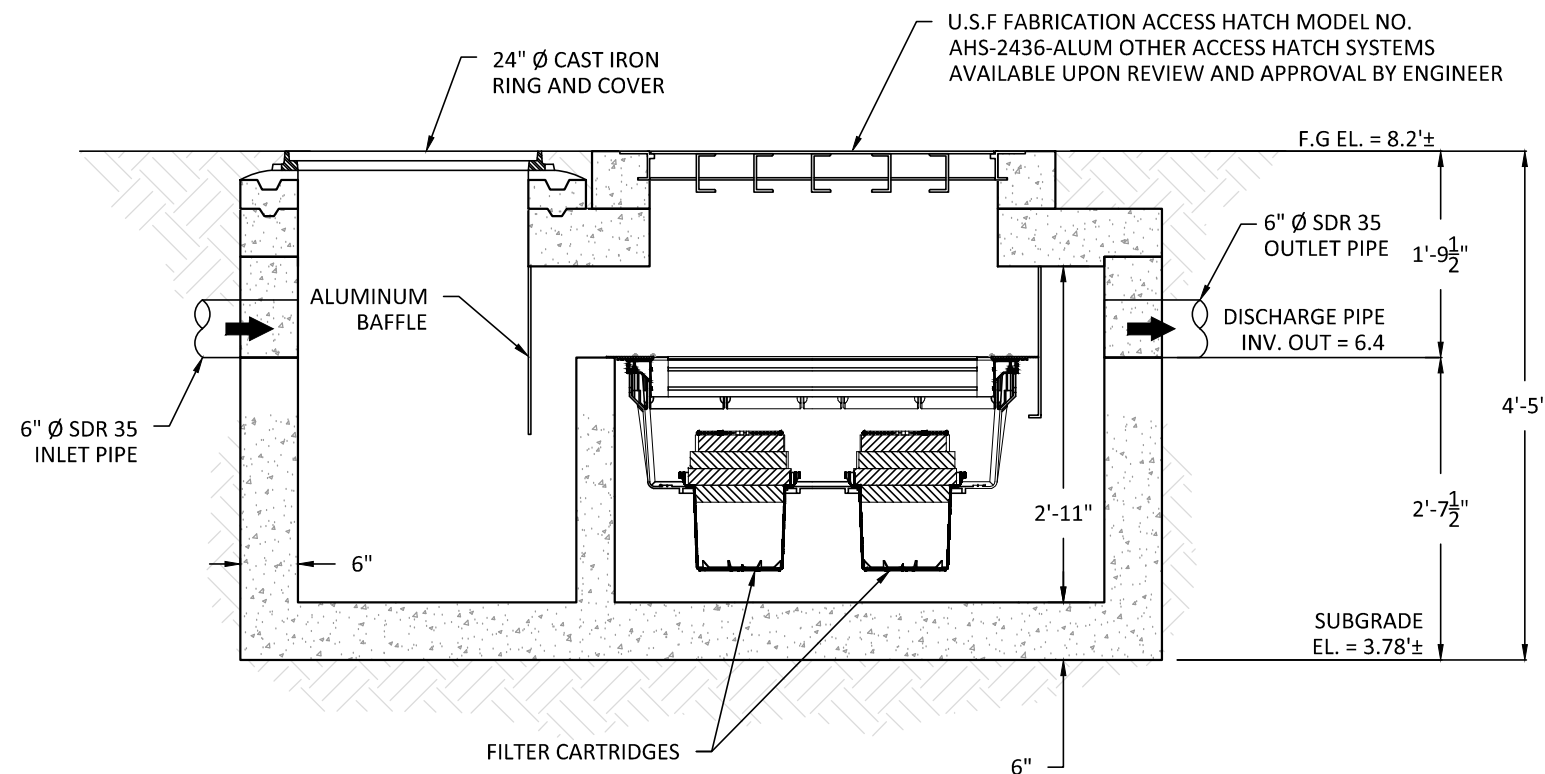
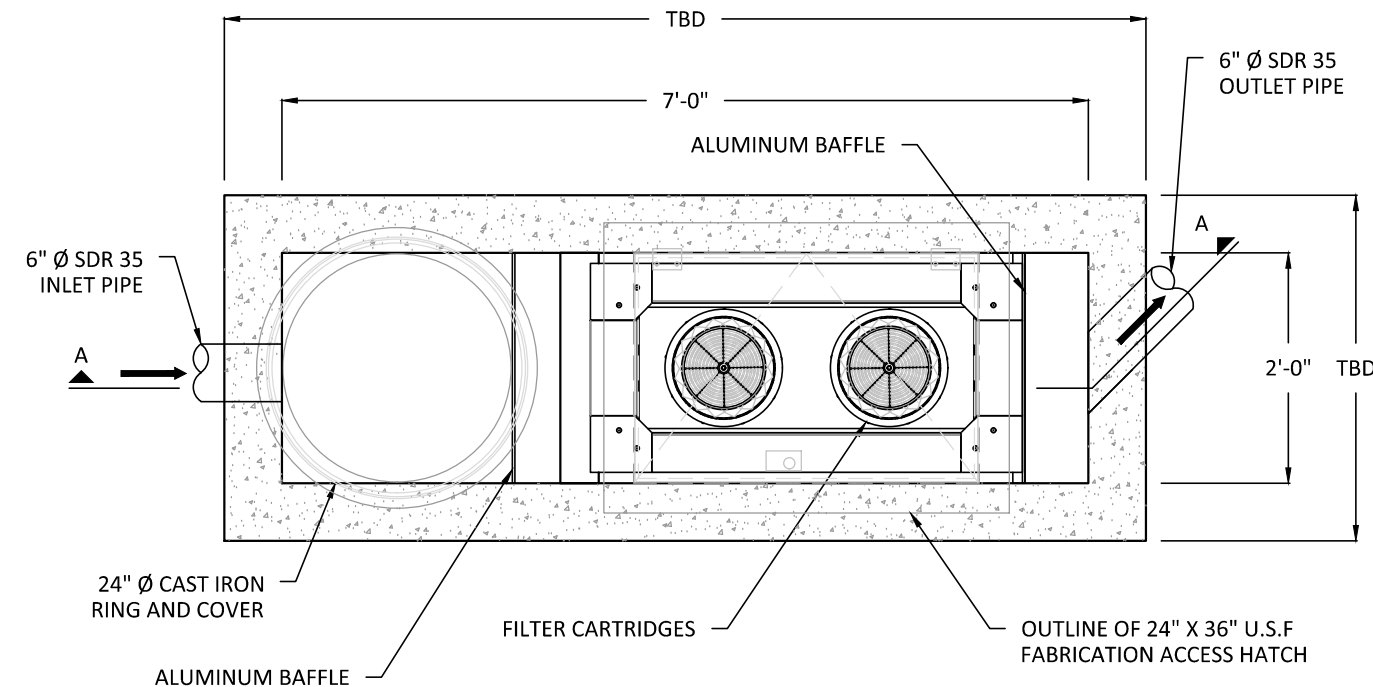
- CONTRACTOR TO VERIFY VERTICAL DIMENSIONS OF ALL PRECAST PIECES IN FIELD
- VERIFY SUBBASE ELEVATION BEFORE PLACING PRECAST COMPONENTS OR BACKFILLING.
- APPLY BUTYL MASTIC AND/OR GROUT TO SEAL JOINTS OF STRUCTURE.
- APPLY LOAD TO MASTIC SEAL IN JOINTS OF VAULT/MANHOLE SECTIONS TO COMPRESS SEALANT IF NECESSARY. UNIT MUST BE WATER TIGHT, HOLDING WATER UP TO FLOWLINE INVERT (MINIMUM).
- CONTRACTOR TO GROUT SEAL INLET AND DISCHARGE PIPES TO VAULT/MANHOLE WALL
- ALL INTERNAL COMPONENTS INSTALLED BY MANUFACTURER
- BLOCK AND/OR GROUT PACK BENEATH FRAMES AND COVERS TO MATCH FINISHED GRADE.

MATERIALS:



- FINAL DIMENSIONS OF PROJECT SPECIFIC MANUFACTURING VARIES WITH LOCAL PRECASTING CAPACITIES AS WELL AS PER SITE SPECIFIC STRUCTURAL DESIGN TO MEET INSTALLATION, APPLICATION DEMANDS.
- ALL DIMENSIONS ARE IN DECIMAL INCHES
- PRECAST MATERIALS AND MANUFACTURING METHODS SHALL CONFORM TO ASTM C-857 AND ASSHTO LOADING METHOD.
- CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH $f'c = 5,000$ -psi AT 28-DAYS
- THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/V HIGH SULFATE RESISTANT CEMENT IN ACCORDANCE WITH ASTM CLASS M C-150
- BASIN (PLASTIC) SHALL BE POLYPROPYLENE POLYETHYLENE COPOLYMER
- ALUMINUM ALLOY SHALL BE ASTM 5052-H32

MATERIAL LIST - PROVIDED WITH UNIT:

QTY	COMPONENT DESCRIPTION	PROVIDER	INSTALLER
2	STORM SAFE ANTIMICROBIAL FILTER CARTRIDGES	JENSEN	JENSEN
1	24" X 36" U.S.F FABRICATION ACCESS HATCH MODEL NO. AHS-2436-ALU	JENSEN	JENSEN
1	24" Ø CAST IRON RING AND COVER	JENSEN	JENSEN



SECTION A-A
SCALE: 1" = 40"

MODEL: STORMSAFE - 2C VAULT ANTIMICROBIAL FILTER SYSTEM		PROJECT: LIDO MARINA VILLAGE VIA OPORTO NEWPORT BEACH, CA 92663		 521 DUNN CIRCLE, SPARKS, NV 89431 (775) 352-2700 FAX (775) 352-6364			
BY: 		ORG. DWG. DATE 1/16/2015	DWG. REV. DATE			SHEET SIZE 11" X 17"	SCALE AS SHOWN



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Kraken™ Filter

A Stormwater Filtration Solution



OVERVIEW

The Bio Clean Kraken™ Filter is a state-of-the-art system utilizing advanced membrane filtration, ensuring a high level of removal for not only TSS, but also metals, trash, nutrients, and hydrocarbons. The Kraken™ membrane filter cartridge provides high flow rates and over 170 sq. ft. of surface area. This much surface area allows it to operate at a loading rate of only 0.05 gpm/sq. ft. to ensure maximum performance and minimum maintenance. The Kraken™ Filter's low loading rate successfully overcomes high maintenance requirements and frequent clogging issues often found in other filter systems advertising high loading rates.

Each membrane filter cartridge is lightweight, washable, reusable, and more sustainable than typical granular-filled media cartridges. By eliminating the need to purchase new granular media and dispose of spent media, the Kraken™ Filter provides lower life cycle and maintenance costs.

Each filter cartridge is equipped with easy-to-grab handles and is pressure fitted, allowing it to be quickly removed, cleaned, and reattached without the use of tools.



Kraken™ Membrane Filter Cartridge



PERFORMANCE

85-89% REMOVAL OF TOTAL SUSPENDED SOLIDS (TSS)

72% REMOVAL OF PHOSPHORUS

ADVANTAGES

- NO GRANULAR MEDIA TO REPLACE
- HIGH FLOW RATES AND MAXIMUM SURFACE AREA
- LOADING RATE OF 0.05 GPM / SQ. FT. FOR MINIMAL MAINTENANCE
- MEMBRANE FILTER CARTRIDGES CAN BE EASILY REMOVED AND CLEANED BY HAND
- BUILT-IN PRETREATMENT CHAMBER CAPTURES TRASH, SEDIMENTS, DEBRIS, AND HYDROCARBONS
- FILTER CARTRIDGE DRIES OUT BETWEEN STORM EVENTS TO PREVENT BIOFILM GROWTH WHICH CAN CAUSE CLOGGING AND OTHER PERFORMANCE ISSUES
- NJDEP ONLINE INSTALLATION APPROVED

APPROVALS

The Kraken™ Filter has received NJCAT Verification for 89% TSS removal and NJDEP Certification at an 80% TSS removal rate. In addition, the Kraken™ Filter NJCAT Verification is also for online installations.



TAPE PERFORMANCE

The Kraken™ Filter completed its TAPE field testing in the spring of 2016. The Kraken™ has met the performance benchmarks for basic treatment (TSS) and phosphorus. The system features washable and reusable cartridges to reduce overall maintenance costs.



POLLUTANT	AVERAGE INFLUENT CONCENTRATION (mg/L)	AVERAGE EFFLUENT CONCENTRATION (mg/L)	REMOVAL EFFICIENCY
Total Suspended Solids	73.1	7.0	85%
Total Phosphorus	0.151	0.034	72%
Suspended Solids Conc.	151.3	6.9	89%
Nitrogen (TKN)	1.5	1.0	31%
Fecal Coliform	692	355	60%
Motor Oil	4.6	0.7	81%
Total Zinc	0.158	0.054	54.3%
Total Copper	0.042	0.017	52%
Diesel Range Organics	1.2	0.4	65%

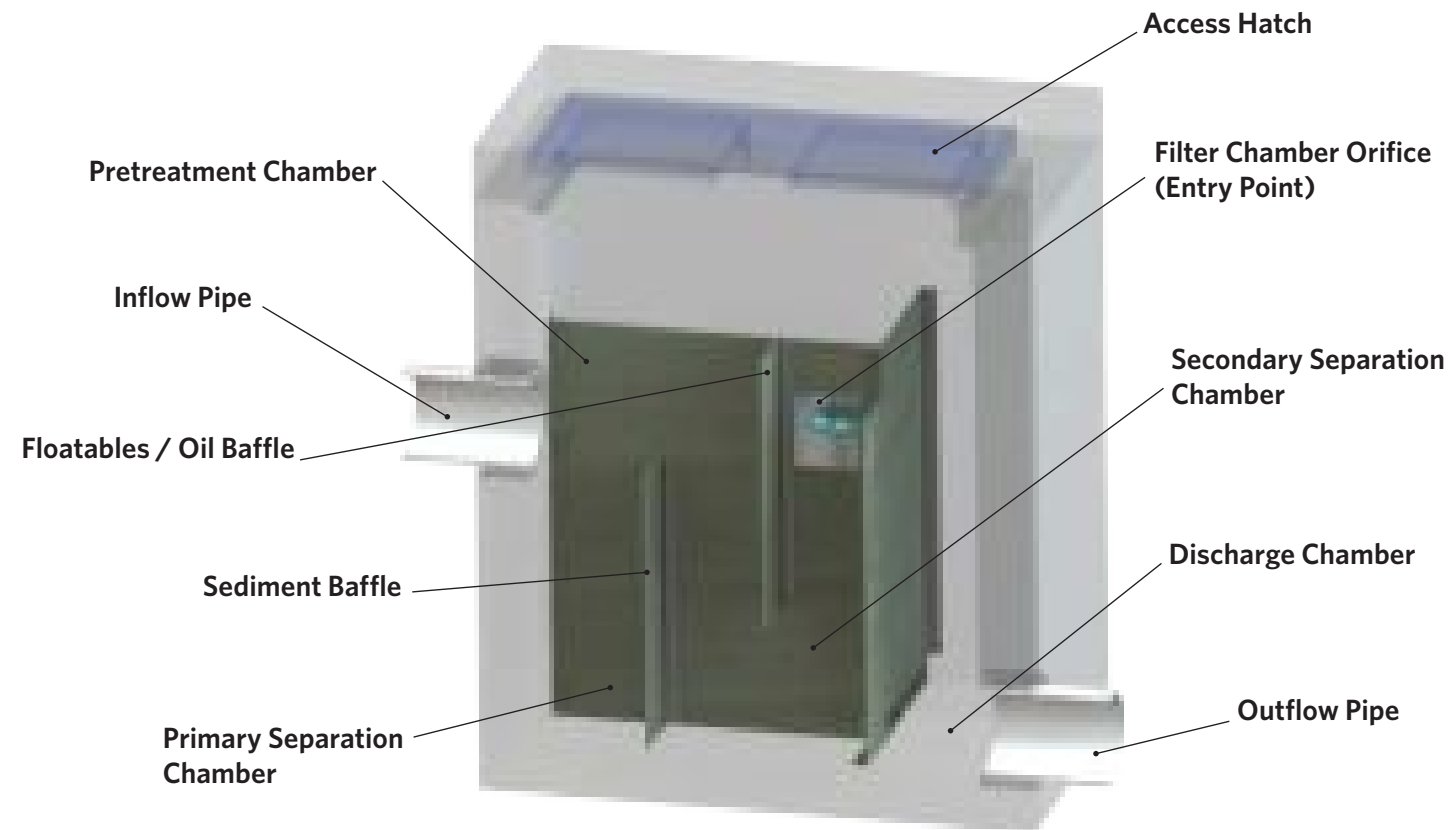
SPECIFICATIONS

Based on Max Cartridge Capacity

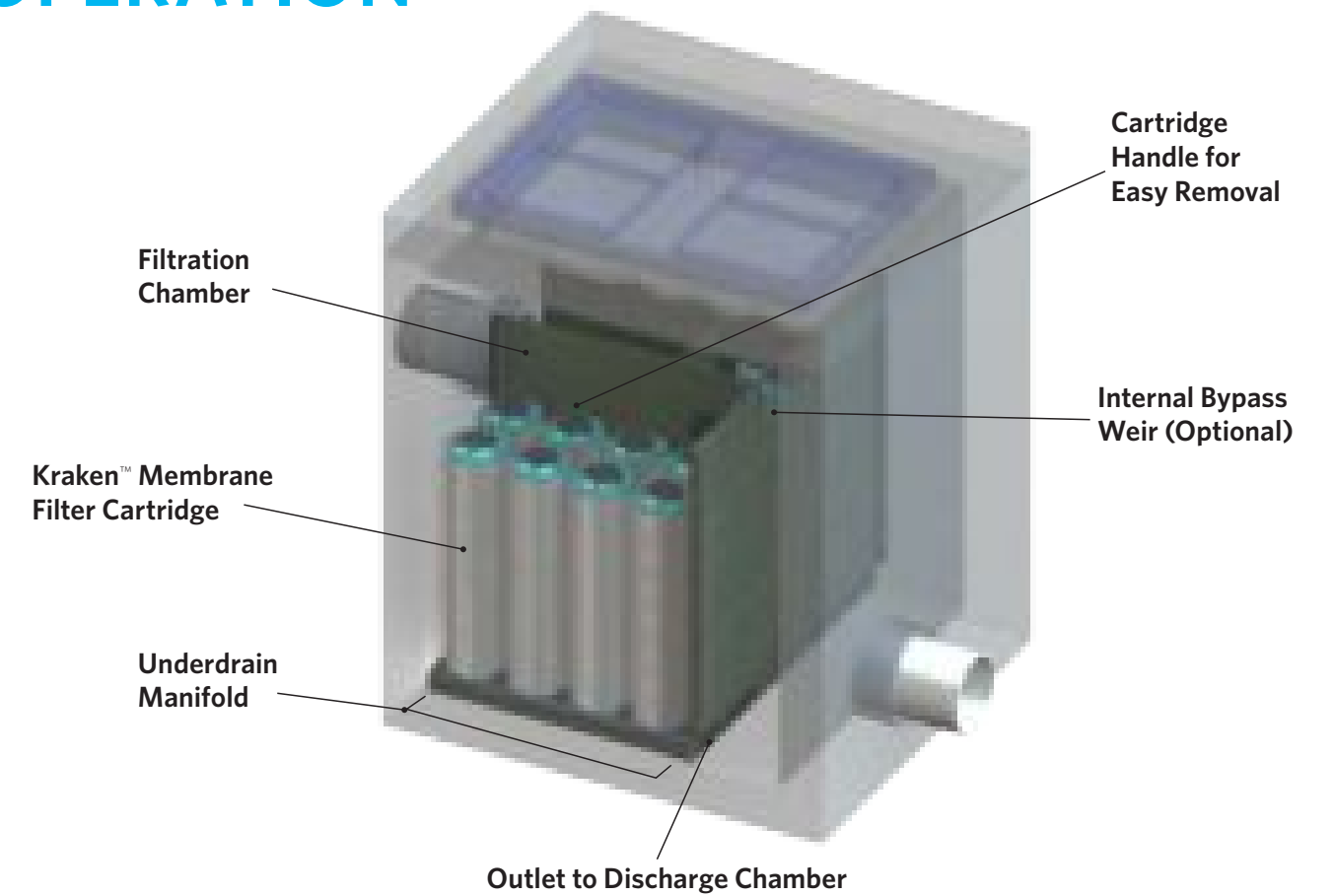
MODEL #	STRUCTURE SIZE (ft. x ft.)	CARTRIDGE CAPACITY	MAX MEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW CAPACITY (cfs)
KF-4-4	4' x 4'	9 to 16	2720	0.30
KF-4-6	4' x 6'	17 to 24	4080	0.46
KF-4-8	4' x 8'	25 to 32	5440	0.61
KF-8-8	8' x 8'	33 to 48	8160	0.91
KF-8-10	8' x 10'	49 to 65	11220	1.25
KF-8-12	8' x 12'	66 to 78	13260	1.48
KF-8-14	8' x 14'	79 to 96	16320	1.82
KF-8-16	8' x 16'	97 to 114	19380	2.16
KF-10-16	10' x 16'	115 to 152	25840	2.88

See design manual for list of all models. Many other models and structure sizes are available for higher flows. Please contact us for more details.

OPERATION

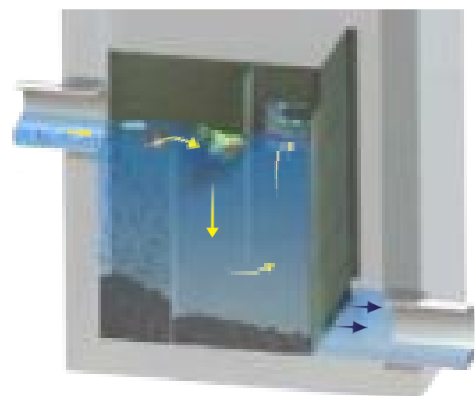


OPERATION



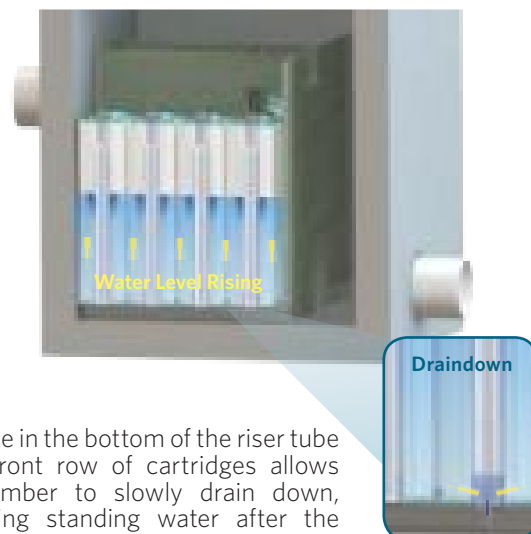
1 PRETREATMENT

To reduce loading on the membrane cartridge, runoff is initially passed through the pretreatment chamber to capture trash, hydrocarbons, and sediments. Once runoff is pretreated, it is directed to the filter chambers for primary treatment.



2 MEMBRANE FILTRATION FILL-UP

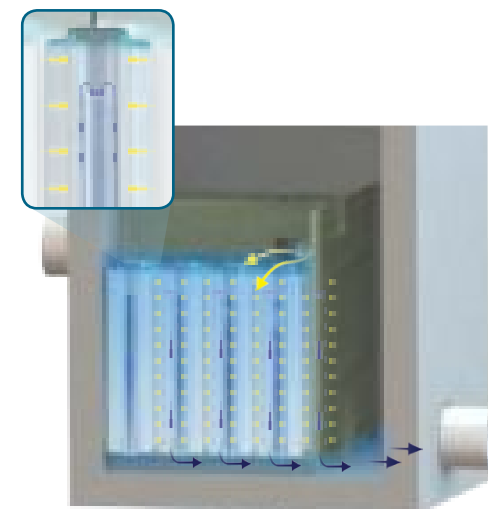
During the fill-up process, a riser tube prevents flow through the membrane cartridge until the water level nears the top of the cartridge. This ensures loading is evenly distributed over the vertical height of the cartridge maximizing efficiency.



An orifice in the bottom of the riser tube in the front row of cartridges allows the chamber to slowly drain down, eliminating standing water after the storm event.

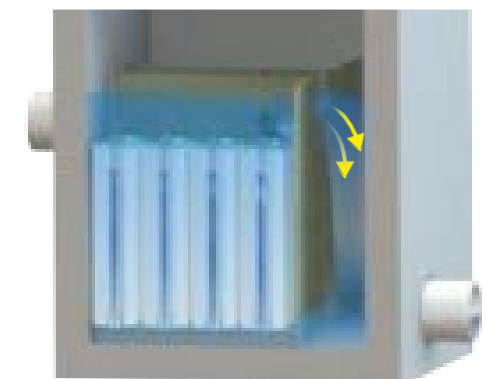
3 MEMBRANE FILTRATION PEAK CAPACITY

As the water level reaches the top of the membrane cartridges, flow through will begin. The riser tube creates an upward flow path within each cartridge to increase performance. Treated water then passes down the riser tube and collects in the underdrain manifold and flows to the discharge chamber.



4 BYPASS

An optional internal bypass is available with most system configurations. When flows exceed the treatment capacity of the system, the water level rises and goes into bypass. High flows are conveyed from the pretreatment chamber directly to the discharge chamber to prevent scouring of fine sediments captured within the filtration chamber.



INSTALLATION



Small footprint reduces installation and shipping costs.

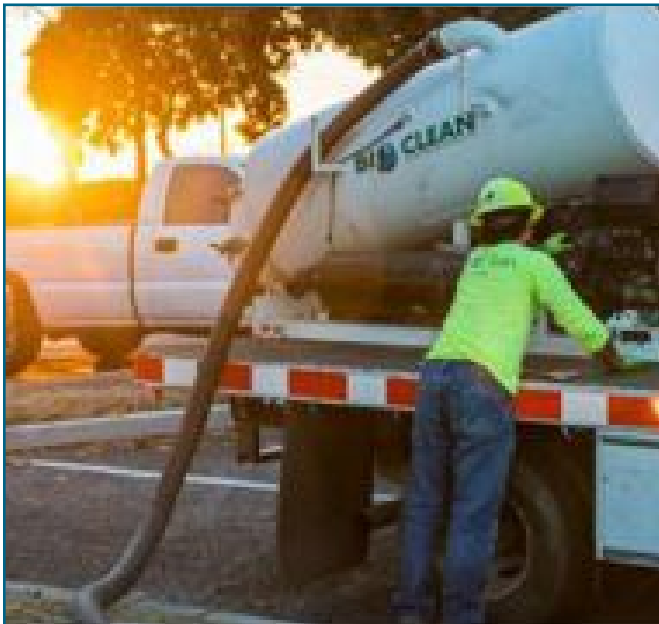


No deep sump chamber (as found with tentacle-type systems) and reduces excavation costs.

MAINTENANCE



Lowest lifecycle cost of any media filter with fast and simple maintenance procedures.



Easily cleaned with a standard vacuum truck, and reusable cartridge can be cleaned with a standard garden hose.





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Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com



A Forterra Company

Storm Water Membrane Filtration Device

PART 1 – GENERAL

01.01.00 Purpose

The purpose of this specification is to establish generally acceptable criteria for Storm Water Membrane Filtration Devices (SWMFD) that treat storm water runoff including dry weather flows and other contaminated water sources. It is intended to serve as a guide to promote understanding regarding materials, manufacture and installation; and to identify devices complying with this specification.

01.02.00 Description

The SWMFD is used for filtering stormwater runoff including dry weather flows. The SWMFD is a pre-engineered water treatment system composed of a pretreatment chamber, one or more filtration chambers containing a plurality of vertically extending membrane filter cartridges, an underdrain system, and a discharge chamber.

01.03.00 Manufacturer

The manufacturer of the SWMFD shall be one that is regularly engaged in the engineering design and production of systems developed for the treatment of stormwater runoff for at least (10) years, and have a history of successful production, acceptable to the engineer of work. In accordance with the drawings, the SWMFD(s) shall be a device manufactured by Bio Clean Environmental Services, Inc., or assigned distributors or licensees. Bio Clean Environmental Services, Inc. can be reached at:

Bio Clean Environmental Services, Inc
Corporate Headquarters:
398 Via El Centro
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.com

01.04.00 Submittals

- 01.04.01 Submittal drawings are to be provided with each order to the contractor and consulting engineer.
- 01.04.02 Submittal drawings are to detail the SWMFD and all components required and the sequence for installation, including:
 - System configuration with primary dimensions
 - Interior components
 - Any accessory equipment called out on submittal drawings
- 01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

- 01.05.01 Specification requirements for installation of SWMFD.
- 01.05.02 Manufacturer to supply components of the SWMFD(s):
 - Concrete structure (chambers)
 - Internal components
 - Risers, hatches, and manholes optional

01.06.00 Reference Standards

ASTM C 891	Specifies for installation of underground precast concrete utility structures
ASTM C 478	Specification for precast reinforced concrete manhole sections
ASTM C 443	Specification for joints for concrete pipe and manholes, using rubber sealants and gaskets
ASTM D 4101	Specification for copolymer steps construction

PART 2 – COMPONENTS

The Storm Water Membrane Filtration Device (SWMFD) and all of its components shall be self-contained within a concrete structure constructed with a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615, Grade 60, and supports a minimum H-20 loading as indicated by AASHTO. All seams and connection points shall be sealed water tight with non-shrink grout in accordance with manufactures recommendations and project specifications.

02.01.00 Pretreatment Chamber

- 02.01.01 Baffle Walls shall be constructed of concrete or fiberglass. Concrete baffles shall have a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615, Grade 60. Fiberglass baffle walls constructed of marine grade and be a minimum of ¼” thick.
- 02.01.02 Pretreatment Chamber is designed to remove floatables, oils, coarser sediments and other suspended particulates that may cause premature filter clogging.

02.03.00 Membrane Filter Cartridge

Filter cartridges shall be comprised of cylindrical membrane filter elements pressure fitted to a filter coupling. The diameter of each cartridge is approximately 8”, consisting of a 3” core surrounded by 2.5” pleated membranes to maximize surface area. The length of each filter element shall be a minimum of 9.62”, with a maximum length of 30.75”. The maximum flux rate determined by the maximum treatment flow rate per unit of filtration membrane surface area shall be 0.05 gpm/ft². The filter cartridges shall be located below the access hatches to allow access for maintenance. The filter cartridges shall have removable handles to facilitate ease of maintenance. The filter cartridges shall be removable and installed by hand.

<u>Cartridge Length (in)</u>	<u>Pleated Media Area (ft²)</u>	<u>Design Treatment Flow Rate (gpm) (1 filter)</u>
9.62	40	2
19.5	90	4.5
30.75	170	8.5

- 02.03.01 Underdrain Assembly shall be constructed of aluminum grade 6061-T6 or 5052 rectangular tubing, the width of the tubing being wider than the O.D. of the membrane filter cartridges. Connection point between tubing and cartridge couplers to be water tight. The underdrain assembly shall be open on the effluent end located inside the discharge chamber.
- 02.03.02 Riser Tube – A PVC riser will be installed inside each cartridge to control the flow rate and evenly distribute sediment loading along the full height of the cartridge. One in every eight cartridges will include a riser with a drain down orifice at the bottom of the riser.

PART 3 – PERFORMANCE

The membrane media filter shall only meet performance specification listed on the submittal drawings.

03.01.00 General

3.01.01 Function

The storm water quality filter treatment device functions to remove pollutants by the following unit treatment processes; sedimentation, floatation and membrane filtration.

3.01.02 Pollutants

The stormwater quality filter treatment device removes oil, debris, trash, sediment, sediment-bound pollutants, metals and nutrients from stormwater during frequent wet weather events.

3.01.04 Treatment Flux Rate

The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum treatment flux rate across the membrane filter cartridges of 0.05 gpm/ft² (0.034 lps/m²).

03.02.00 Test Performance

At a minimum, the SWMFD must meet all of these testing performance standards and have a Manufactures Performance Certification per Section 05.02.00:

03.02.01 Independent Third Party Testing:

The SWMFD must be tested under a nationally recognized lab protocol and verified independently by a third party public agency;

- Must capable of removing greater than 80% TSS
- Verified by NJCAT and approved by NJDEP
- Must use a particle size distribution with d₅₀ of 52 microns
- Approval must be current and not expired.

3.02.02 Suspended Solids Removal

The SWMFD shall have demonstrated a minimum median TSS removal efficiency of greater than 80%.

03.02.03 Sediment Loading

The SWMFD must be proven to have the ability to load 27 lbs/cartridge and/or 37 lbs/sf of effective treatment/sedimentation area, while still maintaining an overall 89% removal efficiency.

~~03.02.04 Online Use~~

~~The SWMFD shall be approved for online use by NJDEP, able to internally bypass higher flows without scouring.~~

PART 4 - EXECUTION

04.01.00 General

The installation of the SWMFD shall conform to all applicable national, state, state highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the SWMFD device(s) and appurtenances in accordance with the drawings and these specifications.

- 04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.
- 04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations and per governing agencies standards, prior to installation of SWMFD unit(s).
- 04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations and per governing agencies standards, and with a minimum of 6" of gravel under all concrete structures.
- 04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.03.00 Shipping, Storage and Handling

- 04.03.01 Shipping – The SWMFD unit(s) shall be shipped to the contractor's address or job site. The contractor is responsible for offloading and placing the units(s) in the exact site of installation.
- 04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the SWMFD and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The SWMFD(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The SWMFD shall always be handled with caution and lifted according to OSHA and NIOSA lifting recommendations and/or the contractor's workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

- 04.04.01 Inspection – After installation, the contractor shall demonstrate that the SWMFD has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the SWMFD and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the SWMFD has been installed per the manufacturer's specifications and recommendations. All components shall be inspected by a qualified professional once a year and results of inspection shall be kept in an inspection log.
- 04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal. The maintenance shall be performed by a qualified professional. A maintenance manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the SWMFD.

- 04.04.03 A maintenance/inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities performed, amount and description of debris collected.
- Material Disposal - All debris, trash, organics, and sediments captured by the SWMFD shall be transported and disposed of at an approved facility for disposal site in accordance with local and state requirements. Please refer to state and local regulations for the proper disposal of toxic and non-toxic materials.

PART 5 – QUALITY ASSURANCE

05.01.00 Warranty

The Manufacturer shall guarantee the SWMFD against all manufacturing defects in materials and workmanship for a period of (5) years from the date of delivery to the customer. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The SWMFD is limited to recommended application for which it was designed.

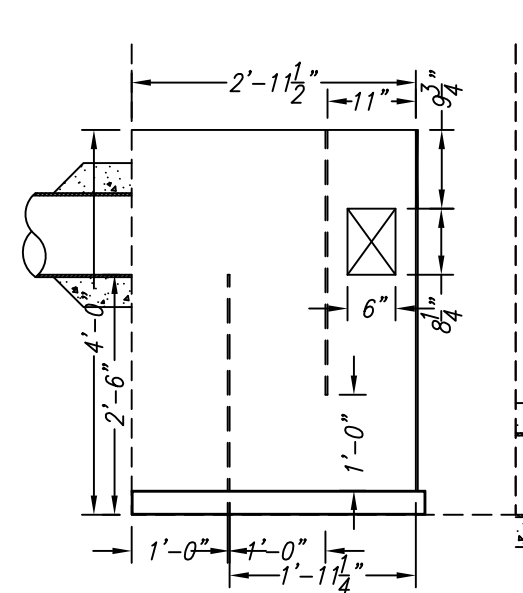
05.02.00 Performance Certification

The SWMFD manufacturer shall submit to the Engineer of Record a “Manufacturer’s Performance Certificate” certifying the SWMFD is capable of achieving the specified removal efficiency for suspended solids as typically found in storm water runoff. The SWMFD manufacture shall also provide a copy of their latest NJ CAT verification and NJDEP approval letter certifying it will remove a minimum of 80% of total suspended solids (of the size fractions typical for urban runoff or as required by local regulations) from the design flow rate. Devices without these performance certifications will not be accepted.

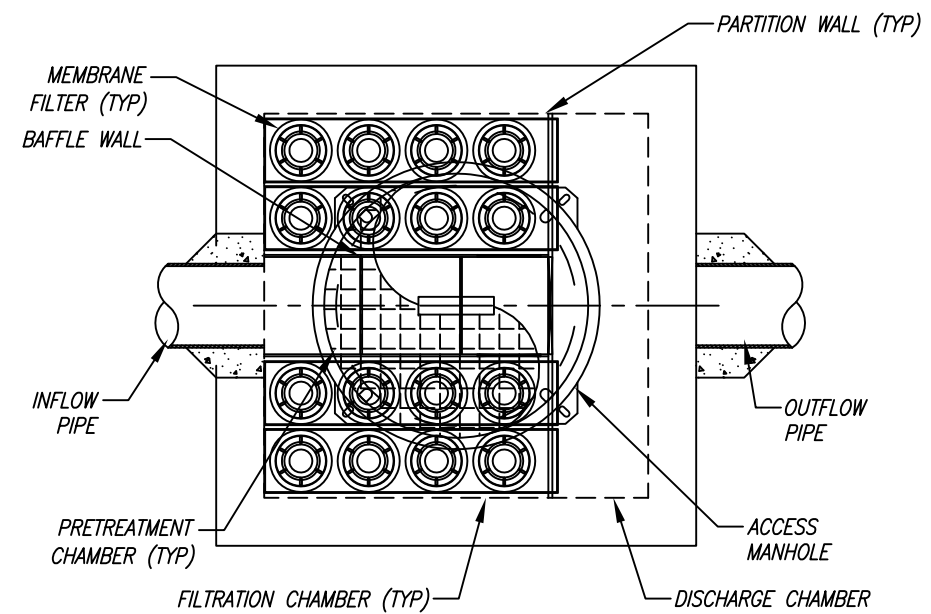
END OF SECTION

SITE SPECIFIC DATA*			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS)			
PEAK FLOW RATE (CFS)			
PEAK STORM DURATION (YEARS)			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			10"
OUTLET PIPE 1			10"
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			
FRAME AND COVER	ø30"		
CORROSIVE SOIL CONDITIONS			
KNOWN GROUNDWATER ELEVATION			
NOTES:			
*PER ENGINEER OF RECORD			

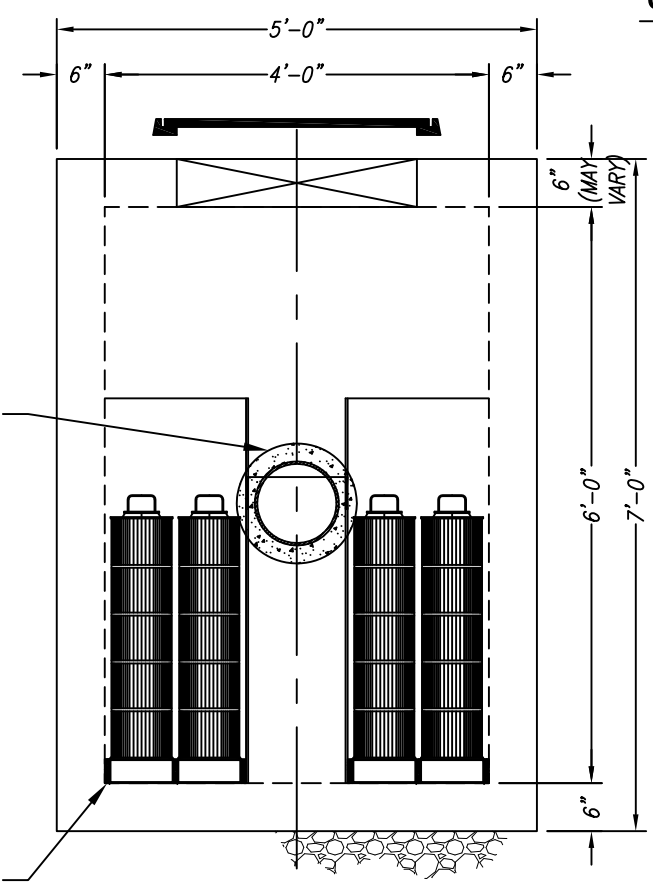
KF PERFORMANCE DATA				
CARTRIDGE HEIGHT (IN)			30.75	
CARTRIDGE FLOW RATE (GPM)			8.50	
NUMBER OF CARTRIDGES			16	
TOTAL TREATMENT FLOW RATE (CFS)			0.30	
SEDIMENT STORAGE CAPACITY (CF)			3.38	
KF STORAGE CAPACITIES				
SEDIMENT CHAMBER CAPACITY				
	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)	TOTAL (CF)
CHAMBER 1	1.00	1.02	1.50	1.53
CHAMBER 2	1.96	1.02	0.50	1.00
FILTRATION CHAMBER CAPACITY*				
CHAMBER 1	2.96	1.47	0.25	0.42
CHAMBER 2	2.96	1.47	0.25	0.42
*VOLUME OF FILTERS SUBTRACTED IN STORAGE CAPACITY				



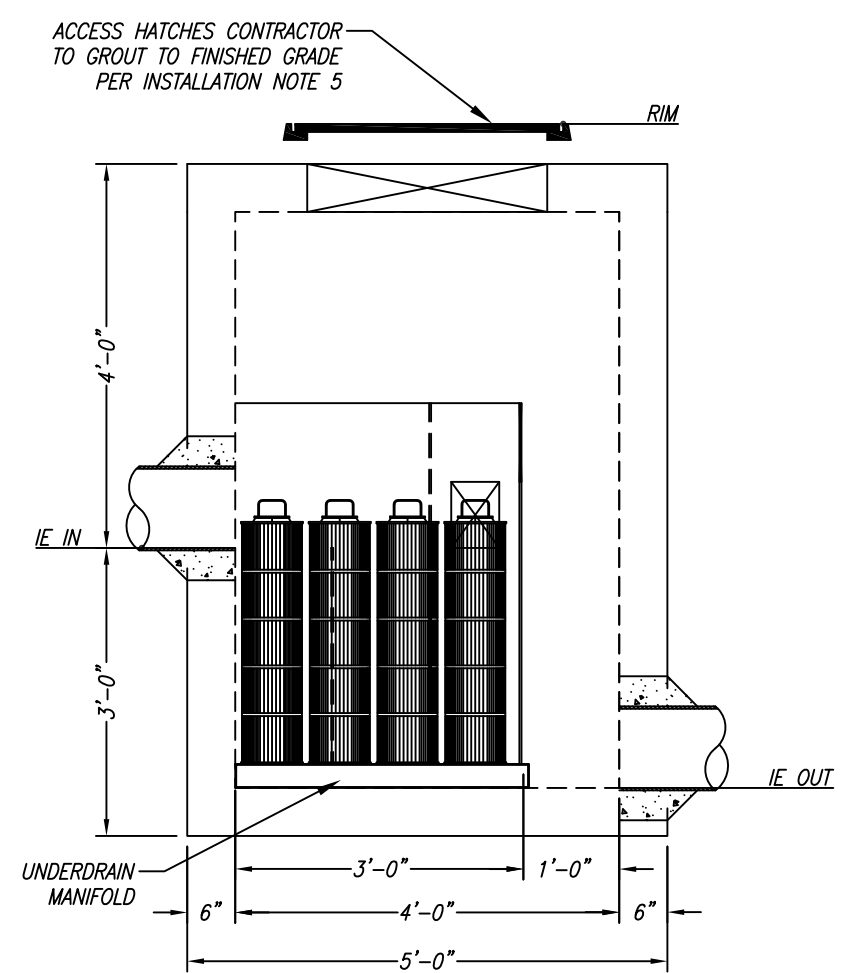
PRETREATMENT CHAMBER SECTION
NTS



PLAN VIEW
NTS



END VIEW
NTS



ELEVATION VIEW
NTS

GENERAL NOTES

- BIO CLEAN TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS, AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

INSTALLATION NOTES

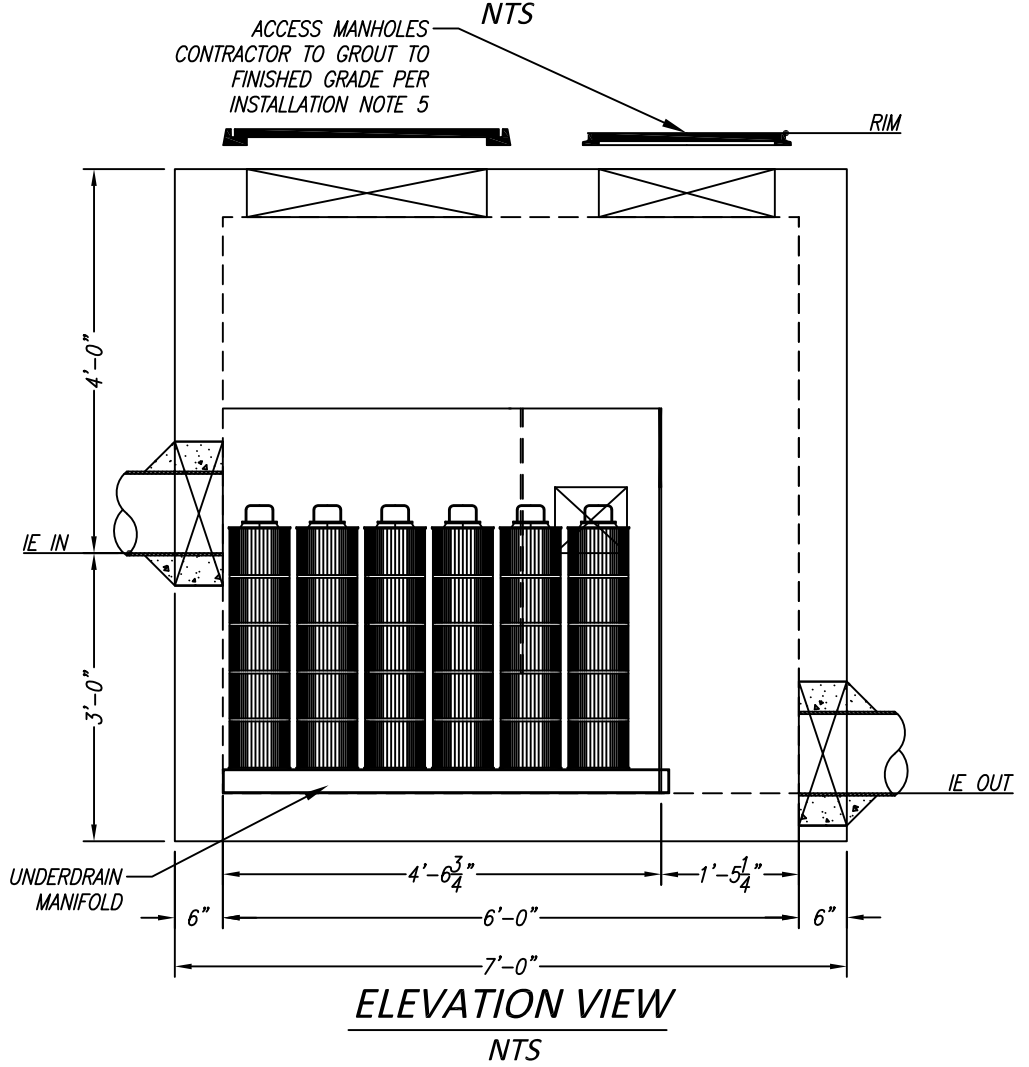
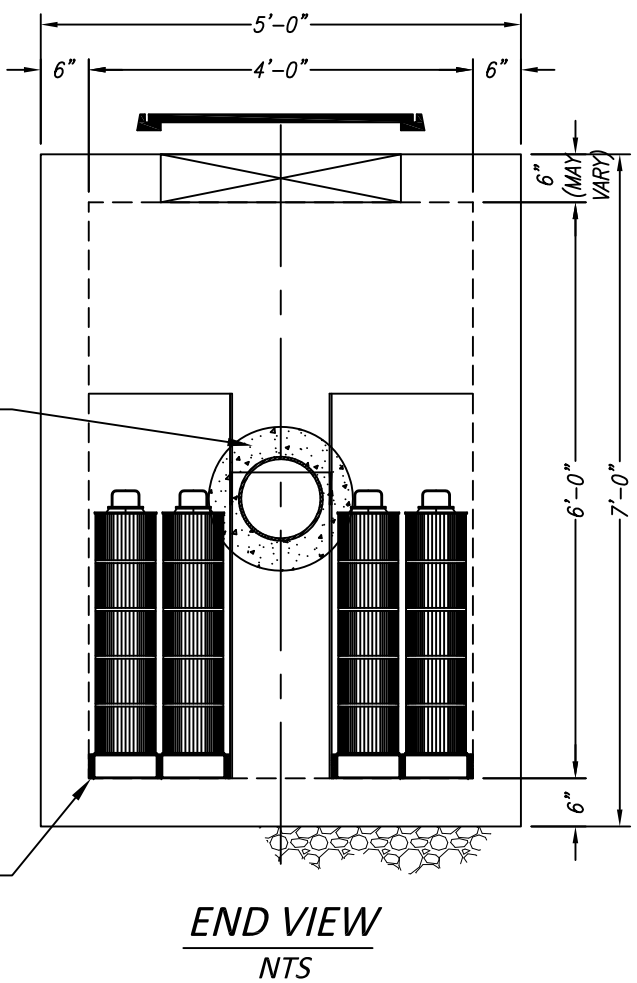
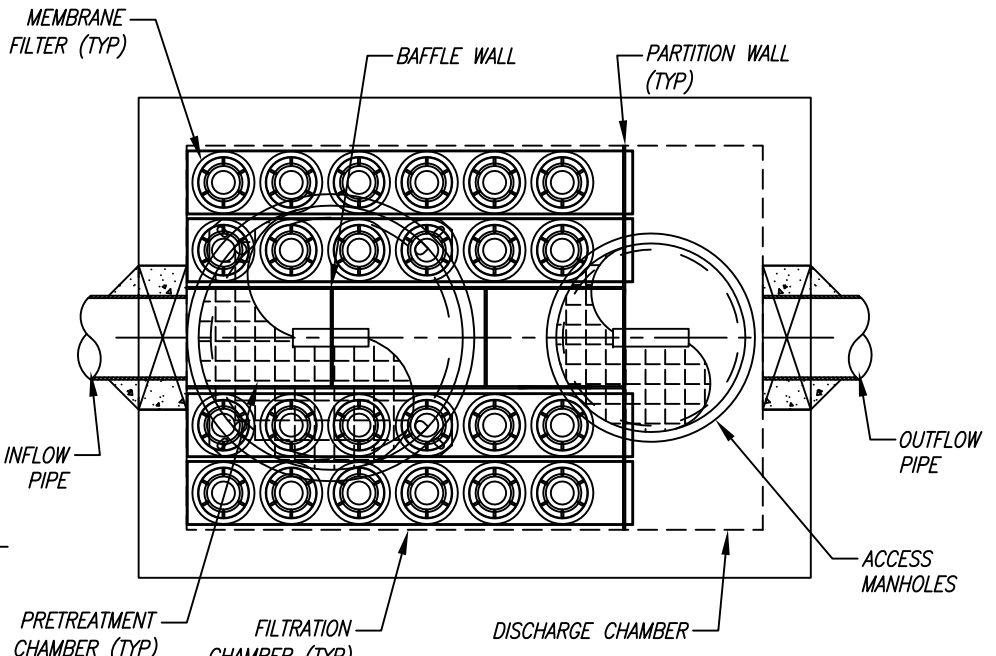
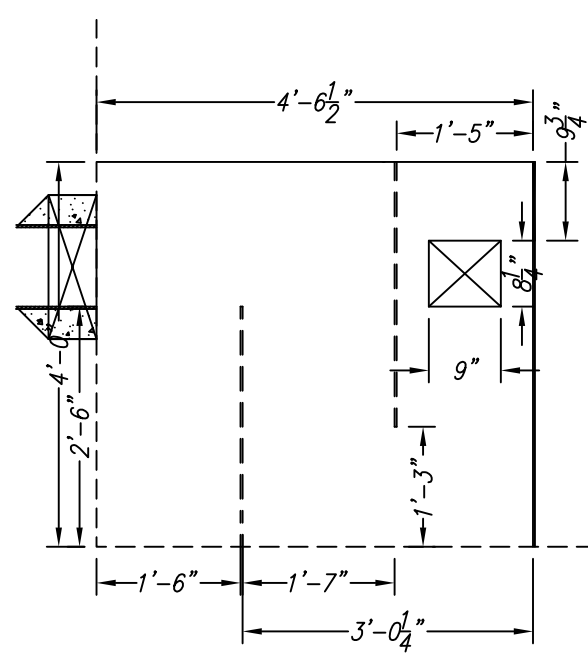
- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE KF UNIT AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
- MANUFACTURER RECOMMENDS A 6"-12" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
- ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
- ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. ALL COVERS SHALL BE SHIPPED LOOSE. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

11/13/17SSERTICH

NOT FOR CONSTRUCTION	<small>PROPRIETARY AND CONFIDENTIAL:</small> THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BIO CLEAN ENVIRONMENTAL SERVICES, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BIO CLEAN ENVIRONMENTAL SERVICES, INC. IS PROHIBITED.	 Bio Clean A Forterra Company	KF-4-4 MEMBRANE FILTRATION SYSTEM WITH PRETREATMENT STANDARD DETAIL
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SITE SPECIFIC DATA*			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS)			
PEAK FLOW RATE (CFS)			
PEAK STORM DURATION (YEARS)			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			10"
OUTLET PIPE 1			10"
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			
FRAME AND COVER			
CORROSIVE SOIL CONDITIONS			
KNOWN GROUNDWATER ELEVATION			
NOTES:			
*PER ENGINEER OF RECORD			

KF PERFORMANCE DATA				
CARTRIDGE HEIGHT (IN)			30.75	
CARTRIDGE FLOW RATE (GPM)			8.50	
NUMBER OF CARTRIDGES			24	
TOTAL TREATMENT FLOW RATE (CFS)			0.45	
SEDIMENT STORAGE CAPACITY (CF)			5.18	
KF STORAGE CAPACITIES				
SEDIMENT CHAMBER CAPACITY				
	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)	TOTAL (CF)
CHAMBER 1	1.50	1.02	1.50	2.30
CHAMBER 2	3.02	1.02	0.50	1.54
FILTRATION CHAMBER CAPACITY*				
CHAMBER 1	4.54	1.47	0.25	0.67
CHAMBER 2	4.54	1.47	0.25	0.67
*VOLUME OF FILTERS SUBTRACTED IN STORAGE CAPACITY				



GENERAL NOTES

- BIO CLEAN TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS, AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

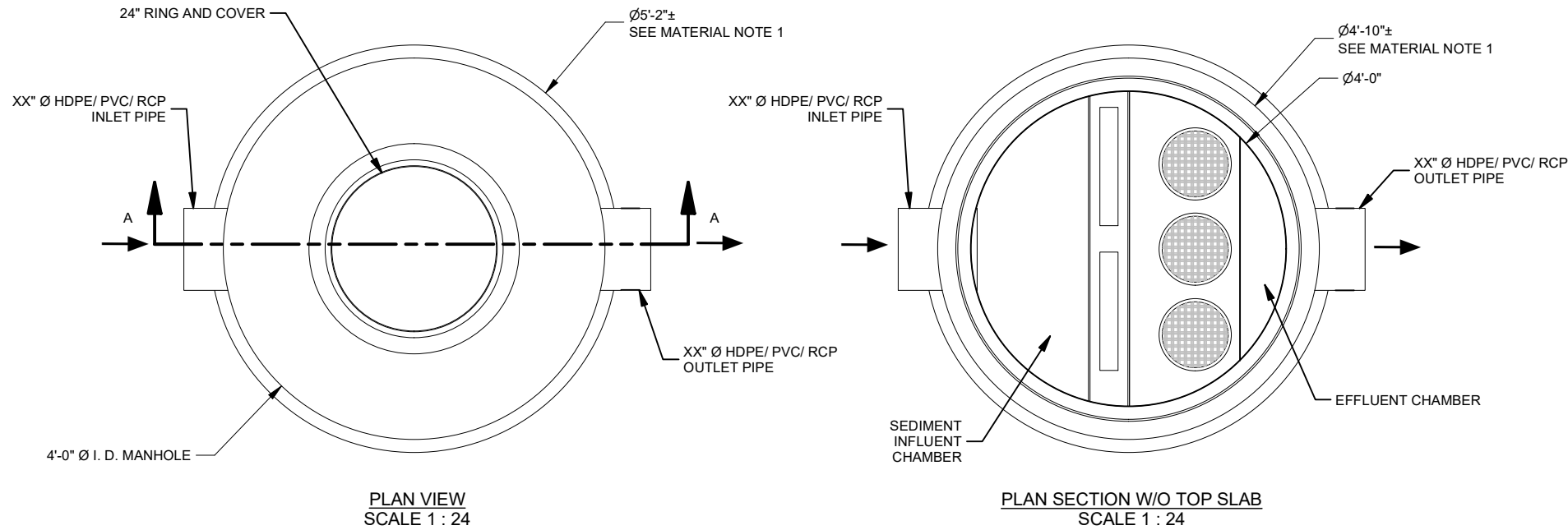
INSTALLATION NOTES

- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE KF UNIT AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
- MANUFACTURER RECOMMENDS A 6"-12" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
- ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
- ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. ALL COVERS SHALL BE SHIPPED LOOSE. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

11/13/17SSERTICH

NOT FOR CONSTRUCTION	PROPRIETARY AND CONFIDENTIAL: <small>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BIO CLEAN ENVIRONMENTAL SERVICES, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BIO CLEAN ENVIRONMENTAL SERVICES, INC. IS PROHIBITED.</small>	 Bio Clean A Forterra Company	KF-4-6 MEMBRANE FILTRATION SYSTEM WITH PRETREATMENT STANDARD DETAIL
-----------------------------	---	---	--

STORMVAULT WITH 3-PACK STORMSAFE CARTRIDGES STORMWATER TREATMENT LOCATIONS C4 & E



STORMSAFE FILTER TREATMENT DESIGN:

STORMWATER QUALITY DESIGN FLOW (SQDF)	0.768-CFS (345-GPM)
STORM DRAIN DESIGN PEAK CONVEYANCE FLOW	6.41-CFS
RETURN FREQUENCY / PERIOD OF PEAK DESIGN CONVEYANCE FLOW	XX - YEARS

SYSTEM AND TREATMENT FLOW DESIGN:

MEDIA FILTER SUBSTRATA	PATHOGEN CARTRIDGE
INDIVIDUAL CARTRIDGE ULTIMATE MAXIMUM LOADING RATE	115-GPM/ CART
REQUIRED HYDRAULIC DRIVING HEAD	6-INCHES

STORMWATER FILTRATION TREATMENT UNIT (SWFTU) NOTES:

THE STORMSAFE FILTER EMPLOYS THE PATENTED ANTIMICROBIAL MEDIA TO TREAT STORMWATER BY FABCO. TREATMENT PROCESS IS DESIGNED TO ACHIEVE BACTERIA REDUCTION THROUGH PHYSICAL CELLULAR DISRUPTION IN ADDITION TO BASIC SEDIMENTATION, PHYSICAL FILTRATION OF TOTAL SUSPENDED SOLIDS (TSS), AND GROSS SOLIDS AND DEBRIS. THE STORMSAFE PATHOGEN CARTRIDGE ACHIEVES THE FOLLOWING EFFLUENT DISCHARGE WATER QUALITY GOALS:

- SPECIFICALLY TARGETS AND KILLS 50 TO 70% OF THE BACTERIA IN STORMWATER
- PROVEN CAPABLE OF REDUCING THE FOLLOWING TYPES OF INDICATOR BACTERIA:
 - 77% E.Coli
 - 77% FECAL COLIFORM
 - 49% ENTEROCOCCUS
- NO ATTENUATION, DISSIPATION OF BACTERIA REMOVAL EFFICIENCY OVER TIME REGARDLESS OF TOTAL MASS LOADING
- NO TOXICITY RESIDUAL IMPACTS TO DOWN STREAM BIOTA
- REMOVAL OF OIL AND GREASE

MEDIA FILTRATION PROCESS SPECIFICATIONS:

- FILTER CARTRIDGES SHALL BE OPEN CELL FOAM SUBSTRATA MEDIA WITH THE PATENTED CHEMICAL CHARGED COATING ON POLYMER OPEN CELL FOAM SUBSTRATA MEDIA.
- THE DEPTH OF THE POLYMER MEDIA SHALL BE NOT LESS THAN 11-INCHES IN DEPTH / THICKNESS.
- THE SPECIFIC HYDRAULIC LOADING RATE OF THE FILTRATION MEDIA SHALL BE NO MORE THAN THE VALUE SHOWN IN THE STORMSAFE FILTER TREATMENT DESIGN TABLE ABOVE.

CONSTRUCTION NOTES:

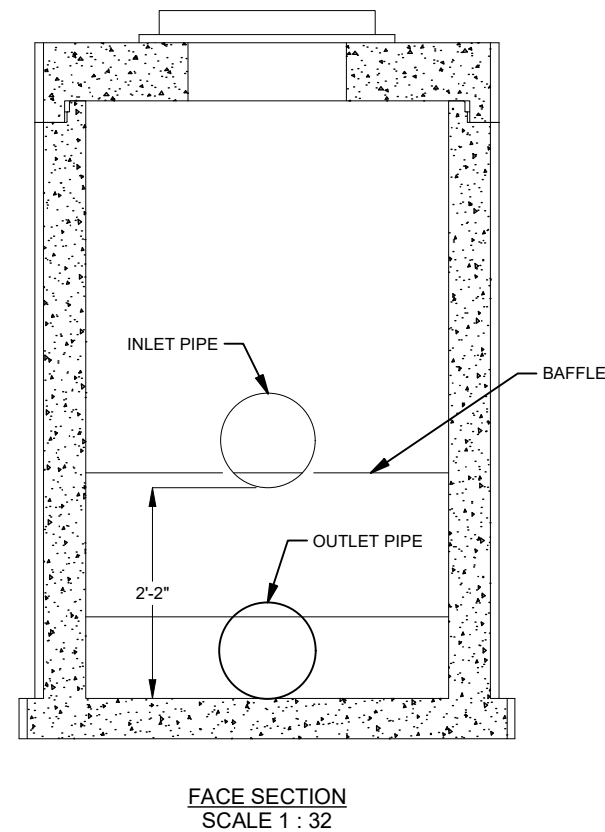
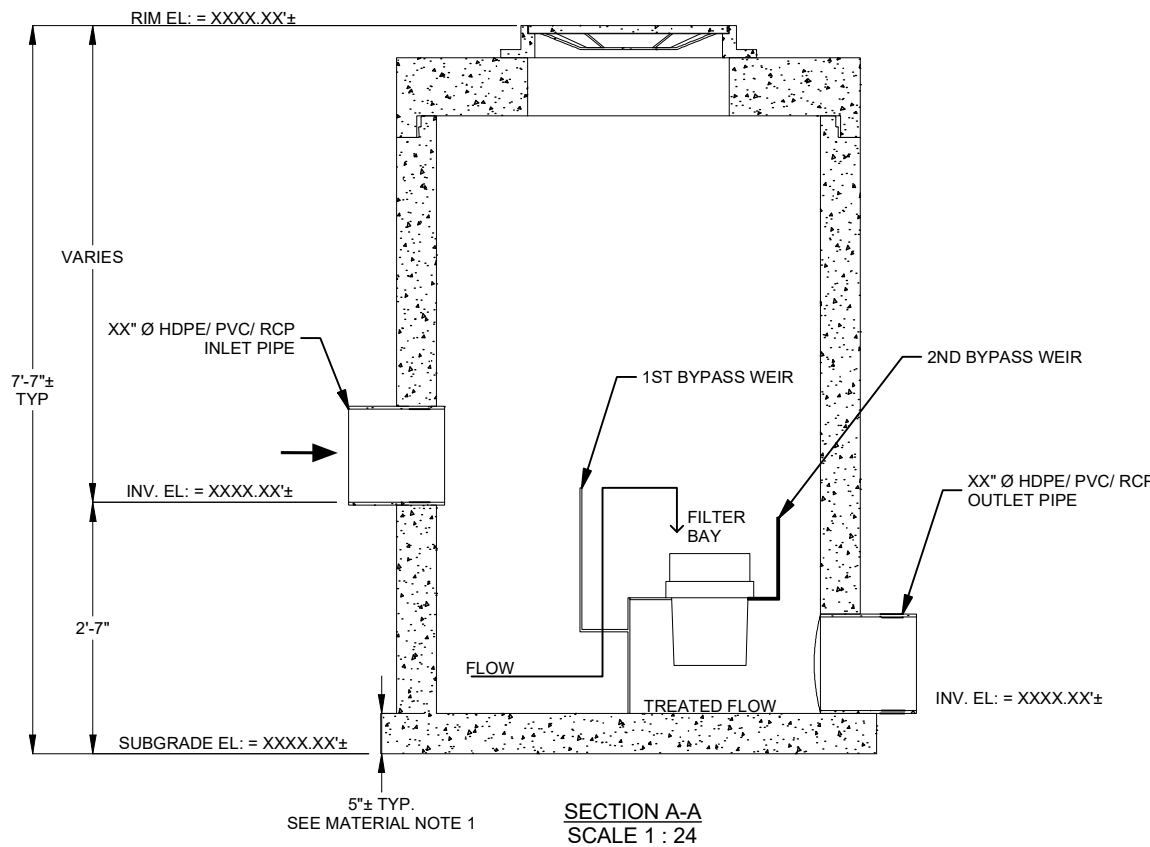
- CONTRACTOR TO VERIFY VERTICAL DIMENSIONS OF ALL PRECAST PIECES IN FIELD
- VERIFY SUBBASE ELEVATION BEFORE PLACING PRECAST COMPONENTS OR BACKFILLING.
- APPLY BUTYL MASTIC AND/OR GROUT TO SEAL JOINTS OF STRUCTURE.
- APPLY LOAD TO MASTIC SEAL IN JOINTS OF VAULT/MANHOLE SECTIONS TO COMPRESS SEALANT IF NECESSARY. UNIT MUST BE WATER TIGHT, HOLDING WATER UP TO FLOWLINE INVERT (MINIMUM).
- CONTRACTOR TO GROUT SEAL INLET AND DISCHARGE PIPES TO VAULT/MANHOLE WALL
- ALL INTERNAL COMPONENTS INSTALLED BY MANUFACTURER
- BLOCK AND/OR GROUT PACK BENEATH FRAMES AND COVERS TO MATCH FINISHED GRADE.

MATERIALS:

- FINAL DIMENSIONS OF PROJECT SPECIFIC MANUFACTURING VARIES WITH LOCAL PRE-CASTING CAPACITIES AS WELL AS PER SITE SPECIFIC STRUCTURAL DESIGN TO MEET INSTALLATION, APPLICATION DEMANDS.
- ALL DIMENSIONS ARE IN DECIMAL INCHES
- PRECAST MATERIALS AND MANUFACTURING METHODS SHALL CONFORM TO ASTM C-857 AND ASSHTO LOADING METHOD
- CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH $f'c = 5,000$ - psi AT 28-DAYS
- THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/V HIGH SULFATE RESISTANT
- BASIN (PLASTIC) SHALL BE POLYPROPYLENE COPOLYMER
- ALUMINUM ALLOY SHALL BE ASTM 5052-H32
- STAINLESS STEEL SHALL BE ASTM 316L

MATERIAL LIST - PROVIDED WITH UNIT:

QTY	COMPONENT DESCRIPTION	PROVIDER	INSTALLER
3	STORM SAFE PATHOGEN FILTER CARTRIDGES	JENSEN	JENSEN
2	24" RING AND COVER	JESNEN	CONTRACTOR
1	30" RING AND COVER	JENSEN	CONTRACTOR



110519 DANA POINT - STORMSAFE - 3 PACK.rdw

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- All elevations have been provided by others, and have not been verified by Jensen Precast. Contractor to verify all dimensions and elevations in field prior to installation.
- These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint orientations may vary across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
- System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
- Foundation, subgrade, and backfill to be designed by others.

JENSEN STORMWATER SYSTEMS
521 DUNN CIRCLE, SPARKS, NV 89431
www.jensenwaterresources.com
(855) 468-5600

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DESCRIPTION:		DANA POINT STORMSAFE		REV:
		DANA POINT, CA		SHEET:
PART NUMBER:	3 PACK - STORMSAFE	DRAWN BY:	K. Keller	1 OF 2
CREATED:		MODIFIED:	12/6/2019	

STORMVAULT WITH 10-PACK STORMSAFE CARTRIDGES STORMWATER TREATMENT LOCATION C2.1

SYSTEM AND TREATMENT FLOW DESIGN:

STORMWATER QUALITY DESIGN FLOW (SQDF)	2.56-CFS (1150-GPM)
STORM DRAIN DESIGN PEAK CONVEYANCE FLOW	21-CFS
RETURN FREQUENCY / PERIOD OF PEAK DESIGN CONVEYANCE FLOW	XX - YEARS

STORMSAFE FILTER TREATMENT DESIGN:

MEDIA FILTER SUBSTRATA	PATHOGEN CARTRIDGE
INDIVIDUAL CARTRIDGE ULTIMATE MAXIMUM LOADING RATE	115-GPM/ CART
REQUIRED HYDRAULIC DRIVING HEAD	6-INCHES

STORMWATER FILTRATION TREATMENT UNIT (SWFTU) NOTES:

THE STORMSAFE FILTER EMPLOYS THE PATENTED ANTIMICROBIAL MEDIA TO TREAT STORMWATER BY FABCO. TREATMENT PROCESS IS DESIGNED TO ACHIEVE BACTERIA REDUCTION THROUGH PHYSICAL CELLULAR DISRUPTION IN ADDITION TO BASIC SEDIMENTATION, PHYSICAL FILTRATION OF TOTAL SUSPENDED SOLIDS (TSS), AND GROSS SOLIDS AND DEBRIS. THE STORMSAFE PATHOGEN CARTRIDGE ACHIEVES THE FOLLOWING EFFLUENT DISCHARGE WATER QUALITY GOALS:

- SPECIFICALLY TARGETS AND KILLS 50 TO 70% OF THE BACTERIA IN STORMWATER
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 - 77% E.Coli
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- NO ATTENUATION, DISSIPATION OF BACTERIA REMOVAL EFFICIENCY OVER TIME REGARDLESS OF TOTAL MASS LOADING
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- REMOVAL OF OIL AND GREASE

MEDIA FILTRATION PROCESS SPECIFICATIONS:

1. FILTER CARTRIDGES SHALL BE OPEN CELL FOAM SUBSTRATA MEDIA WITH THE PATENTED CHEMICAL CHARGED COATING ON POLYMER OPEN CELL FOAM SUBSTRATA MEDIA.
2. THE DEPTH OF THE POLYMER MEDIA SHALL BE NOT LESS THAN 11-INCHES IN DEPTH / THICKNESS.
3. THE SPECIFIC HYDRAULIC LOADING RATE OF THE FILTRATION MEDIA SHALL BE NO MORE THAN THE VALUE SHOWN IN THE STORMSAFE FILTER TREATMENT DESIGN TABLE ABOVE.

CONSTRUCTION NOTES:

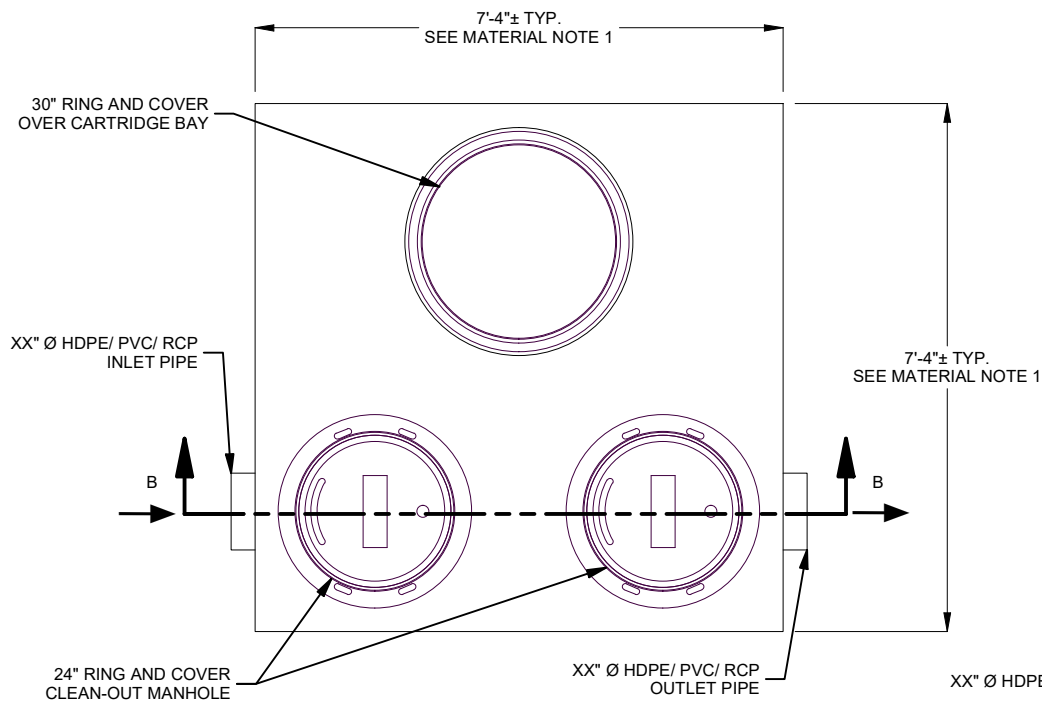
1. CONTRACTOR TO VERIFY VERTICAL DIMENSIONS OF ALL PRECAST PIECES IN FIELD
2. VERIFY SUBBASE ELEVATION BEFORE PLACING PRECAST COMPONENTS OR BACKFILLING.
3. APPLY BUTYL MASTIC AND/OR GROUT TO SEAL JOINTS OF STRUCTURE.
4. APPLY LOAD TO MASTIC SEAL IN JOINTS OF VAULT/MANHOLE SECTIONS TO COMPRESS SEALANT IF NECESSARY. UNIT MUST BE WATER TIGHT, HOLDING WATER UP TO FLOWLINE INVERT (MINIMUM).
5. CONTRACTOR TO GROUT SEAL INLET AND DISCHARGE PIPES TO VAULT/MANHOLE WALL
6. ALL INTERNAL COMPONENTS INSTALLED BY MANUFACTURER
7. BLOCK AND/OR GROUT PACK BENEATH FRAMES AND COVERS TO MATCH FINISHED GRADE.

MATERIALS:

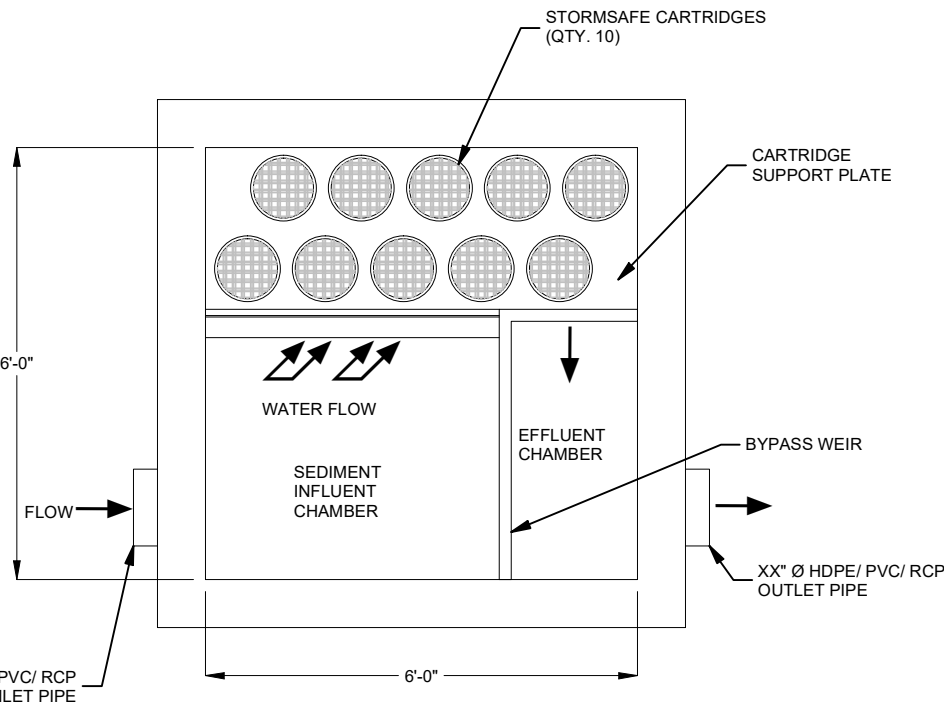
1. FINAL DIMENSIONS OF PROJECT SPECIFIC MANUFACTURING VARIES WITH LOCAL PRE-CASTING CAPACITIES AS WELL AS PER SITE SPECIFIC STRUCTURAL DESIGN TO MEET INSTALLATION, APPLICATION DEMANDS.
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5. THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/IV HIGH SULFATE RESISTANT
6. BASIN (PLASTIC) SHALL BE POLYPROPYLENE COPOLYMER
7. ALUMINUM ALLOY SHALL BE ASTM 5052-H32
8. STAINLESS STEEL SHALL BE ASTM 316L

MATERIAL LIST - PROVIDED WITH UNIT:

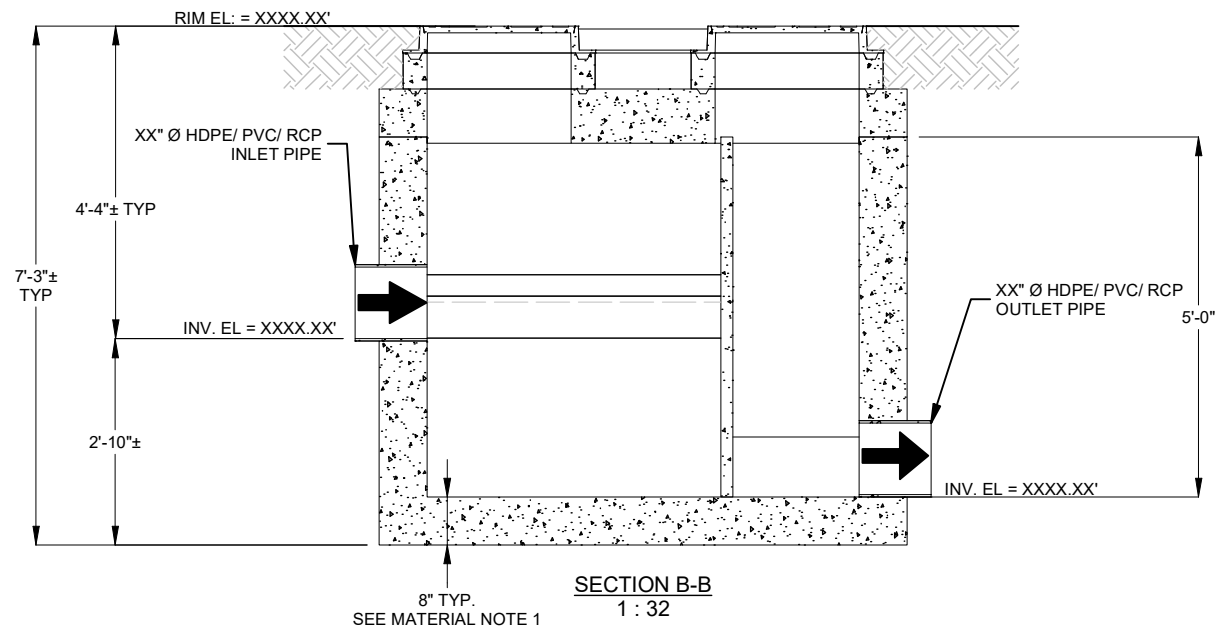
QTY	COMPONENT DESCRIPTION	PROVIDER	INSTALLER
10	STORM SAFE PATHOGEN FILTER CARTRIDGES	JENSEN	JENSEN
2	24" RING AND COVER	JESNEN	CONTRACTOR
1	30" RING AND COVER	JENSEN	CONTRACTOR



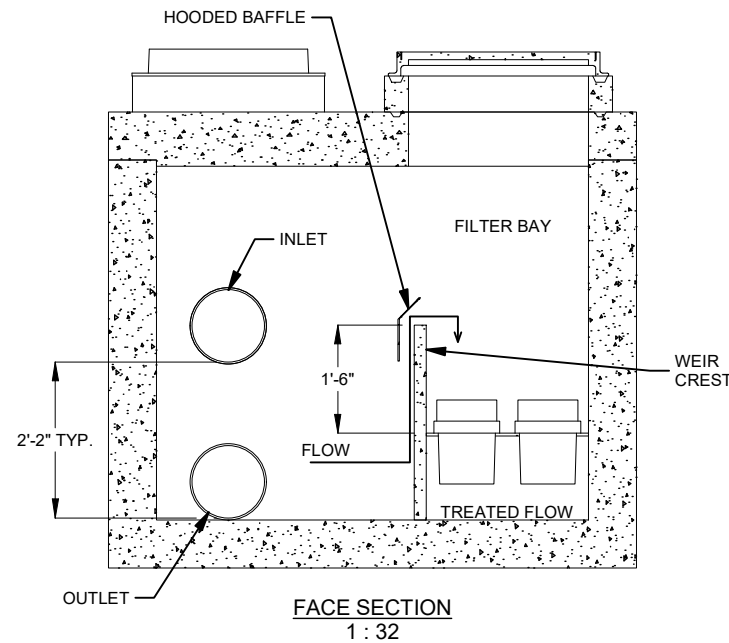
PLAN VIEW
SCALE 1 : 32



PLAN SECTION W/O TOP SLAB
SCALE 1 : 32



SECTION B-B
SCALE 1 : 32



FACE SECTION
SCALE 1 : 32

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- 2.) These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint orientations may vary across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
- 3.) System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
- 4.) Foundation, subgrade, and backfill to be designed by others.

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DESCRIPTION:	DANA POINT STORMSAFE		REV:
	DANA POINT, CA		SHEET:
PART NUMBER:	10 CARTRIDGE STORMSAFE	DRAWN BY:	K. Keller
CREATED:		MODIFIED:	12/6/2019
			1 OF 2



- Project input values
- Check to see if design is OK or NOT OK

PROJECT SUMMARY	
Date:	
Project Name:	
Location:	
Designed By:	
Company:	
Telephone:	

CARTRIDGE DETAILS											
StormSafe Model	Cartridge Description	Specific Cartridge Treatment Flow Rate "Q _{CART} "		Total Surface Area per Cartridge "A _{CART} "	Volume of media per Cartridge "V _{CART} "	Hydraulic Loading Rate (HLR) (Q _{CART} /A _{CART})		Volumetric Flux Rate	Residence (Contact) Time "RT" RT = V _{CART} /Q _{CART}		
		(gpm/cart)	(cfs/cart)	(ft ²)	(ft ³)	(gpm/ft ²)		(gpm/ft ³)	(sec)		
9718-2-000	Pathogens	115.00	0.26	0.441786	0.441786	≤	260	≤	300	≥	1.5

Enter Required Project Treatment Flow Rate, (cfs) = 2.24

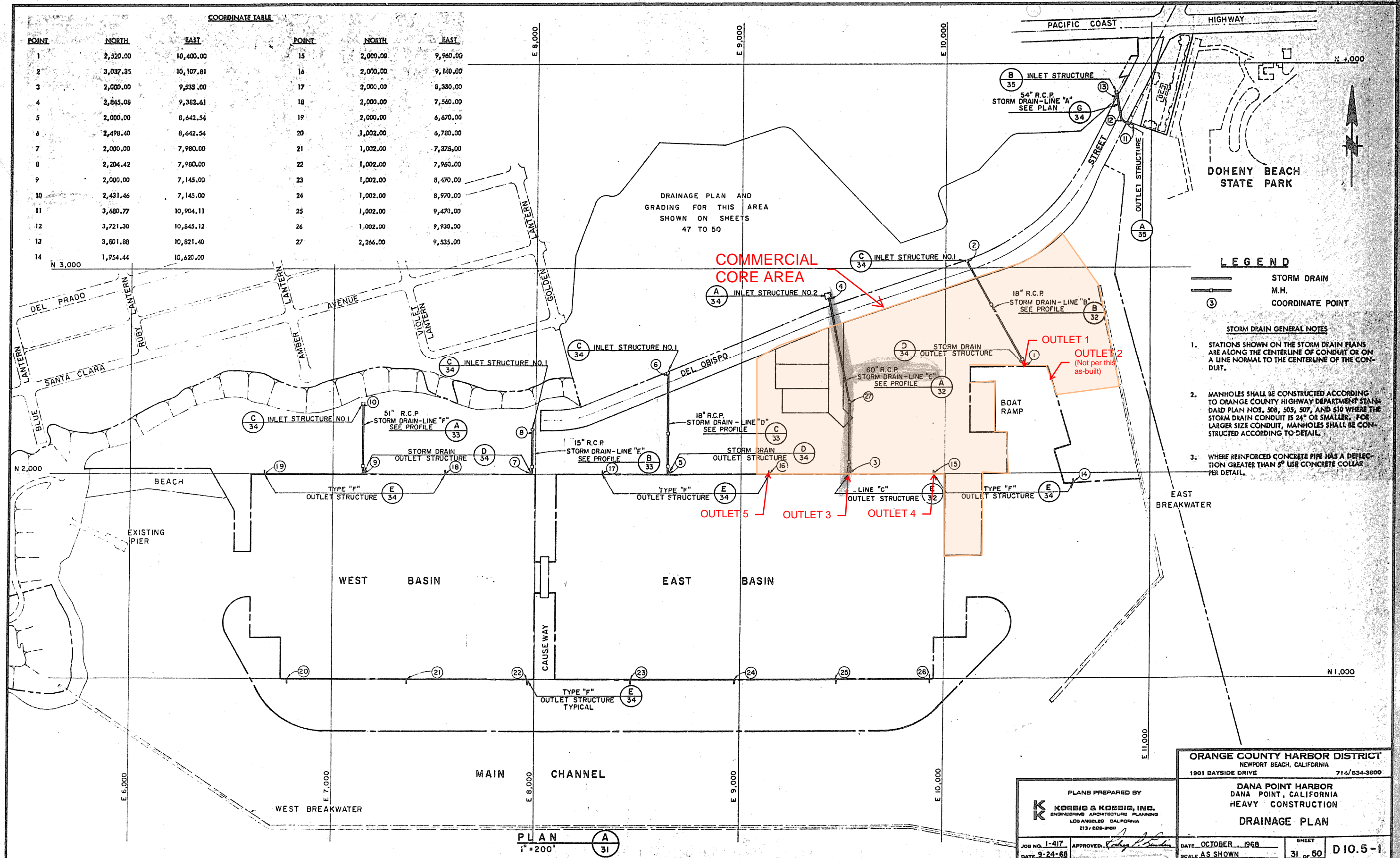
Required Project Treatment Flow Rate, (gpm) = 1,005

PROJECT SPECIFIC TREATMENT FLOW VALUES										
Filter Unit's Label	Project Specific Water Quality Treatment Flow		Number of Cartridges	Project Specific Cartridge Treatment Flow Rate "Q _{CART} "		Treatment Flux Rate/ Hydraulic Loading Rate (HLR) Normalize	Total Volume of Media in all the Cartridges	Volumetric Flux (Q _{CART} /V _{CART})	Residence/ Contact Time (RT) = V _{CART} /Q _{CART}	Design OK? Or NOT OK?
	(cfs)	(gpm)		(gpm/cart)	(cfs/cart)	(gpm/ft ²)				
C2.1	2.24	1,005	10	101	0.22	227.57	4.4	227.6	2	OK
C2.2	0.13	58	1	58	0.13	132.07	0.4	132.1	3	OK
C4	0.68	305	3	102	0.23	230.28	1.3	230.3	2	OK
D	0.094	42	1	42	0.09	95.50	0.4	95.5	5	OK
E	0.57	256	3	85	0.19	193.03	1.3	193.0	2	OK

Appendix K – Storm Drain As-Built Plans

COORDINATE TABLE

POINT	NORTH	EAST	POINT	NORTH	EAST
1	2,520.00	10,400.00	15	2,000.00	9,960.00
2	3,037.35	10,107.61	16	2,000.00	9,740.00
3	2,000.00	9,539.00	17	2,000.00	8,330.00
4	2,845.08	9,362.61	18	2,000.00	7,560.00
5	2,000.00	8,642.54	19	2,000.00	6,670.00
6	2,498.40	8,642.54	20	3,002.00	6,780.00
7	2,000.00	7,980.00	21	1,002.00	7,375.00
8	2,204.42	7,980.00	22	1,002.00	7,960.00
9	2,000.00	7,145.00	23	1,002.00	8,470.00
10	2,431.46	7,145.00	24	1,002.00	8,970.00
11	3,680.77	10,904.11	25	1,002.00	9,470.00
12	3,721.30	10,645.12	26	1,002.00	9,930.00
13	3,801.88	10,821.40	27	2,266.00	9,535.00
14	1,954.44	10,620.00			



- LEGEND**
- STORM DRAIN
 - M.H.
 - ③ COORDINATE POINT
- STORM DRAIN GENERAL NOTES**
- STATIONS SHOWN ON THE STORM DRAIN PLANS ARE ALONG THE CENTERLINE OF CONDUIT OR ON A LINE NORMAL TO THE CENTERLINE OF THE CONDUIT.
 - MANHOLES SHALL BE CONSTRUCTED ACCORDING TO ORANGE COUNTY HIGHWAY DEPARTMENT STANDARD PLAN NOS. 508, 505, 507, AND 510 WHERE THE STORM DRAIN CONDUIT IS 24" OR SMALLER. FOR LARGER SIZE CONDUIT, MANHOLES SHALL BE CONSTRUCTED ACCORDING TO DETAIL.
 - WHERE REINFORCED CONCRETE PIPE HAS A DEFLECTION GREATER THAN 6" USE CONCRETE COLLAR PER DETAIL.

PLAN A 31
1" = 200'

PLANS PREPARED BY
K KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 628-3100

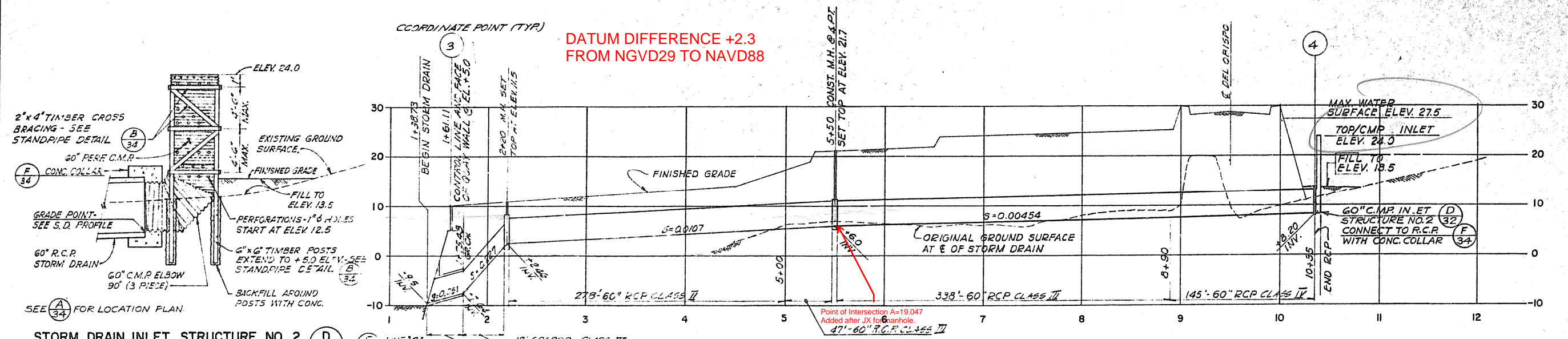
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
DRAINAGE PLAN

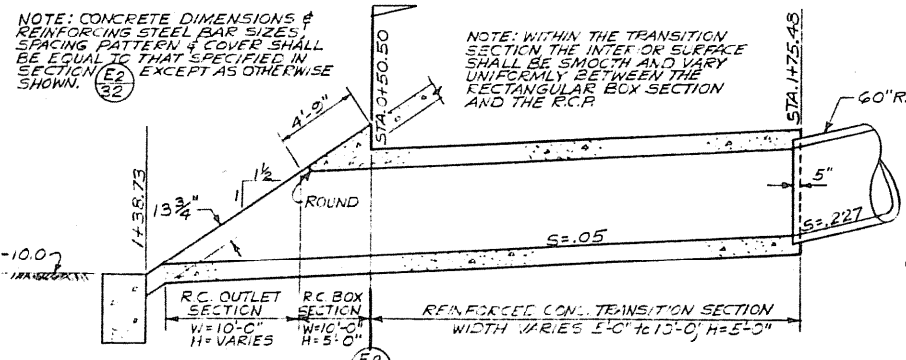
JOB NO. 1-417 APPROVED: [Signature] DATE 9-24-68 SHEET 31 OF 50 D10.5-1
DATE OCTOBER 1968 SCALE AS SHOWN

Plan 09796
Dana Point Harbor
Sheet 31 of 50
Red. 22.71
Blue line
Scale - As Shown

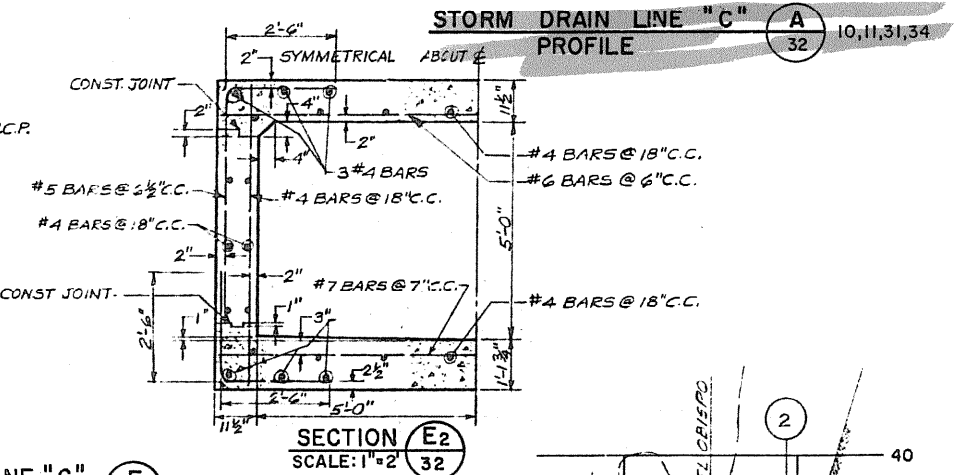
MICROFILMED
JUN 8 1969



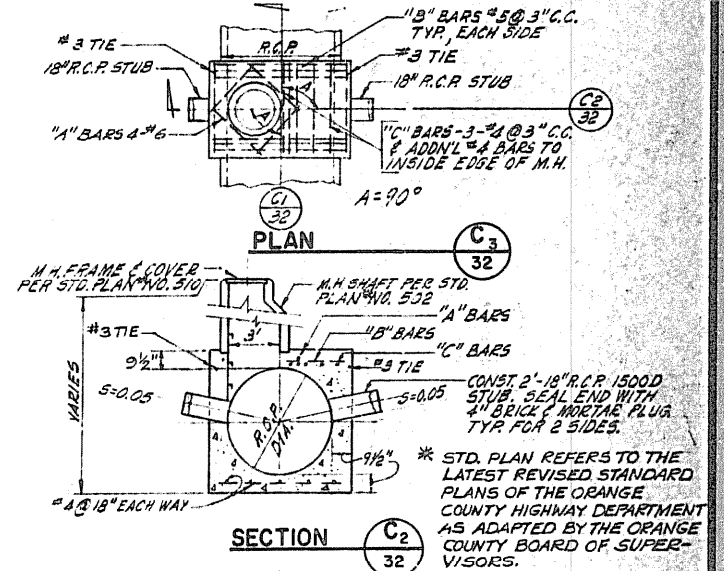
STORM DRAIN INLET STRUCTURE NO. 2 (D) 34
SCALE: 1"=5'



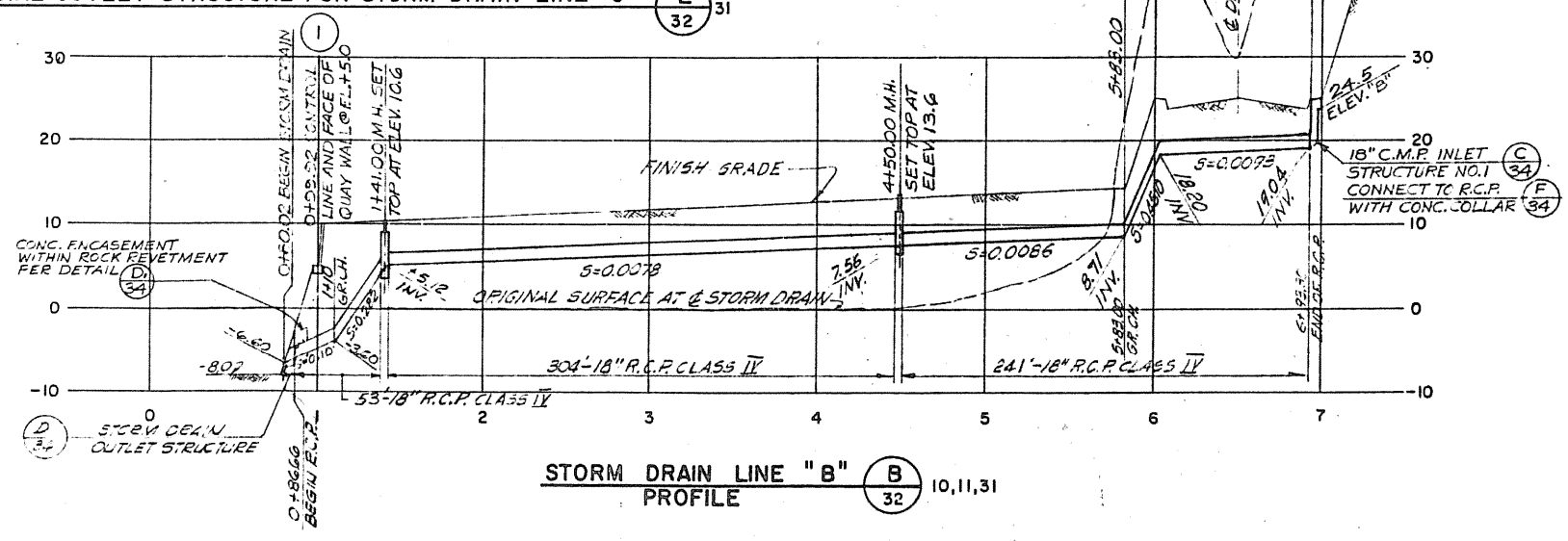
SECTION E1 (E) 32
SCALE: 1"=5'



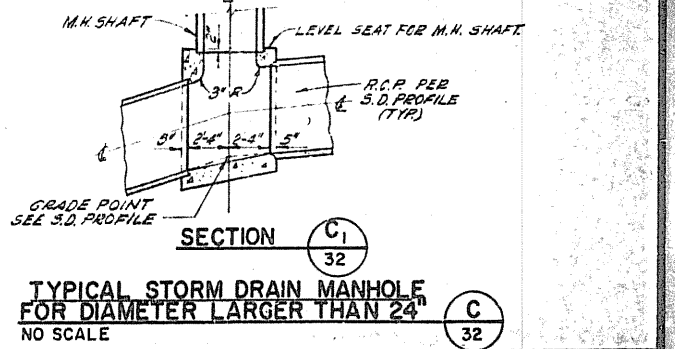
SECTION E2 (E) 32
SCALE: 1"=2'



SECTION C2 (C) 32
NO SCALE



STORM DRAIN LINE 'B' PROFILE (B) 32 10,11,31



SECTION C1 (C) 32
NO SCALE

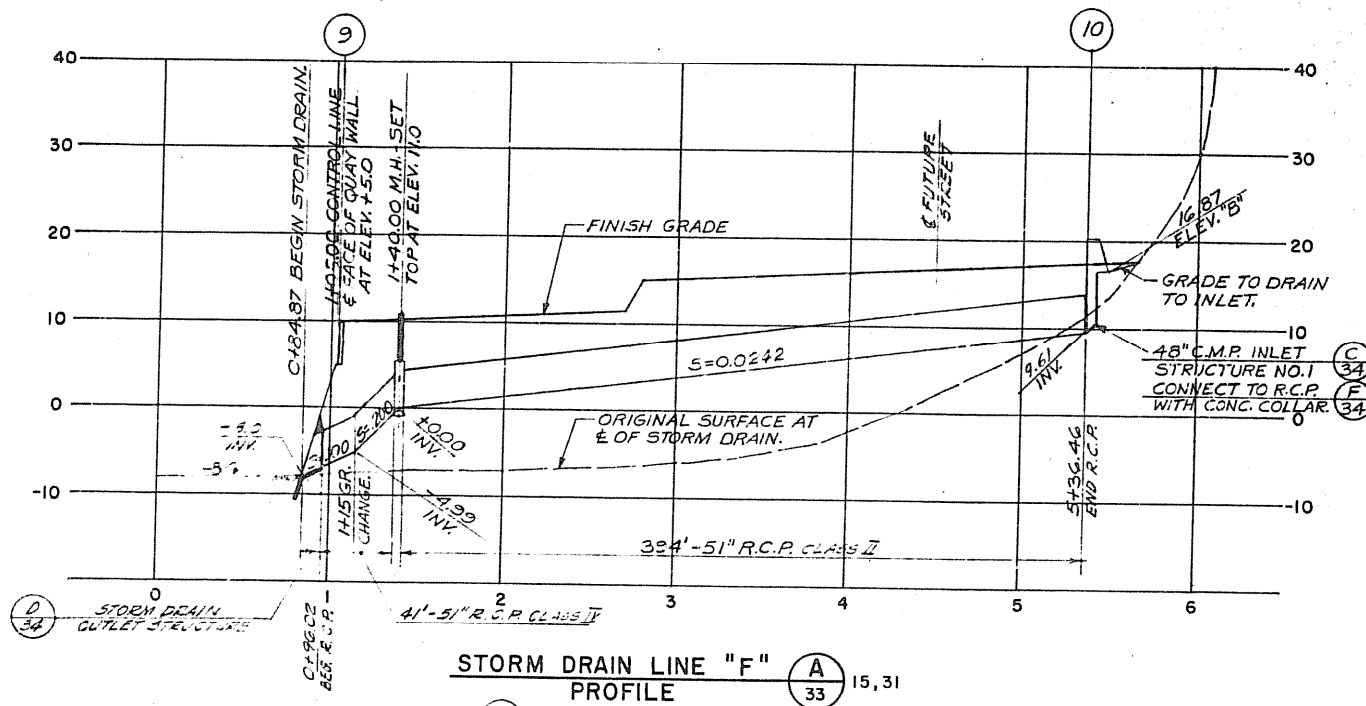
ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800	
DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION DRAINAGE PROFILES I	
PLANS PREPARED BY K KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213/888-3182	JOB NO. 1-417 DATE 9-24-68 APPROVED: <i>[Signature]</i>
DATE OCTOBER 1968 SCALE AS SHOWN	SHEET 32 OF 50 D 10.5-1

SCALE HORIZ. 1"=50'
VERT. 1"=10'

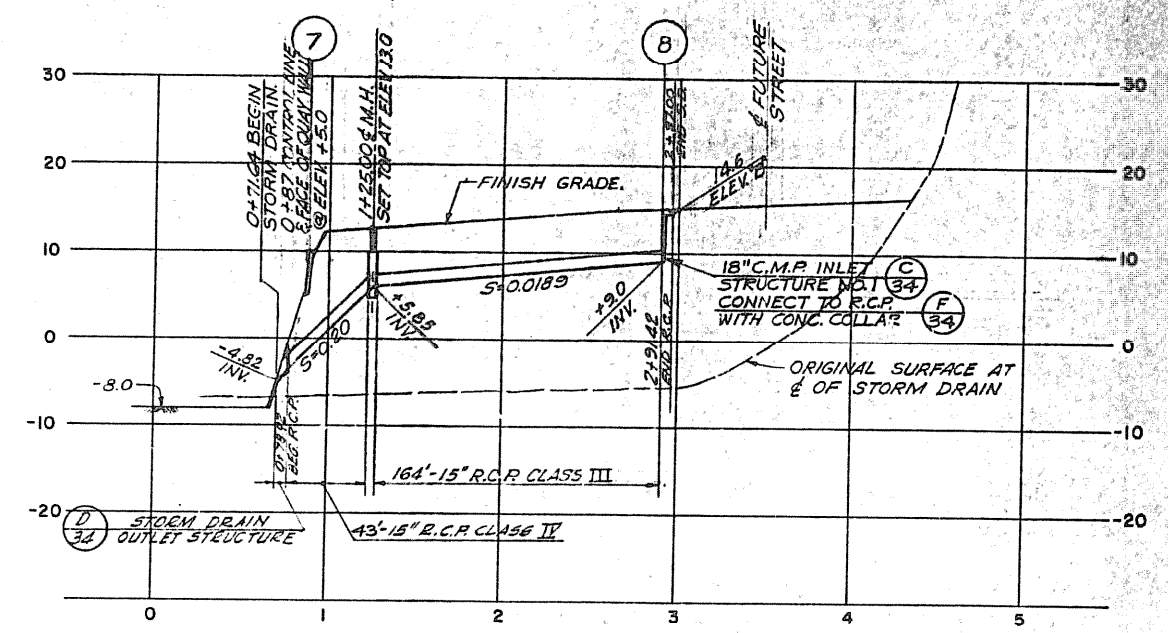
Plan 49796
Dana Point Harbor
Sheet 32 of 50
Red 22, 5:1
Blue lines
Scale- As Shown

MICROFILMED
JUN 6 1969

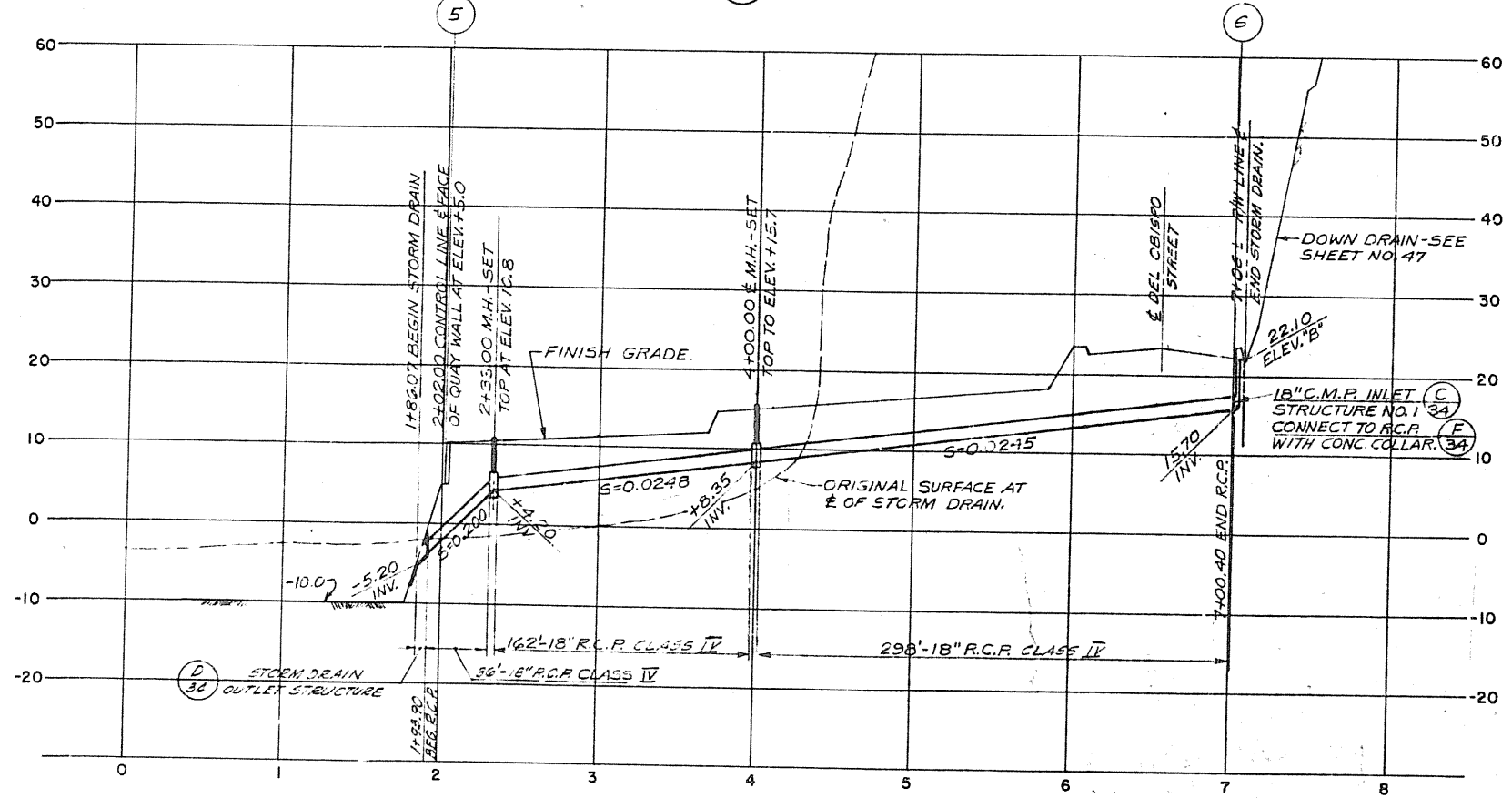
COORDINATE POINT, TYPICAL



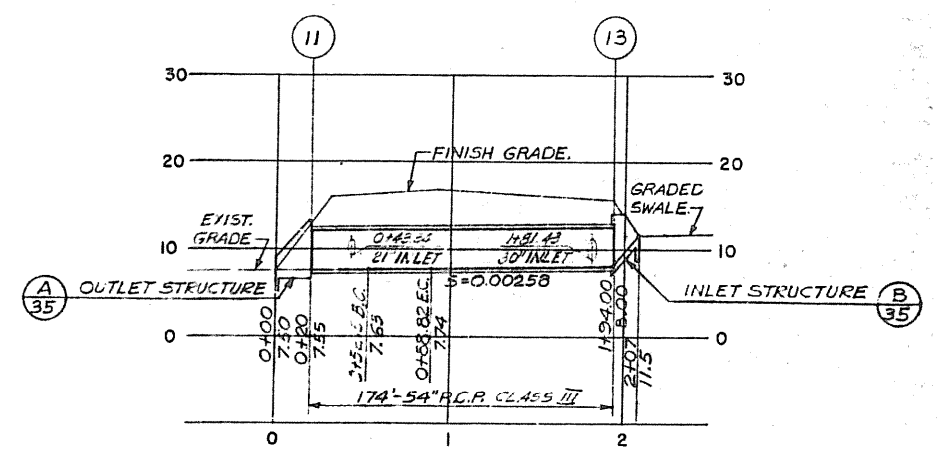
STORM DRAIN LINE "F" PROFILE A 15,31



STORM DRAIN LINE "E" PROFILE B 13,31



STORM DRAIN LINE "D" PROFILE C 9,13,31



STORM DRAIN LINE "A" PROFILE D 9,31,34

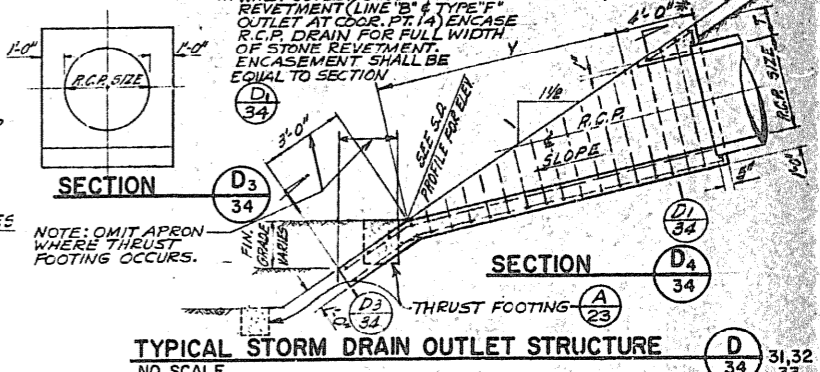
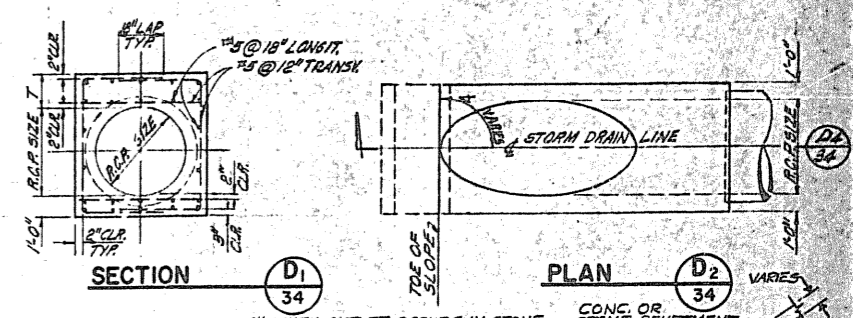
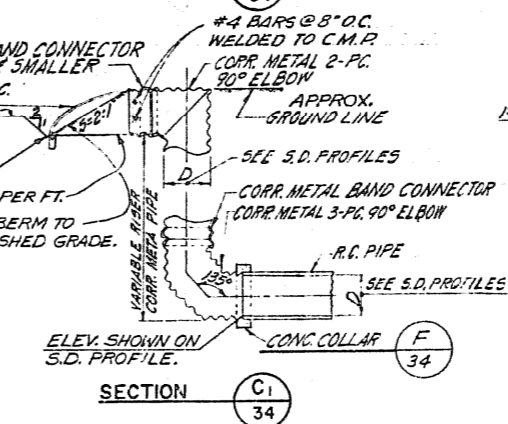
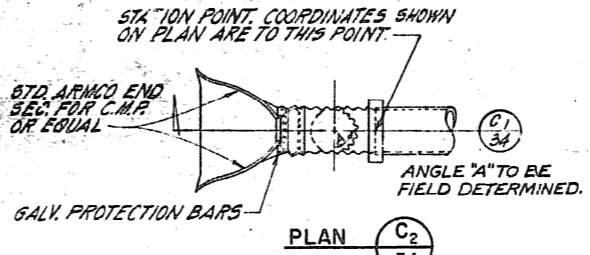
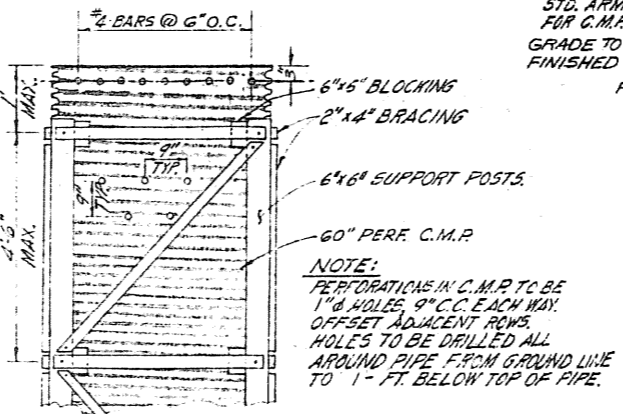
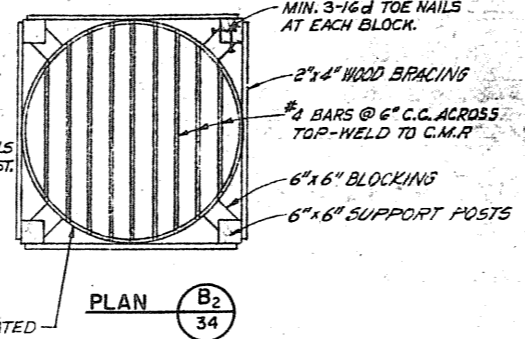
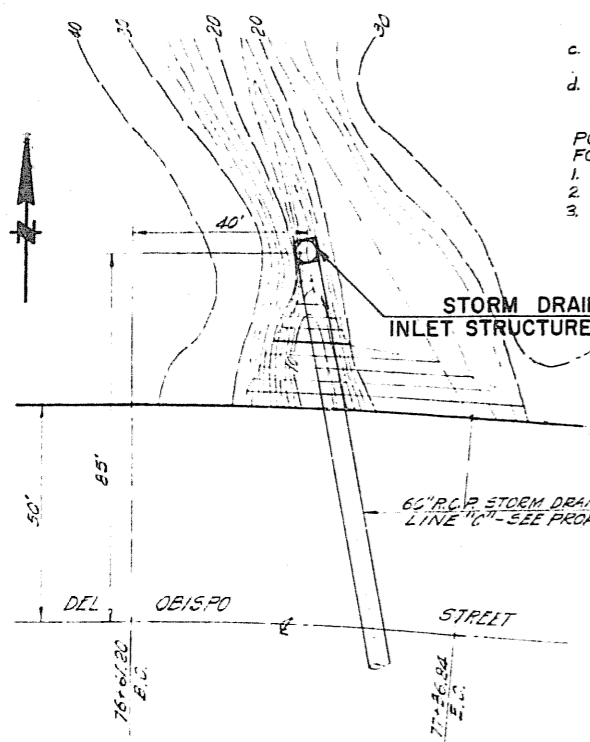
FOR PLAN - SEE G 34

HORIZ. 1" = 50'
VERT. 1" = 10'

PLANS PREPARED BY K KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213 / 980-3100		ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800	
JOB NO. 1-417 DATE 9-24-68 Plan 99796 Dana Point Harbor Sheet 13 of 50 rev. 22.5.1 Baseline Scale - As Shown		DAMA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION DRAINAGE PROFILES II	
APPROVED: <i>[Signature]</i> DATE OCTOBER, 1968 SCALE AS SHOWN		SHEET 33 OF 50 D 10.5-1 MICROFILMED JUN 6 1969	

NOTES:
 a. ALL LUMBER SHALL BE DOUGLAS FIR, "CONSTRUCTION GRADE"
 b. ALL LUMBER SHALL BE BRUSH COATED WITH CREOSOTE PRESERVATIVE, AA540, M133.
 c. NAILS SHALL BE STEEL COMMON WIRE NAILS.
 d. PROVIDE A MINIMUM OF 3-16d NAILS AT EACH BRACING MEMBER TO POST.

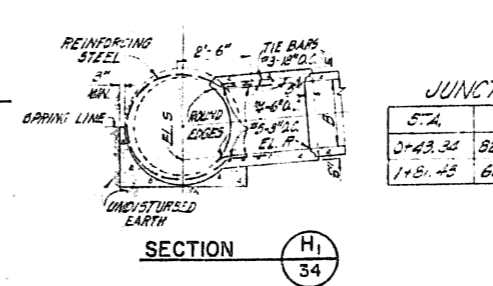
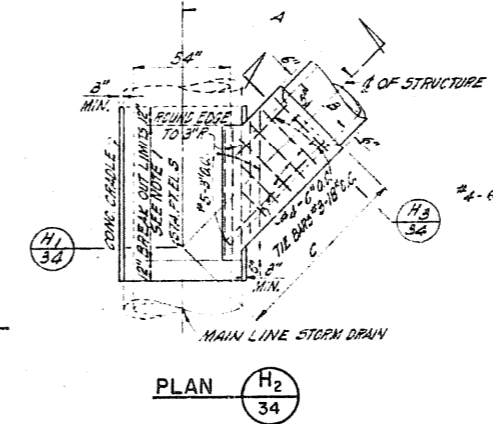
POSTS SHALL BE INSTALLED AS FOLLOWS:
 1. BACKFILL PIPE TRENCH.
 2. DRILL 12" ϕ POST HOLE.
 3. INSTALL WOOD POST AND FILL HOLE WITH CONCRETE.



S.D. LINE	R.C.P. SIZE	SLOPE	ELEV. INV.	Y	T
"B"	18" ϕ	0.100	-0.60	2'-10"	2'-1"
"C"	SPECIAL STRUCTURE-SEE (15)				
"D"	18" ϕ	0.200	-5.2	3'-7 3/4"	1'-7 3/4"
"E"	18" ϕ	0.200	-4.82	3'-0 1/2"	1'-7 3/4"
"F"	5" ϕ	0.100	-8.0	8'-0"	2'-1 1/2"
TYPE "F" OUTLET STRUCT.	15" ϕ	0.300	-4.4	4'-1"	1'-3"

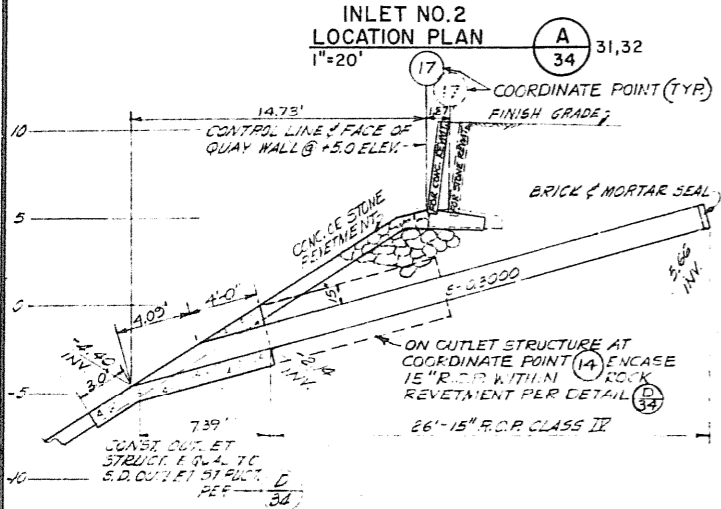
JUNCTION STRUCTURE NOTES

- BREAKOUT LIMITS SHALL BE DETERMINED AS FOLLOWS:
 UPSTREAM LIMIT - AT THE INTERSECTION OF THE OUTSIDE OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL.
 DOWNSTREAM LIMIT - 6 INCHES DOWNSTREAM OF THE INTERSECTION OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL.
 THE OPENING SHALL BE RECTANGULAR, CUT NORMAL TO PIPE SURFACE AND WITHOUT DAMAGING REINFORCING STEEL. IF A JOINT IN THE MAIN LINE PIPE FALLS WITHIN THE LIMITS OF THE CONCRETE CRADLE, PROVIDE A CONCRETE ENCASEMENT ONE FOOT ABOVE THE TOP OF THE MAIN LINE PIPE TO THE LIMITS OF THE CRADLE.
- THE TRANSVERSE REINFORCEMENT IN PIPE SHALL BE CUT AT CENTER OF OPENING AND BENT INTO TOP AND BOTTOM SLABS OF SPUR.
- CONCRETE STRENGTH SHALL BE 3,000 PSI AT 28 DAYS.



JUNCTION STRUCTURE DATA

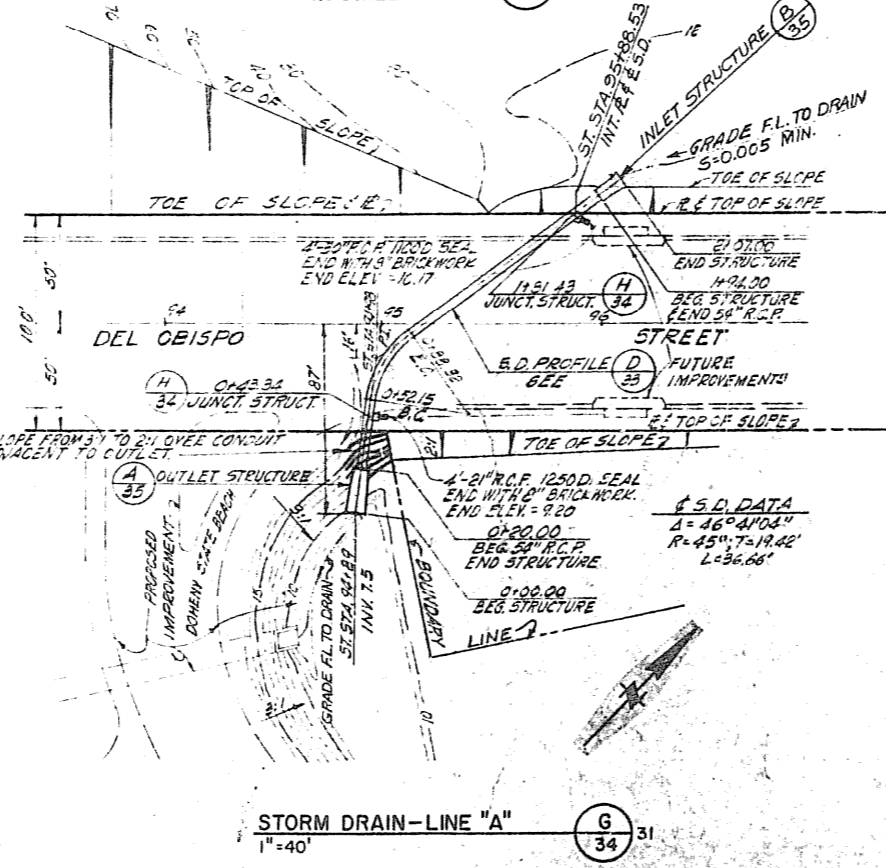
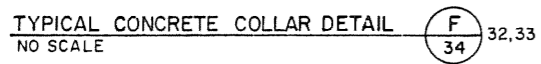
S.T.A.	A	B	C	EL.P.	EL.S
0+43.36	82° 46' 32"	21'	4'5"	9.14	9.07
1+51.43	68° 42' 19"	30'	5'10"	9.68	8.97



D	L	E
15"	1.0'	5"
18"	1.0'	5"
21"	1.5'	10"
24"	1.5'	10"
30"	1.75'	11"

3-#4 CIRCULAR TIES

#4 @ 12" O.C.



ORANGE COUNTY HARBOR DISTRICT
 NEWPORT BEACH, CALIFORNIA
 1601 BAYSIDE DRIVE 714/834-3600

PLANS PREPARED BY
K KOEBIG & KOEBIG, INC.
 ENGINEERING ARCHITECTURE PLANNING
 LOS ANGELES CALIFORNIA
 213/628-3182

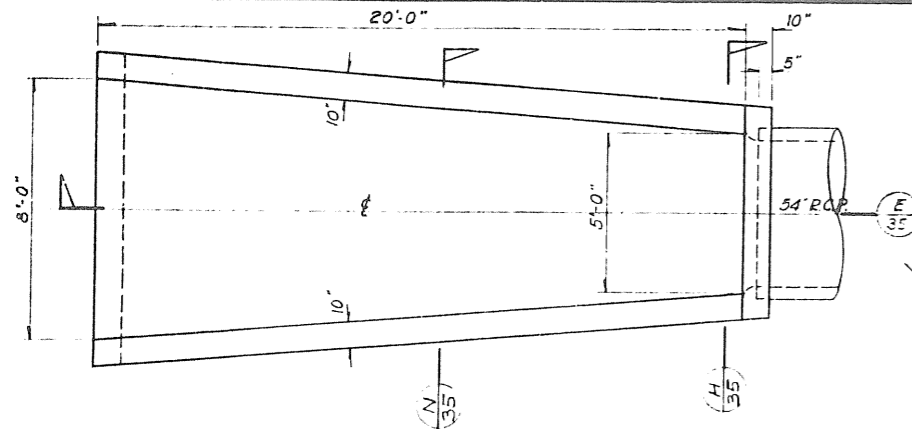
DANA POINT HARBOR
 DANA POINT, CALIFORNIA
 HEAVY CONSTRUCTION
 DRAINAGE DETAILS I

JOB NO. 1-417
 DATE 9-24-68
 APPROVED: [Signature]
 DATE OCTOBER, 1968
 SCALE AS SHOWN

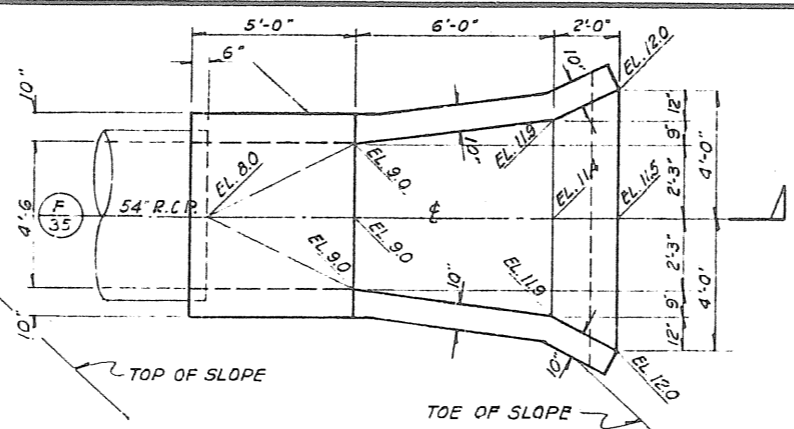
SHEET 34 OF 50
 D I C 5-1

Plan 40796
 Dana Point Harbor
 Sheet 34 of 50
 Red 22 5:1
 Blue line
 Scale - As Shown

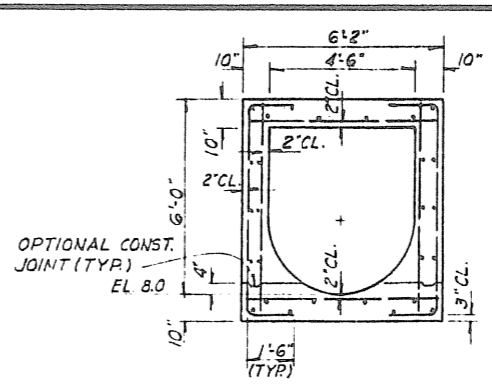
MICROFILMED
 JUN 6 1969



OUTLET STRUCTURE - PLAN (A) 31, 33, 34
3/8"=1'-0"

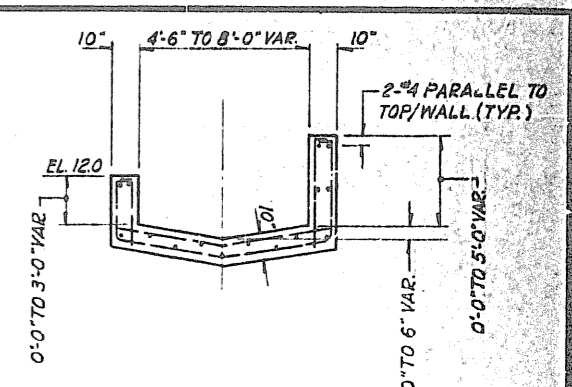


INLET STRUCTURE - PLAN (B) 31, 33, 34
3/8"=1'-0"

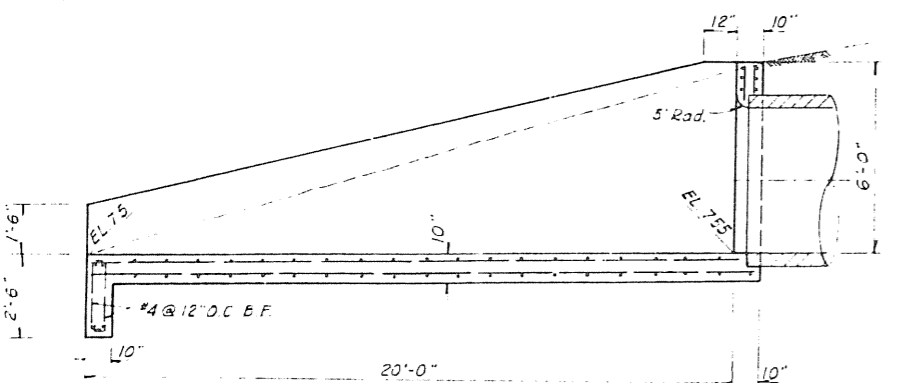


SECTION C (C) 35
3/8"=1'-0"

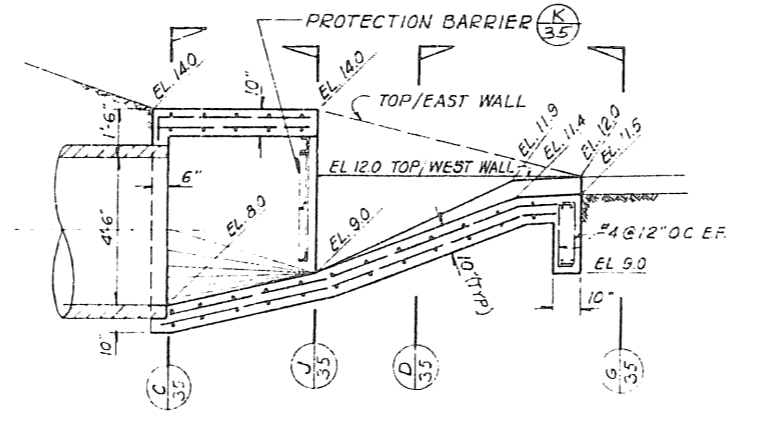
NOTE: ALL LONGITUDINAL BARS ARE #4 @ 18" O.C. (TYP)
ALL TRANSVERSE BARS ARE #4 @ 12" O.C. E.F. (TYP)



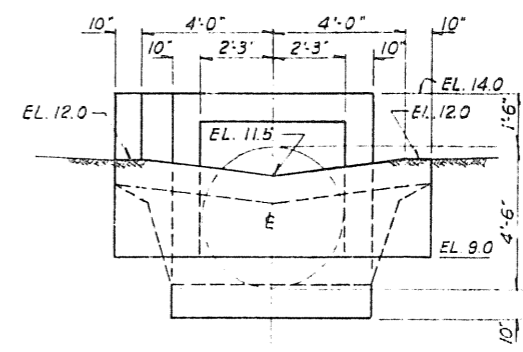
SECTION D (D) 35
3/8"=1'-0"



OUTLET STRUCTURE - SECTION E (E) 35
3/8"=1'-0"



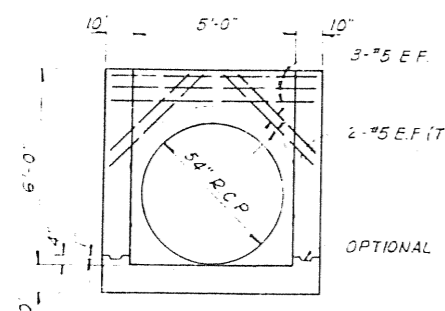
INLET STRUCTURE - SECTION F (F) 35
3/8"=1'-0"



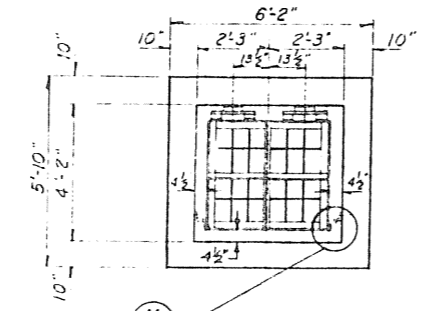
SECTION G (G) 35
3/8"=1'-0"

PROTECTION BARRIER NOTES

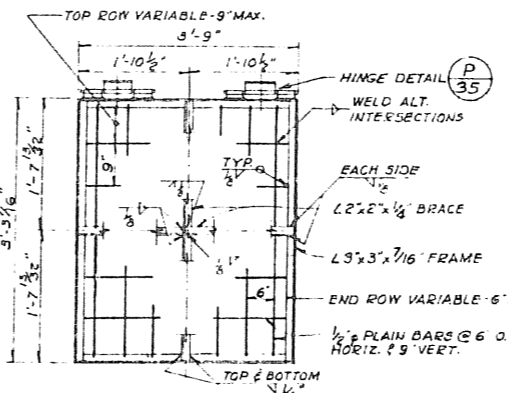
1. ANGLES CONNECTED WITH SHEAR PINS SHALL FIT SNUGLY & TRULY FACE TO FACE.
2. SHEAR PIN HOLES TO BE DRILLED TO PROVIDE A TIGHT FIT WITH SHEAR PINS IN PLACE.
3. SHEAR PINS SHALL BE PEENED ON BOTH ENDS AFTER INSTALLATION.
4. ALL 5/8" BOLT HOLES SHALL BE DRILLED ON GAGE LINES OF ANGLES.
5. ALL BOLTS SHALL BE 5/8" EMBEDDED A MIN. OF 4" INTO CONCRETE, OR EQUIVALENT EXPANSION BOLTS, FURNISHED WITH HEX NUTS & 9/32" MIN. THK. METAL WASHERS.
6. FRAME, BRACE, & HINGE ANGLES SHALL HAVE THE OUTSTANDING LEGS FACING IN DIRECTION OF FLOW.
7. THREAD ENDS OF HINGE PIN SO THAT NUTS & WASHERS WILL BE FLUSH WITH HINGE ANGLE. DAMAGE THREADS BEYOND NUT FACE USE BOLT STOCK FOR PINS.
8. GALVANIZE ALL FERROUS PARTS AFTER FABRICATION.
9. COVER ALL MOVABLE CONTACT SURFACES WITH A COAT OF WATERPROOF GREASE PRIOR TO INSTALLATION.
10. SHEAR PIN MATERIAL SHALL BE ALUMINUM WIRE, ALLOY #100, TEMPER Q, FED. SPEC. QQ-A-111.



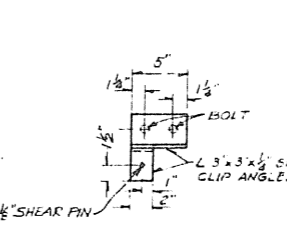
SECTION H (H) 35
3/8"=1'-0"



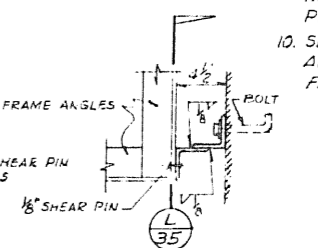
SECTION J (J) 35
3/8"=1'-0"



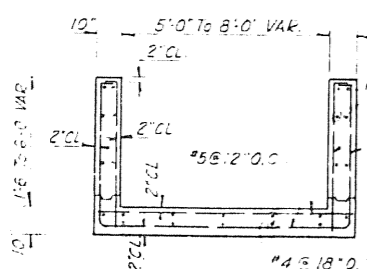
PROTECTION BARRIER DETAIL K (K) 35
3/8"=1'-0"



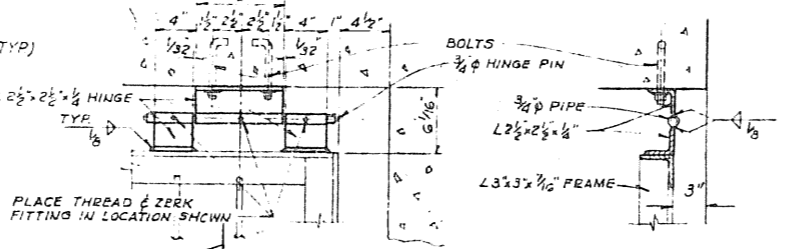
SHEAR PIN CONN. DETAIL L (L) 35
1 1/2"=1'-0"



SHEAR PIN CONN. DETAIL M (M) 35
1 1/2"=1'-0"



SECTION N (N) 35
3/8"=1'-0"



HINGE DETAIL P (P) 35
1 1/2"=1'-0"

SECTION Q (Q) 35
1 1/2"=1'-0"

Plan #9796
Dana Point Harbor
Sheet 17 of 50
Rev. 22. F.11
Scale - As Shown

PLANS PREPARED BY K KORBIO & KORBIO, INC. ENGINEERS ARCHITECTURE PLANNERS LOS ANGELES CALIFORNIA 213 / 800-2100		ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3000	
DANA POINT HARBOR HEAVY CONSTRUCTION DRAINAGE DETAILS II		DATE <u>OCTOBER, 1968</u> SCALE <u>AS SHOWN</u>	SHEET 35 OF 50 D 10.5-1

MICROFILMED
JUN 6, 1969



JOB NO. ME0301C SHEET NO. 1

PROJECT DANA POINT HARBOUR

DATE 11-3-19 BY J. BARKER

STORM DRAIN MANHOLE @ N.W.C. GARDEN LAUNDRY
& DANA POINT HARBOUR DRIVE:

PTH - 100972
RIM ELEV - 3139

N - 2115008.11
E - 6121299.26

DIPS - LEVEL 1 = -9.05
LEVEL 2 = -16.55
LEVEL 3 = -~~24.10~~ 24.10

Appendix L - Site Photos

14-inch Trench Drain



Outlet 2 (6-inch orifice)





Commercial Core Retail Area Boardwalk

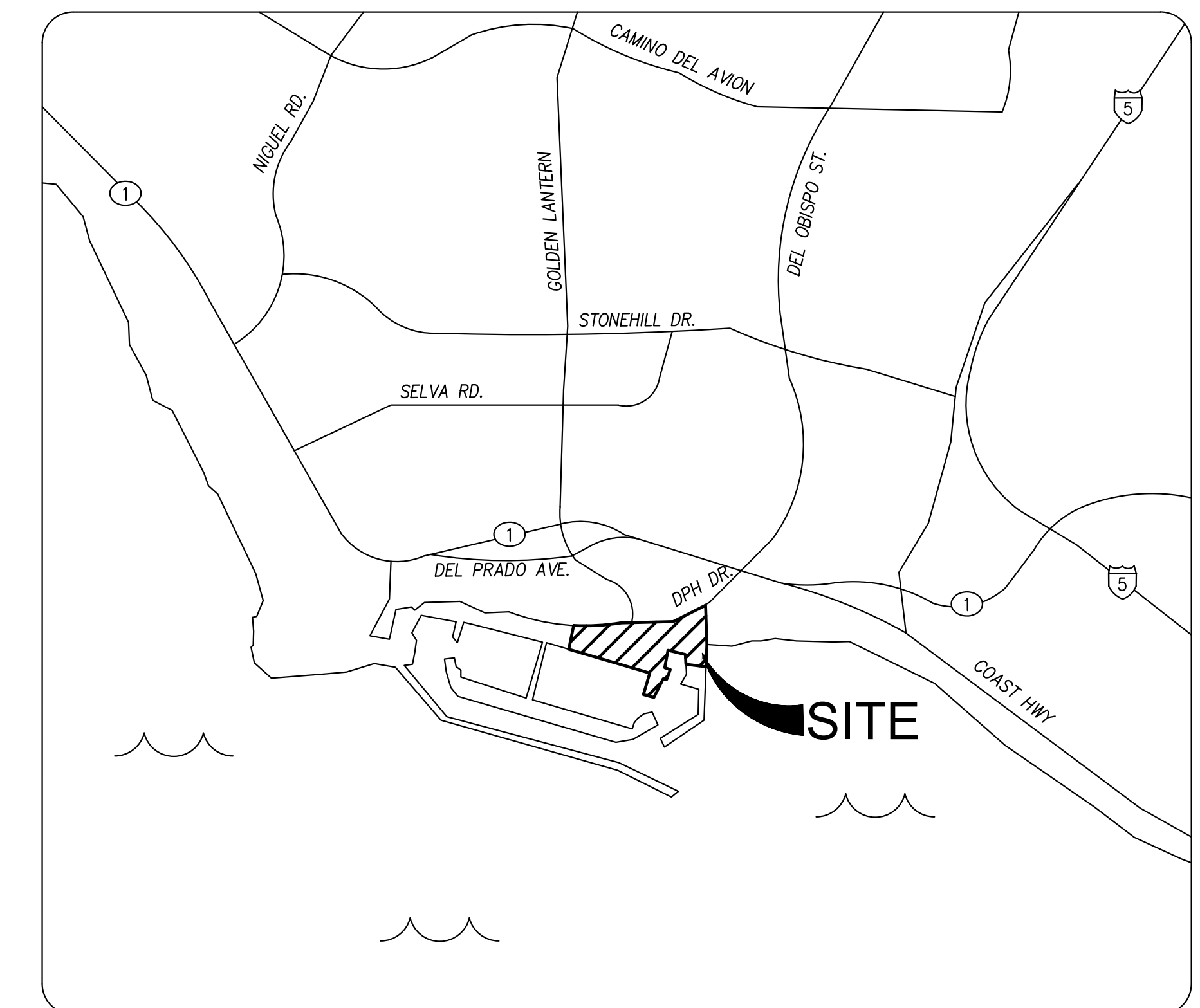


Appendix M – Conceptual Construction Plans

IN THE CITY OF DANA POINT, COUNTY OF ORANGE, STATE OF CALIFORNIA

DANA POINT HARBOR CONCEPTUAL GRADING PLANS

24650 DANA POINT HARBOR DR.
DANA POINT, CA 92629
PREPARED FOR:
DANA POINT HARBOR PARTNERS, LLC
1100 NEWPORT CENTER DR. STE 200
NEWPORT BEACH, CA 92660



VICINITY MAP
NTS

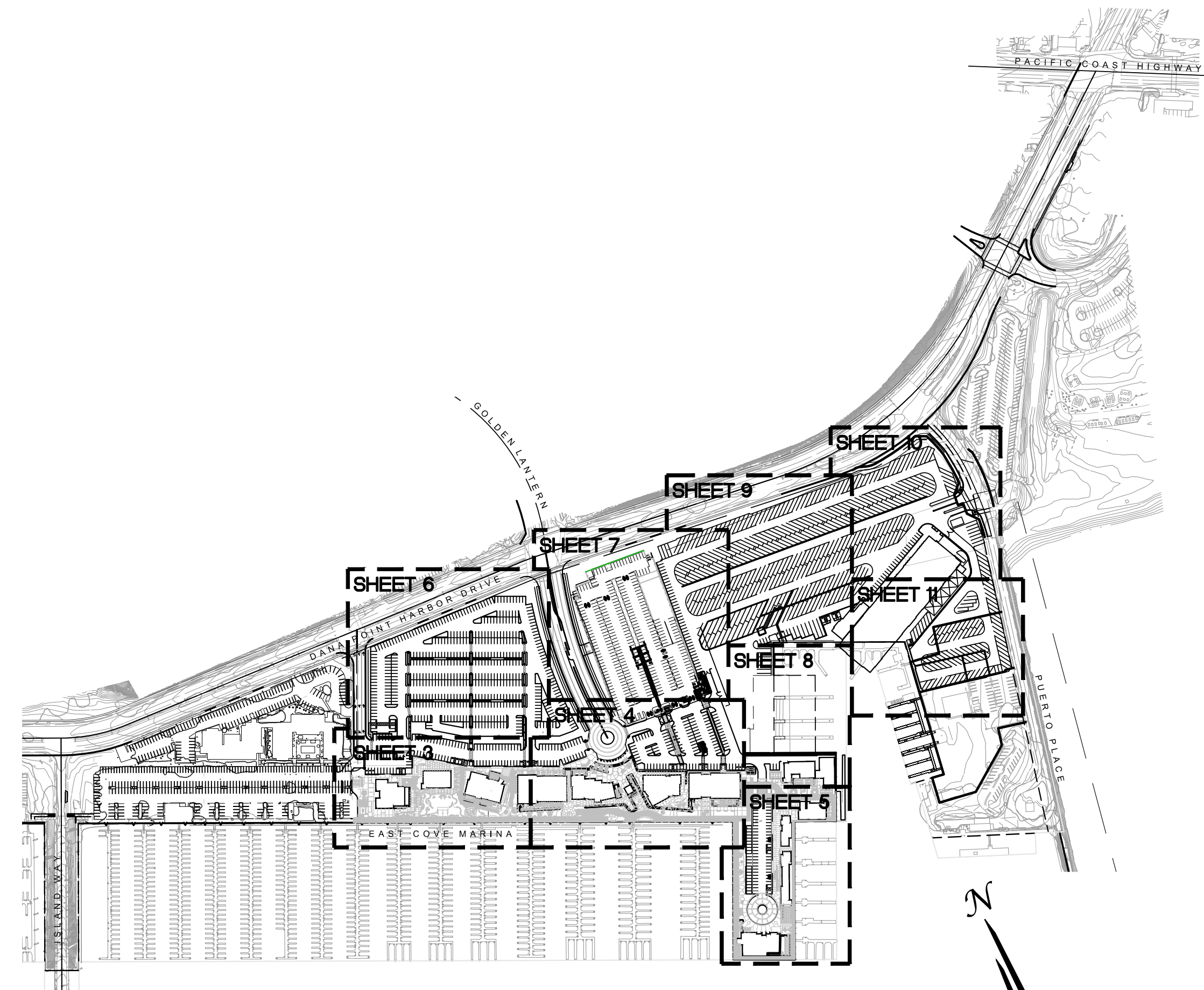
LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF ORANGE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:
PARCEL A:

PARCELS 1 THROUGH 15 INCLUSIVE, AS SHOWN ON A MAP FILED IN BOOK 32, PAGES 35 THROUGH 40, INCLUSIVE, OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, TOGETHER WITH THE LAND UNDERLYING THOSE CERTAIN STREETS SHOWN ON SAID PARCEL MAP, DESIGNATED THEREON AS ISLAND WAY, DANA DRIVE, CASITAS PLACE, DEL PRADO (NOW STREET OF THE GOLDEN LANTERN), EMBARCADERO PLACE, PUERTO PLACE, AND DEL OBISPO STREET (NOW DANA POINT HARBOR DRIVE), SAID DEL OBISPO STREET ALSO BEING DESCRIBED AND SHOWN IN EASEMENT DEED RECORDED MARCH 01, 1971 IN BOOK 9558, PAGE 41 OF OFFICIAL RECORDS, EXCEPT THAT PORTION OF DANA POINT HARBOR DRIVE LYING NORTHEASTERLY OF A LINE WHICH IS PERPENDICULAR TO THE NORTHWESTERLY LINE OF SAID STREET FROM ITS POINT OF INTERSECTION WITH THE WESTERLY CORNER OF LOT 59 OF TRACT NO. 932 AS SHOWN ON A MAP RECORDED IN BOOK 29, PAGES 18 AND 19 OF MISCELLANEOUS MAPS, ALSO EXCEPT FROM SAID PARCEL 13 THAT PORTION CONVEYED TO THE UNITED STATES OF AMERICA BY QUITCLAIM DEED RECORDED MAY 13, 1971 IN BOOK 9639, PAGE 448 OF OFFICIAL RECORDS, ALSO EXCEPT FROM A PORTION OF THE LAND, ALL DEPOSITS OF MINERALS, INCLUDING OIL AND GAS, IN SAID LAND WITH THE RIGHT TO PROSPECT FOR, MINE AND REMOVE SUCH DEPOSITS FROM SAID LAND, RESERVED BY THE STATE OF CALIFORNIA FROM THE LEGISLATIVE GRANT TO THE COUNTY OF ORANGE APPROVED MAY 10, 1961, CHAPTER 321, STATUTES OF 1961. ALSO EXCEPT FROM A PORTION OF THE LAND, MINERALS, GAS, OIL, PETROLEUM, NAPHTHA AND OTHER HYDROCARBON SUBSTANCES BELOW THE DEPTH OF 500 FEET FROM THE SURFACE OF THE PROPERTY, AND THE RIGHT TO PASS THROUGH BELOW SUCH DEPTH FOR EXTRACTING MINERALS, SUBJECT TO THE EXPRESS LIMITATION THAT THE FOREGOING RESERVATION SHALL IN NO WAY BE INTERPRETED TO INCLUDE ANY RIGHT OF ENTRY IN AND UPON THE SURFACE OF THE PROPERTY, OR THE FIRST 500 FEET OF THE SUBSURFACE THEREOF.

PARCEL C:

THAT PORTION OF LOT 2 OF FRACTIONAL SECTION 23, TOWNSHIP 8 SOUTH, RANGE 8 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF ORANGE, STATE OF CALIFORNIA, ACCORDING TO AN OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE, APRIL 12, 1975, DESCRIBED IN THE DEED TO THE ORANGE COUNTY HARBOR DISTRICT, RECORDED NOVEMBER 17, 1964, IN BOOK 7304, PAGE 96.3, OF OFFICIAL RECORDS, BOTH IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT STATION NO. 3 OF THE MEAN HIGH TIDE LINE AS SHOWN ON A MAP, "PLAT OF THE GRANT TO THE COUNTY OF ORANGE, VICINITY OF DANA COVE", DATED FEBRUARY, 1962, AND RECORDED AUGUST 31, 1965, IN BOOK 7951, PAGES 69 THROUGH 87, OF OFFICIAL RECORDS IN THE OFFICE OF SAID COUNTY RECORDER; THENCE, NORTH 87° 55' 03" EAST, 39.62 FEET ALONG SAID MEAN HIGH TIDE LINE; THENCE, NORTH 4° 00' 00" EAST, 46.41 FEET; THENCE, NORTH 86° 00' 00" WEST, 64.00 FEET; THENCE, SOUTH 4° 00' 00" WEST, 42.06 FEET, MORE OR LESS, TO SAID MEAN HIGH TIDE LINE; THENCE, SOUTH 66° 50' 38" EAST, 26.04 FEET TO THE POINT OF BEGINNING, EXCEPT ALL MINERALS, GAS, OIL, PETROLEUM, NAPHTHA AND OTHER HYDROCARBON SUBSTANCES BELOW THE DEPTH OF 500 FEET FROM THE SURFACE OF THE PROPERTY, AND THE RIGHT TO PASS THROUGH BELOW SUCH DEPTH FOR EXTRACTING MINERALS, SUBJECT TO THE EXPRESS LIMITATION THAT THE FOREGOING RESERVATION SHALL IN NO WAY BE INTERPRETED TO INCLUDE ANY RIGHT OF ENTRY IN AND UPON THE SURFACE OF THE PROPERTY, OR THE FIRST 500 FEET OF THE SUBSURFACE THEREOF.



LOCATON MAP

BENCH MARK:

DESIGNATION: 3RR-2-82
OCS INDEX MAP: Q20-06
PAGE/GRID: 971/H-7
CITY/LOCATION: DANA POINT
LINE #/SSN: 376/0040
ESTABLISHED BY: OCS 1982
MONUMENT TYPE: ORANGE COUNTY SURVEYOR'S 3 3/4" ALUMINUM DISK
NAVDDB8(FT): 16.260 NGVD29(FT): 13.961 YEAR LEVELED: 1997

DESCRIPTION:
DESCRIPTION BY OCS 2003 - FOUND 3 3/4" ALUMINUM BENCHMARK DISK STAMPED "3RR-2-82" SET IN THE SOUTHEAST CORNER OF A 4.0 FT. X 4.5 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED APPROXIMATELY 0.5 MILES WESTERLY ALONG DANA POINT HARBOR DRIVE FROM ITS INTERSECTION WITH DEL PRADO STREET, WHERE TWO CONCRETE CATCH BASINS FALL RADIAL ACROSS SAID DRIVE, 35.8 FT. SOUTHERLY OF THE CENTERLINE OF DANA POINT HARBOR DRIVE, 112.2 FT. SOUTHWESTERLY OF STREET LIGHT POLE #2256840M20, 40.8 FT. SOUTHEASTERLY OF STREET LIGHT POLE #2256850M20, 40.6 FT. WESTERLY OF A "NO STOPPING AT ANY TIME" SIGN. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

DANA POINT HARBOR PARTNER'S SURVEY DATUM ELEVATION NOTES:

- ALL ELEVATIONS SHOWN HEREON ARE BASED THE NORTH AMERICAN VERTICAL DATUM ESTABLISHED BY THE COUNTY OF ORANGE BENCH MARK 3RR-2-82 USING THE NAVD88 ELEVATION WHICH IS APPROXIMATELY 2.3 FEET HIGHER THAN THE NAVD29 ELEVATION USED IN THE PREPARATION OF THE APPROVED CDP PLANS.
- THE CURRENT MEAN SEA LEVEL (MSL) FOR DANA POINT HARBOR IS BASED ON THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) LA JOLLA STATION 9410230 WHICH HAS A NAVD88 MSL ELEVATION OF 2.53 FEET. THE APPROVED CDP PLANS USED A MSL ELEVATION OF 0.00.

ABBREVIATIONS

APPROX	APPROXIMATE	O.C., OC	ON CENTER
BEG	BEGIN	OC DPH	OC DANA POINT HARBOR
BLDG	BUILDING	OD	OUTSIDE DIAMETER
BM	BENCH MARK	ORIG	ORIGINAL
BMP	BEST MANAGEMENT PRACTICE	PROP	PROPOSED
B/W	BETWEEN	R	RADIUS
C	CENTERLINE	RCE	REGISTERED CIVIL ENGINEER
CB	CATCH BASIN	RG	ROUGH GRADE
CEN	CENTER	RCE	REGISTERED CIVIL ENGINEER
COORD	COORDINATE	RCP	REINFORCED CONCRETE PIPE
DIA	DIAMETER	RDM	RESOURCES AND DEVELOPMENT MANAGEMENT
E	EAST	SD	DEPARTMENT
ELEV, EL	ELEVATION	SD	STORM DRAIN
ENG	ENGINEER, ENGINEERING	SPEC	SPECIFICATIONS
EXIST, EX	EXISTING	STA	STATION
FG	FINISHED GRADE	STD	STANDARD
FL	FLOW LINE	SW	SIDEWALK
FT	FOOT, FEET	TC	TOP OF CURB
GI	GRATE INLET	TG	TOP OF GRATE
GPS	GLOBAL POSITIONING SYSTEM	TOR	TOP OF RISER
HOR	HORIZONTAL	TYP	TYPICAL
ID	INSIDE DIAMETER	UVA	UNDERGROUND
INV	INVERT	VAR	SERVICE ALERT
MAX	MAXIMUM	VERT	VERTICAL
MIN	MINIMUM	WQ	WATER QUALITY
MISC	MISCELLANEOUS	X-SEC	CROSS SECTION
MLLW	MEAN LOWER LOW WATER		
MON	MONUMENT		
N	NORTH		
NAVD	NORTH AMERICAN VERTICAL DATUM		
NGVD	NATIONAL GEODETIC VERTICAL DATUM		
NGS	NATIONAL GEODETIC SURVEY NUMBER		
NO.	NUMBER		

LEGEND

	TRUNCATED DOMES
	PROPOSED PEDESTRIAN WALKWAY
	PA BOUNDARY
	CDP BOUNDARY
	LIMIT OF 2-FOOT VEHICLE OVERHANG
	BOATER PERMIT PARKING BOUNDARY
	BUILDING/DECK OVERHANG
	LANDSCAPE SETBACK ALONG DANA POINT HARBOR DRIVE

SHEET INDEX

Sheet Number	Sheet Title
1	TITLE SHEET
2	OVERALL CONCEPTUAL GRADING PLAN
3	CONCEPTUAL GRADING PLAN
4	CONCEPTUAL GRADING PLAN
5	CONCEPTUAL GRADING PLAN
6	CONCEPTUAL GRADING PLAN
7	CONCEPTUAL GRADING PLAN
8	CONCEPTUAL GRADING PLAN
9	CONCEPTUAL GRADING PLAN
10	CONCEPTUAL GRADING PLAN
11	CONCEPTUAL GRADING PLAN

UNDERGROUND SERVICE ALERT

811 TOLL FREE 1-800-422-4133
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG. TWO WORKING DAYS BEFORE YOU DIG.

UNAUTHORIZED CHANGES & USES:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO RETEND INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON. IF THE CONTRACTOR ENCOUNTERS ANY DISCREPANCIES, CONDUCTS OR AREAS WHICH HE FEELS UNWORKABLE, HE SHALL NOTIFY THE GRADING ENGINEER IMMEDIATELY PRIOR TO CONTINUING OR DEVIATING FROM THIS PLAN.

7					
6					
5					
4					
3					
2					
1					
NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

PREPARED UNDER THE SUPERVISION OF: 701 N. Parkcenter Drive Santa Ana, CA 92705
TAIT Since 1964
p: 714/540/8200 f: 714/560/8211 www.tait.com
Los Angeles Sacramento San Francisco Dallas Phoenix Ontario San Diego Boise Denver Portland
DESIGN ENGINEER R.C.E. No. DATE

DRAWN BY:	DATE
DESIGNED BY:	DATE
CHECKED BY:	DATE
RECOMMENDED BY:	DATE

DANA POINT HARBOR REVITALIZATION

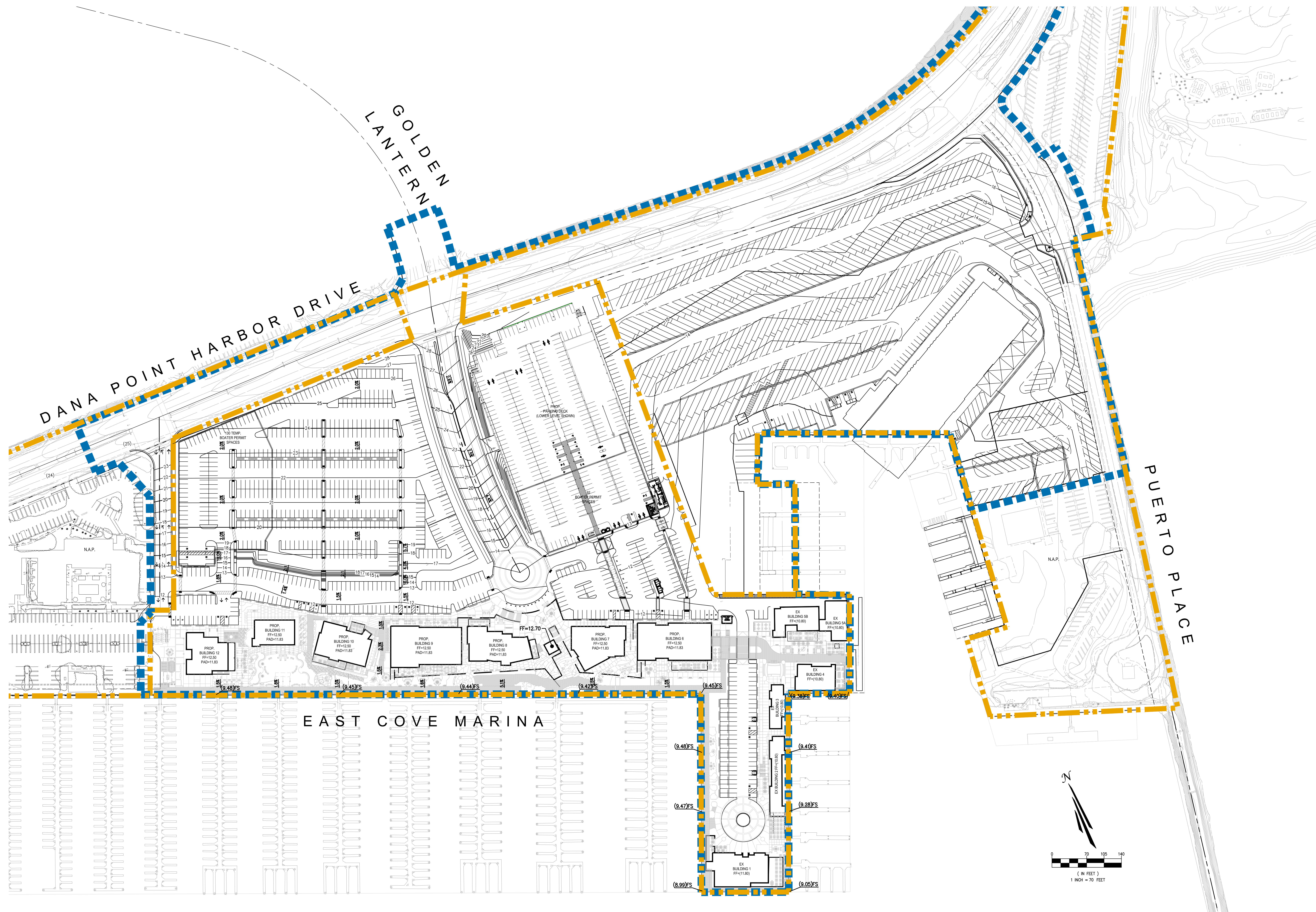
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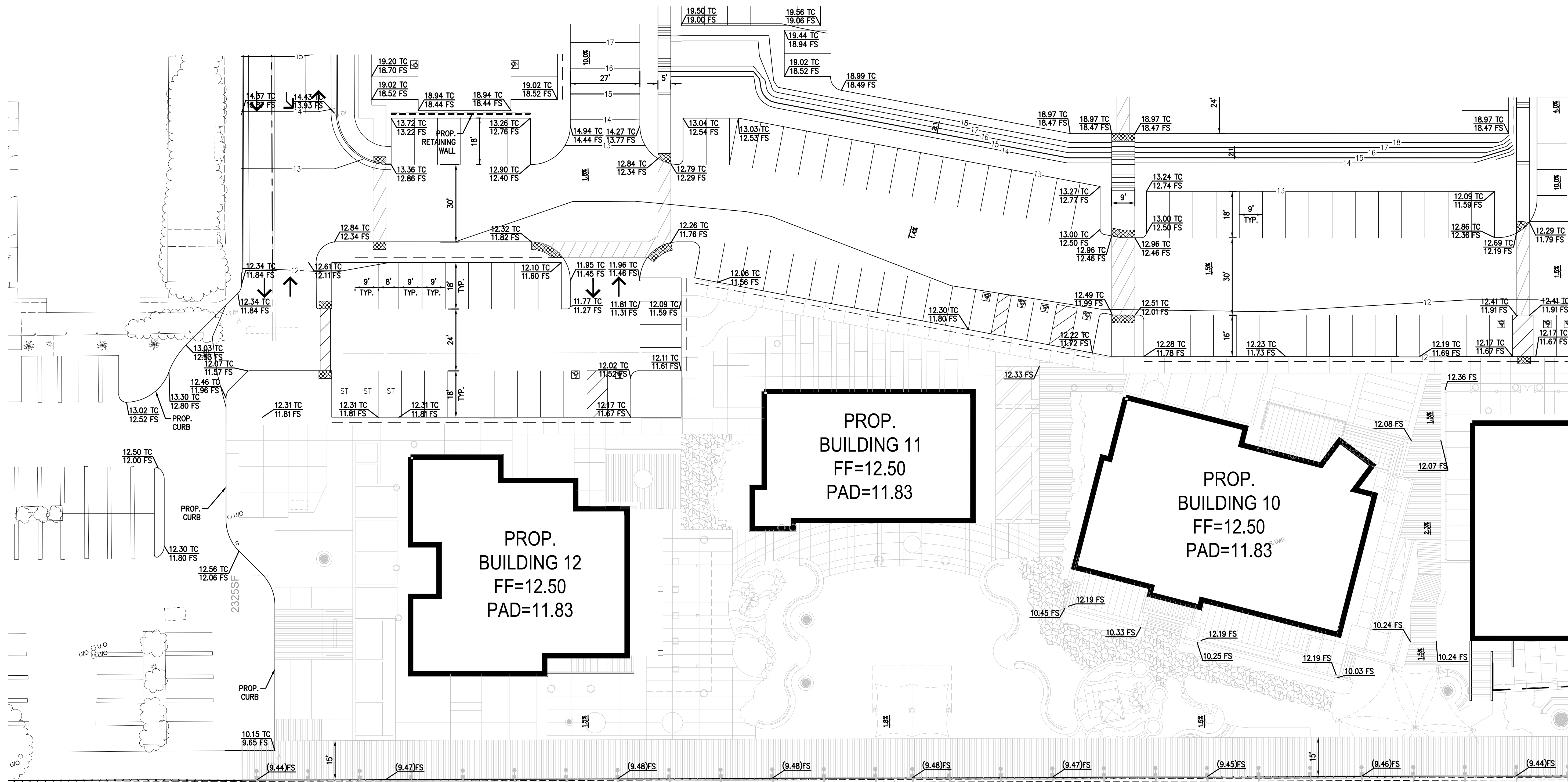
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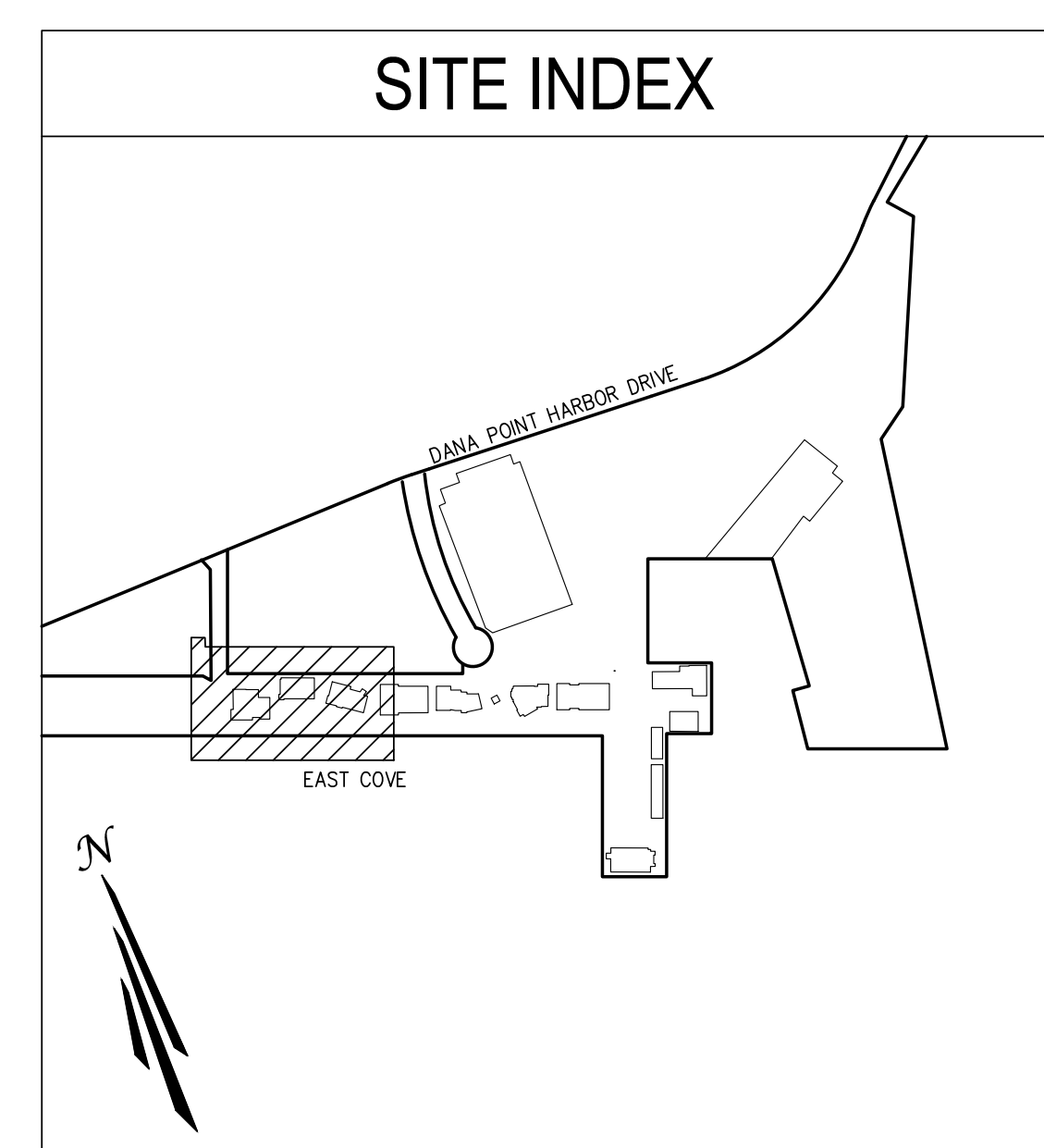
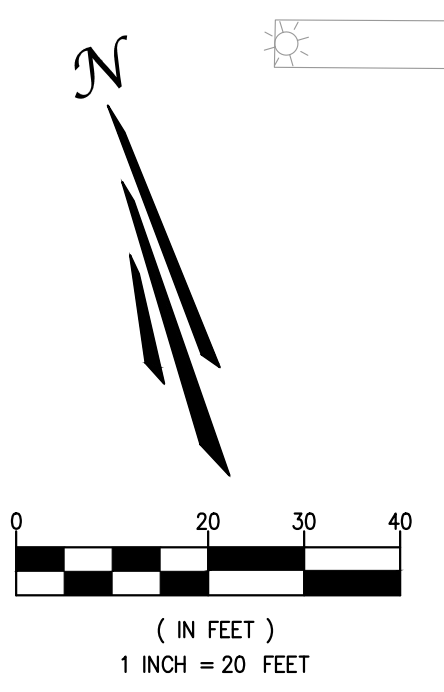
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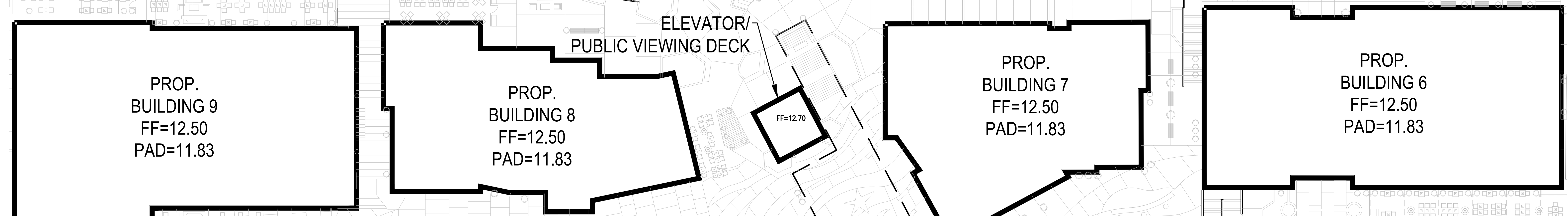
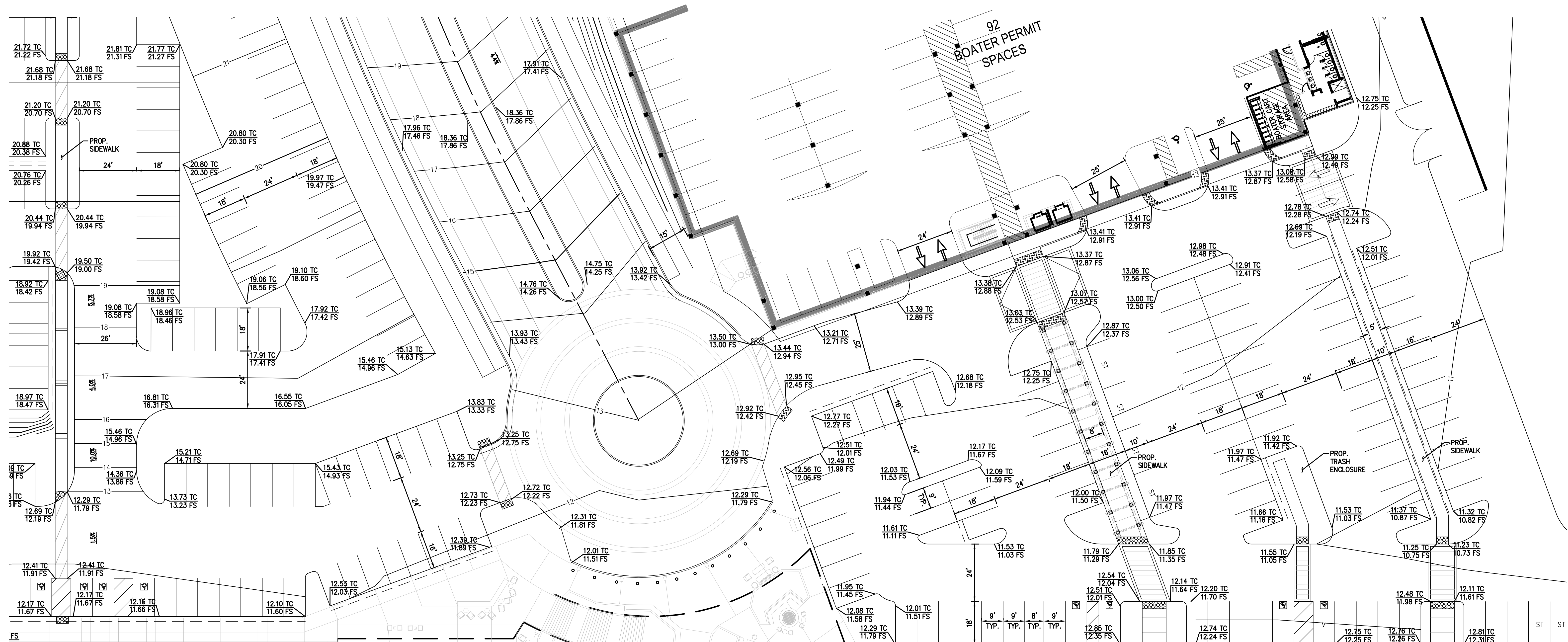
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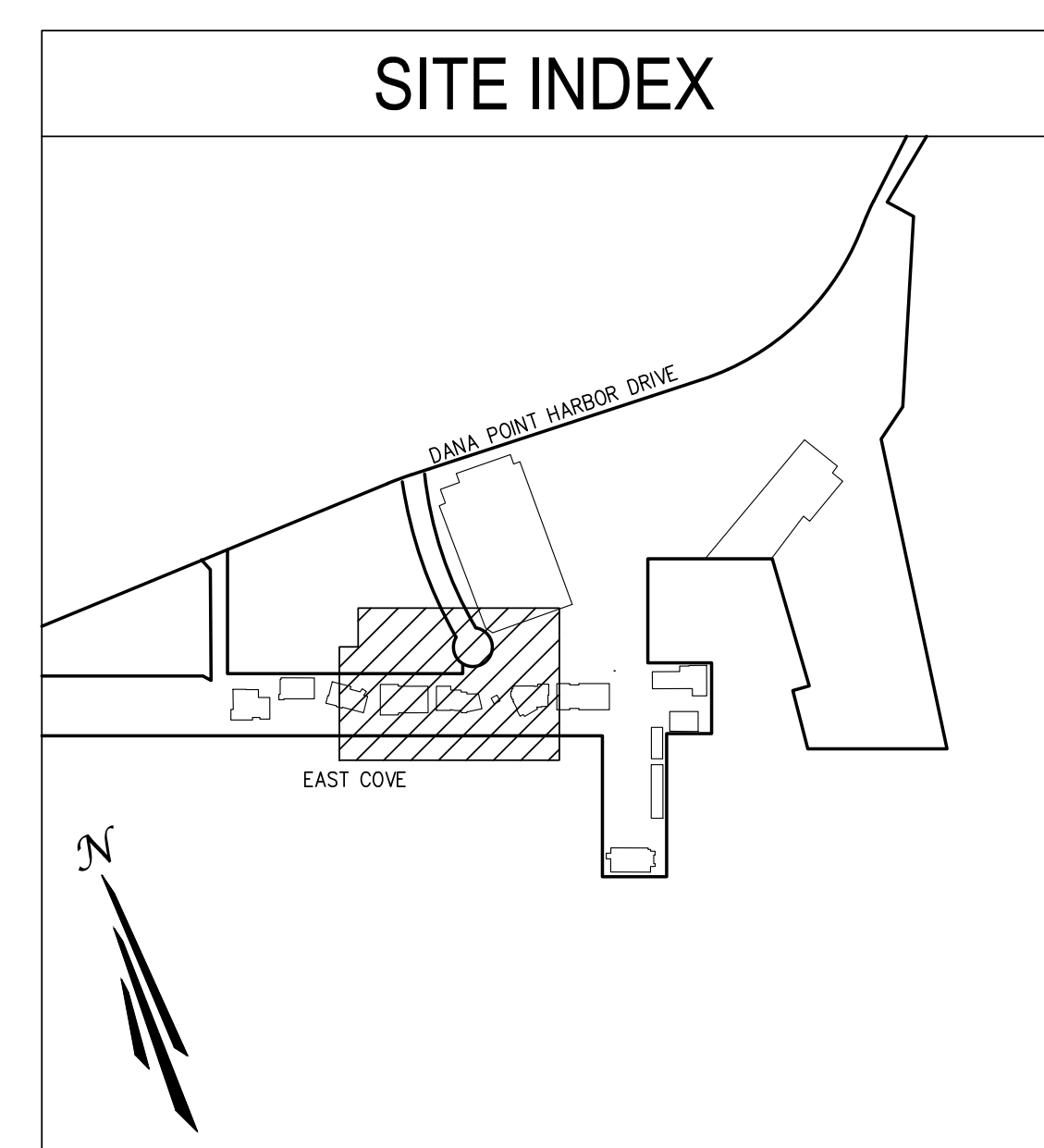
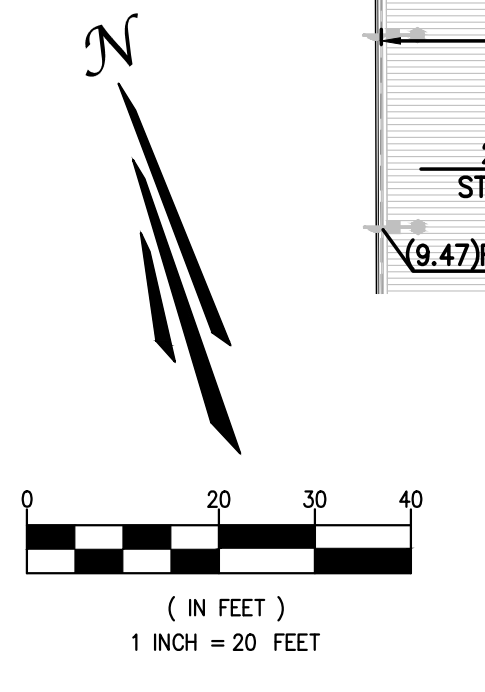
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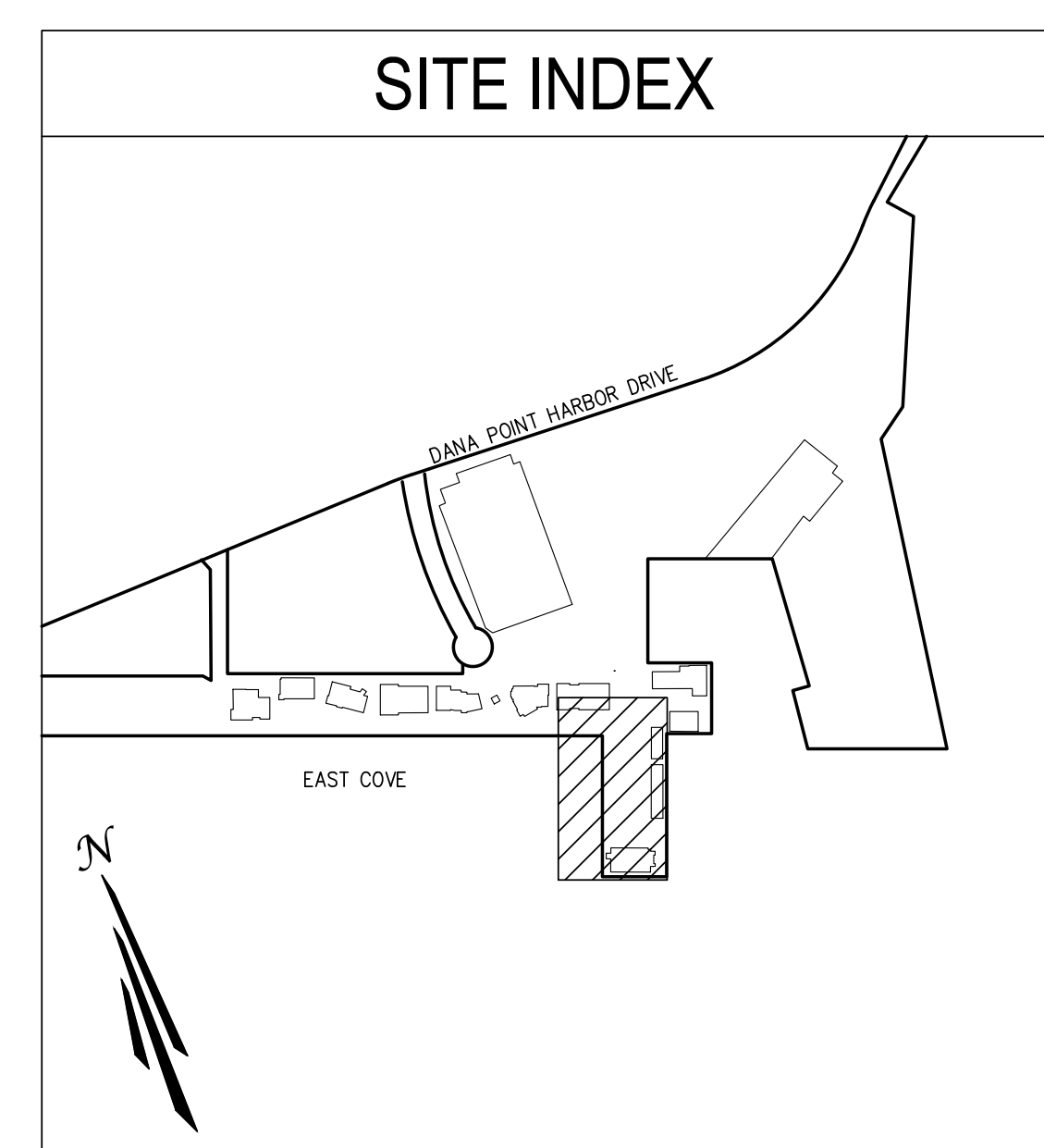
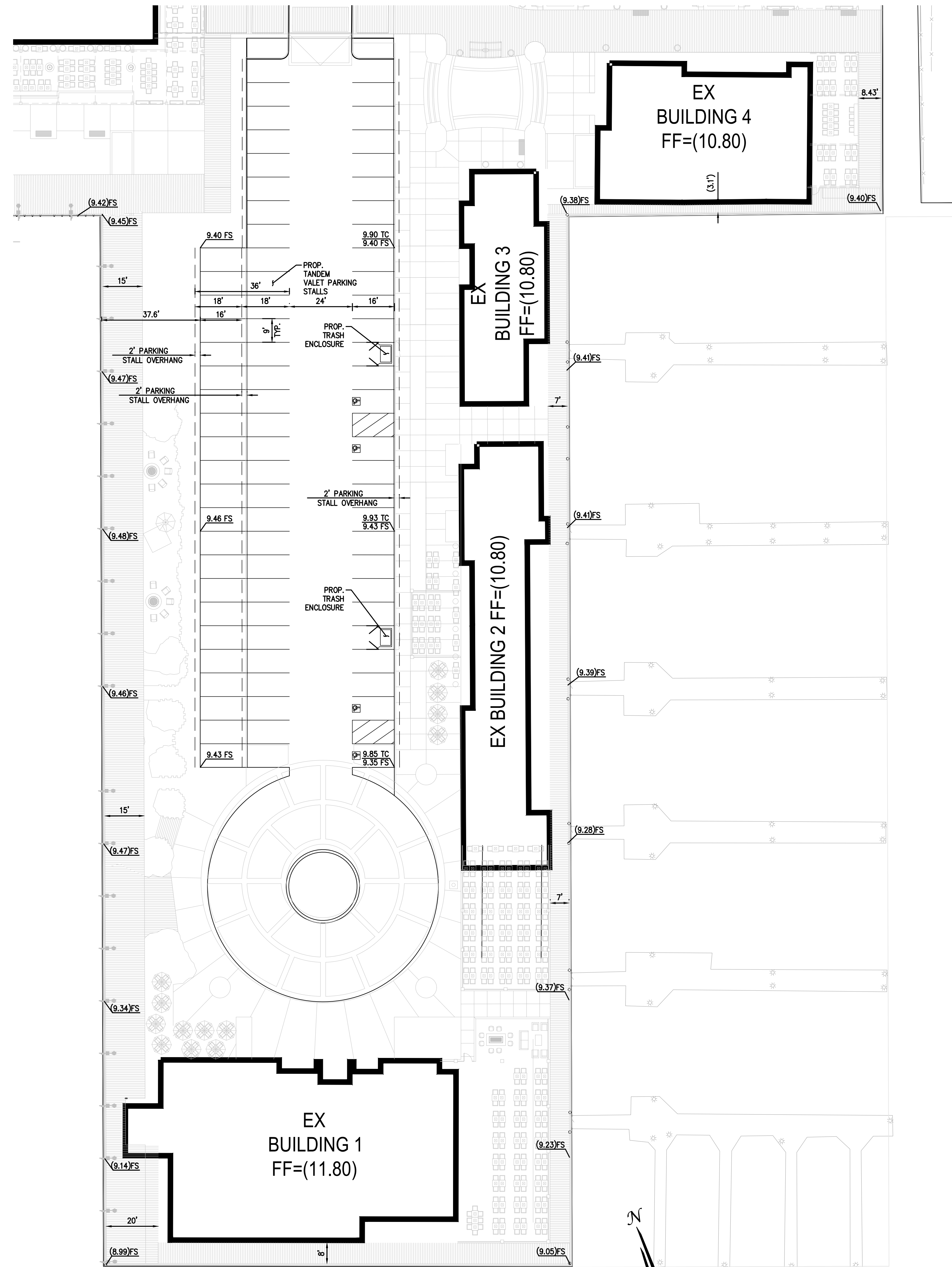
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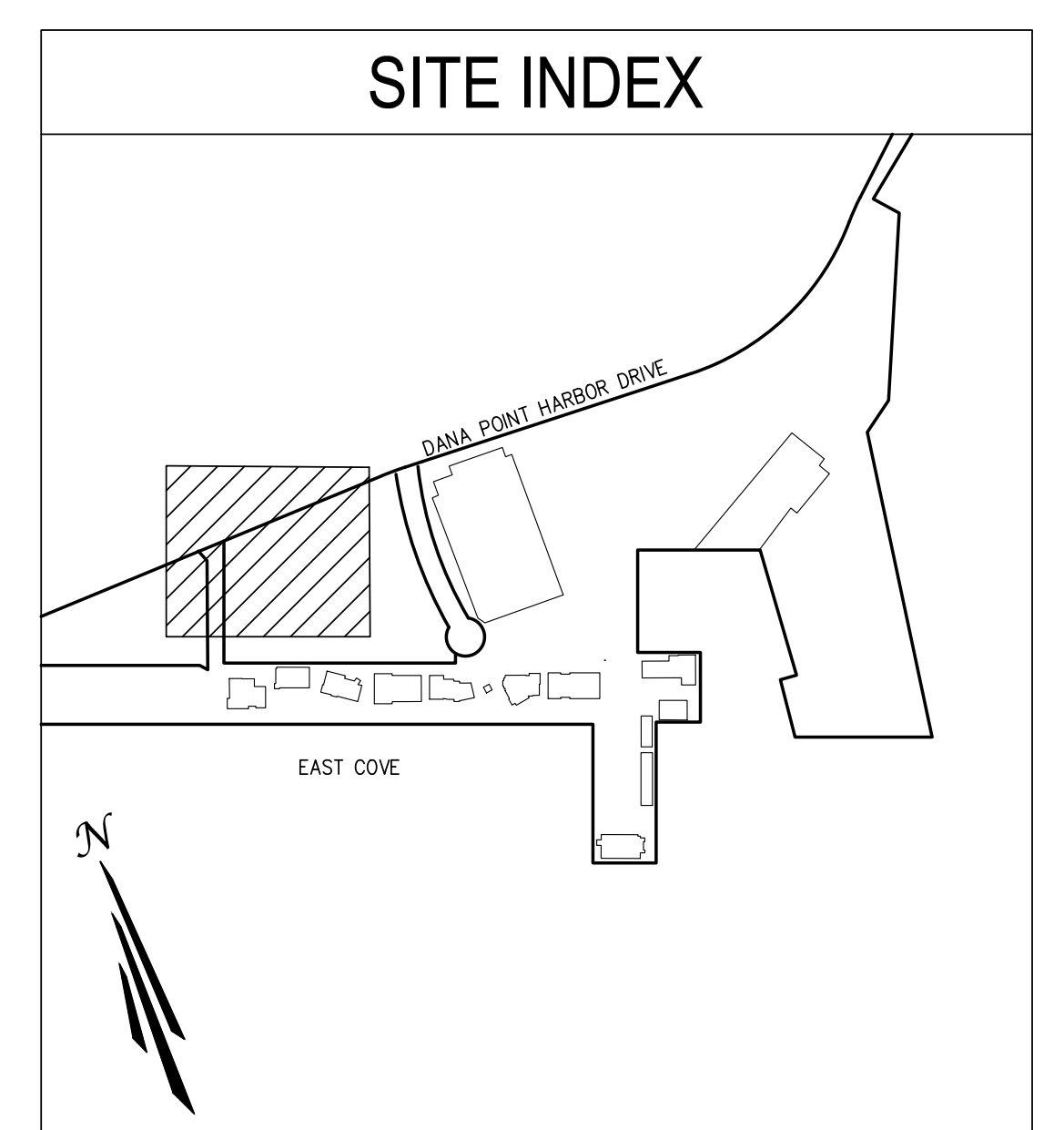
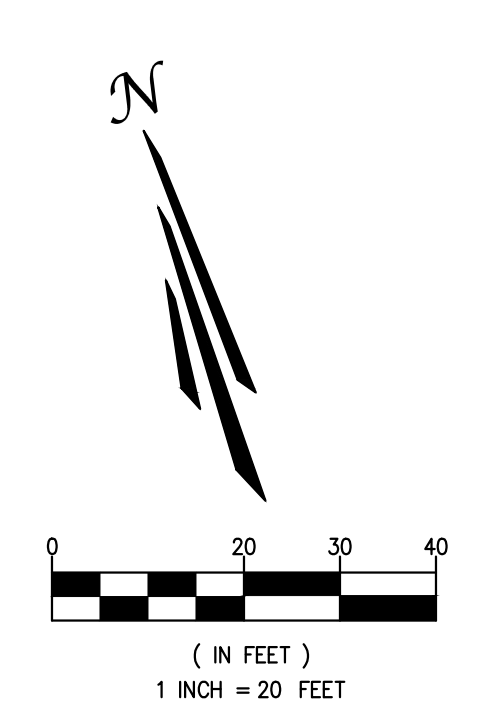
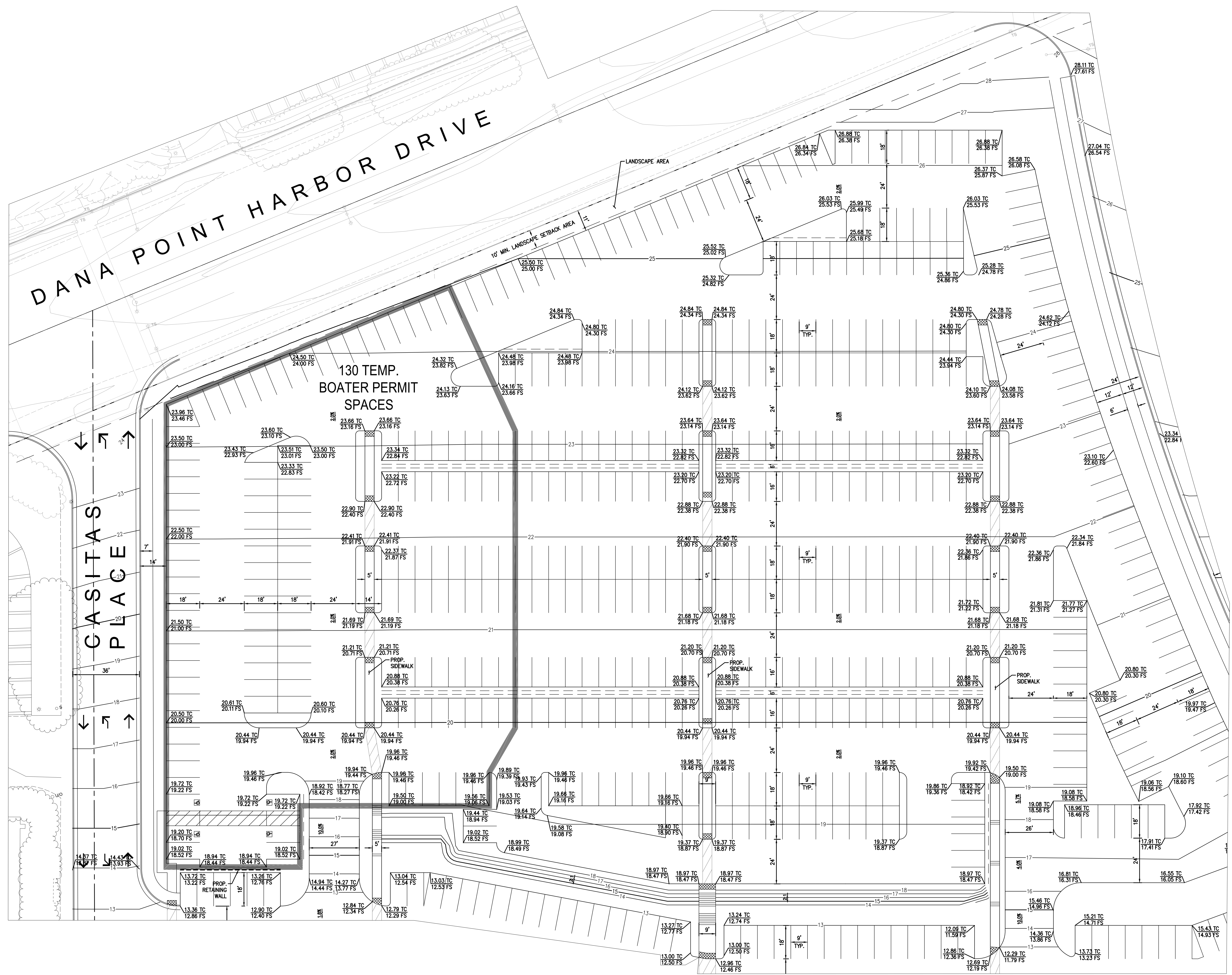
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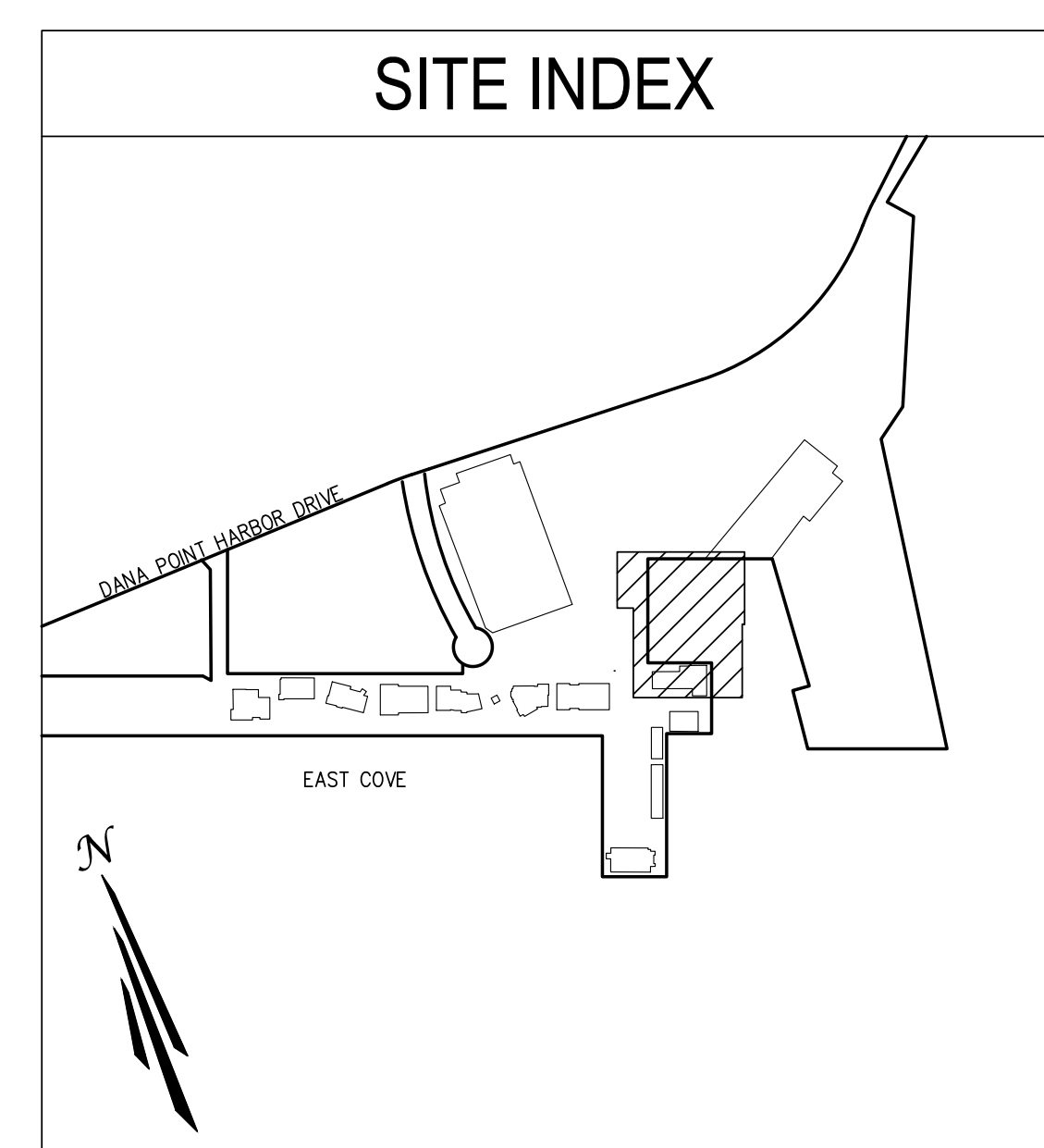
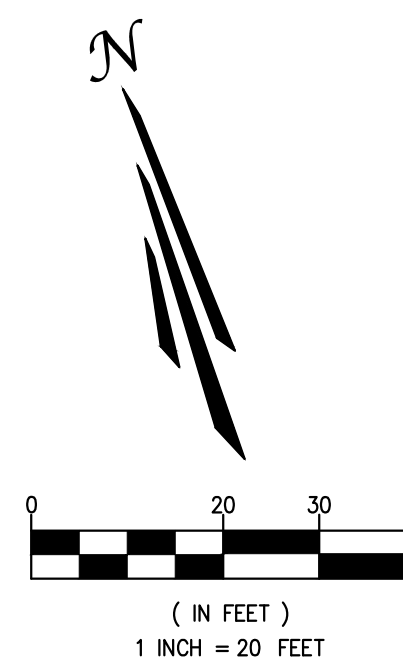
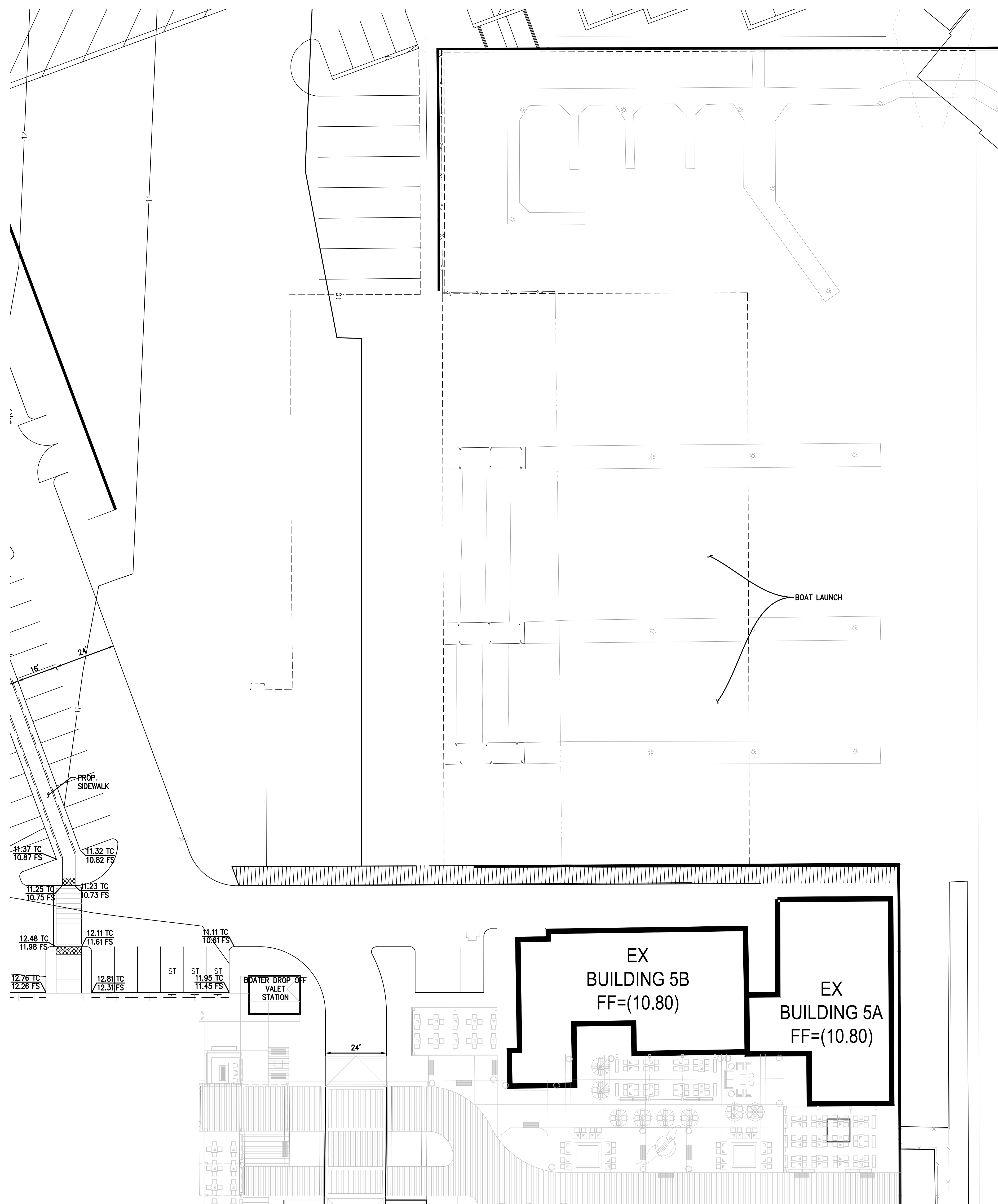
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FESTIVAL PLAZA



North Harbor View of Observation Tower and Festival Plaza

MARKETPORT FOOD HALL



North View From Dana Wharf

WATERFRONT PROMENADE



View of Surf Museum and Festival Plaza B

Appendix N – Trench Drain Hydraulic Analysis

JOB NO. ME0321C SHEET NO. _____PROJECT MPO - Trench Drain CalculationDATE _____ BY EM & OM

$$Q_{\text{trench drain capacity}} = L_{\text{trench drain}} \left(\frac{Q_{\text{eg 5' x 5' good unit}}}{L_{\text{eg 5' x 5' good unit}}} \right) \times \left(\frac{W_{\text{trench drain}}}{W_{\text{eg 5' x 5' good unit}}} \right)$$

$$Y = 0.2 \text{ FT}$$

$$S = 0.005 \text{ FT/FT}$$

$$Q_{\text{eg 5' x 5' good unit}} = 1.30 \text{ cfs}$$

$$L_{\text{eg 5' x 5' good unit}} = 2 \text{ FT} \quad W_{\text{trench drain}} = 14"$$

$$L_{\text{trench drain}} = 316 \text{ FT} \quad W_{\text{eg 5' x 5' good unit}} = 2' - 10 1/2"$$

$$Q_{\text{TD}} = (316 \text{ FT}) \left(\frac{1.30 \text{ cfs}}{2 \text{ FT}} \right) \left(\frac{14"}{31 1/2"} \right)$$

$$Q_{\text{TD}} = 82.45 \text{ cfs} \geq Q_{\text{existing capacity 10' x 12'}} = 15.38 \text{ cfs} \quad \checkmark$$

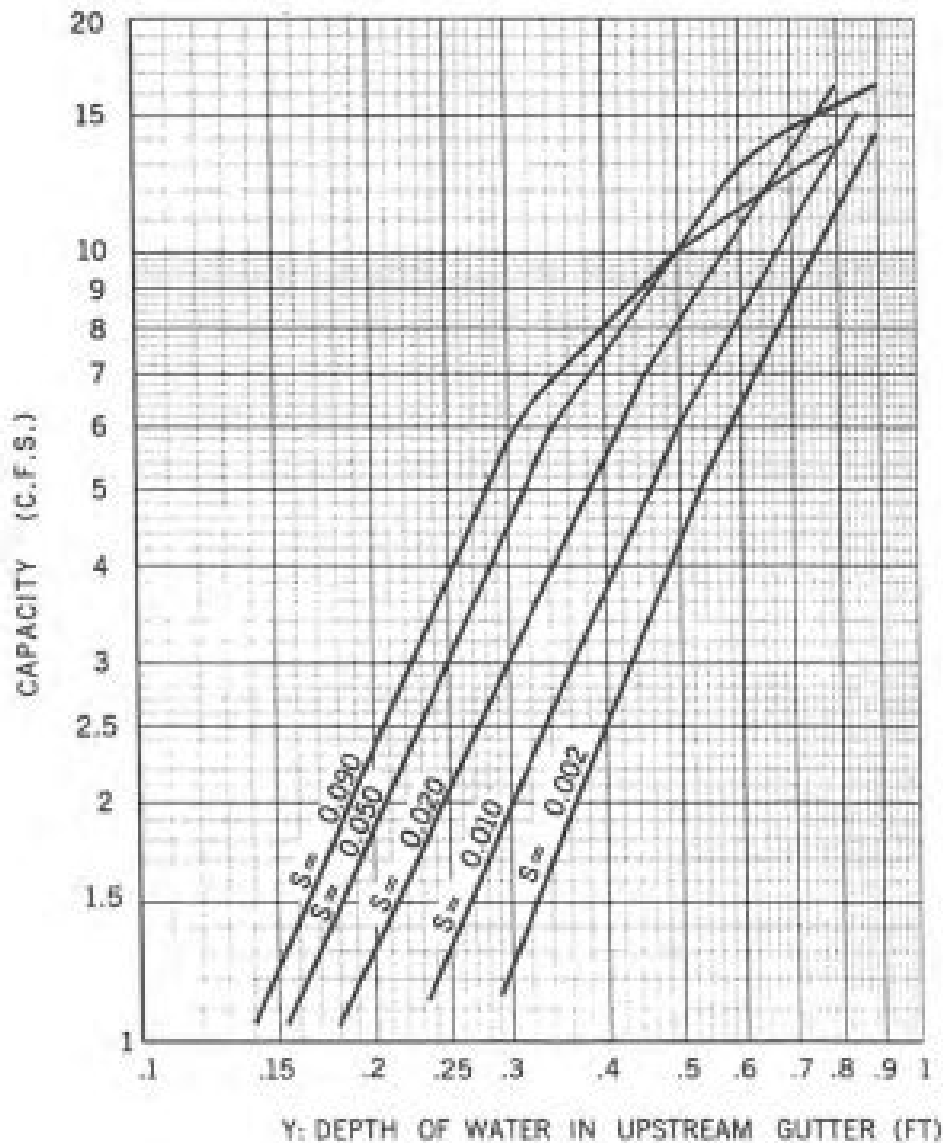
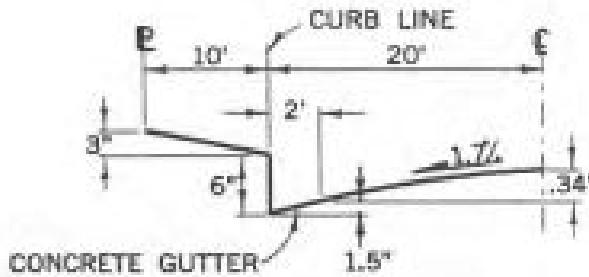


FIGURE 5-15
 LENGTH = 2'-10⁷/₈"
 GRATED INLET CAPACITY

Appendix O – Ocean Water Levels Data

Memorandum

August 12, 2019

To: Joe Ueberroth, Dana Point Harbor Partners, LLC and Dana Point Harbor Partners Drystack, LLC

From: Alyssa Cannon and Adam Gale, Anchor QEA, LLC

cc: Randy Mason, PE, Anchor QEA, LLC

Re: Dana Point Harbor Revitalization – Coastal Hazards and Sea Level Rise Assessment

Anchor QEA, LLC, has completed a coastal hazards analysis for the Dana Point Marina to assist in the California Coastal Commission (CCC) permitting process. The proposed project includes reconfiguration, repair, and modernization throughout Dana Point Harbor with the following elements:

- Marina replacement and reconfiguration (Inner Basin and Outer Basin)
- Marina Drystack Area reconfiguration
- Seawall and revetment repair
- Upland boater service improvements such as replacing existing structures

The applicant has requested a coastal hazards and sea level rise (SLR) analysis/memorandum to aid in understanding potential long-term risks associated with the project and various environmental conditions, predictions, and impacts.

This technical memorandum presents the analysis and results of the coastal hazards evaluation that was conducted for the proposed development, including the following:

- Description of Dana Point Marina (Site) and coastal setting
- Identification of current coastal hazards at the Site, including high tides, storm waves, and wave overtopping
- Identification of potential future coastal hazards at the Site based on local predicted SLR estimates
- Discussion of minimization of impacts from both existing and future (potential) coastal hazards
- Potential future adaptive measures

A project lifetime of 75 years for the coastal structures is expected and was used for the coastal hazards analysis.

Site Description and Coastal Setting

Dana Point Marina is located in Dana Point, California, in southern Orange County (Figure 1). The marina is protected from northerly waves by a natural shoreline headland to the northwest. Two large permeable breakwaters, one along the west/southwest and one along the eastern sides of the marina, protect the Site from westerly and southerly waves. While the outer breakwaters are

semi-permeable, allowing some waves into the marina, the inner island (with parks and parking) adds a second layer of defense against waves for the Inner Basin.

A 75-year lifetime is assumed for the boat launch facility and for the other upland building pad elevations. See Attachments 1, 7, and 9 for design drawings. The boater service buildings, spaced around the marina, will have finished floor elevations ranging between 10.6 and 12.5 feet North American Vertical Datum of 1988 (NAVD88; 10.8 to 12.7 feet MLLW), and the boat launch and storage facilities will have a finished floor elevation of 10.6 feet NAVD88 (10.8 feet MLLW).

Figure 1
Vicinity Map



Tidal Information (Water Levels)

Tidal datums for the area (Table 1) were sourced from the National Oceanic and Atmospheric Administration (NOAA) Tides and Currents database, tidal station 9410660: Los Angeles, California (NOAA Tides and Currents 2019); see Figure 1 for the location.

Table 1
Tidal Datums: Los Angeles NOAA Station No. 9410660

Tidal Datum	Elevation Relative to MLLW at Gage Location (feet) ¹	Elevations Relative to NAVD88 (feet) ²
HAT ¹	7.3	7.1
MHHW	5.5	5.3
Mean High Water	4.8	4.6
MSL	2.8	2.6
Mean Low Water	0.9	0.7
NAVD88 ¹	0.2	0.0
MLLW	0.0	-0.2
LAT	-2.0	-2.2

Notes:

1. HAT and NAVD88 are based on the Santa Barbara Control Station No. 9411340.
 2. Elevations relative to MLLW are based on the current (1983 to 2001) tidal epoch.
- HAT: highest astronomical tide
 LAT: lowest astronomical tide
 MHHW: mean higher high water
 MLLW: mean lower low water
 MSL: mean sea level

Wind

Minimal wind data are available for the local area. The Dana Point station (U.S. Air Force 722859) has wind data from 1984 to 1996, taken irregularly only a few times a day; see Figure 1 for the location. Based on this minimal data, the storm return period is outlined in Table 2, but it is likely not fully representative of current storm conditions. Therefore, wave data were used to more accurately represent storm conditions.

Table 2
Storm Return Period Wind Speeds

2-Year	5-Year	10-Year	25-Year	50-Year	75-Year	100-Year
24 mph	27 mph	30 mph	32 mph	34 mph	35 mph	36 mph

Notes:

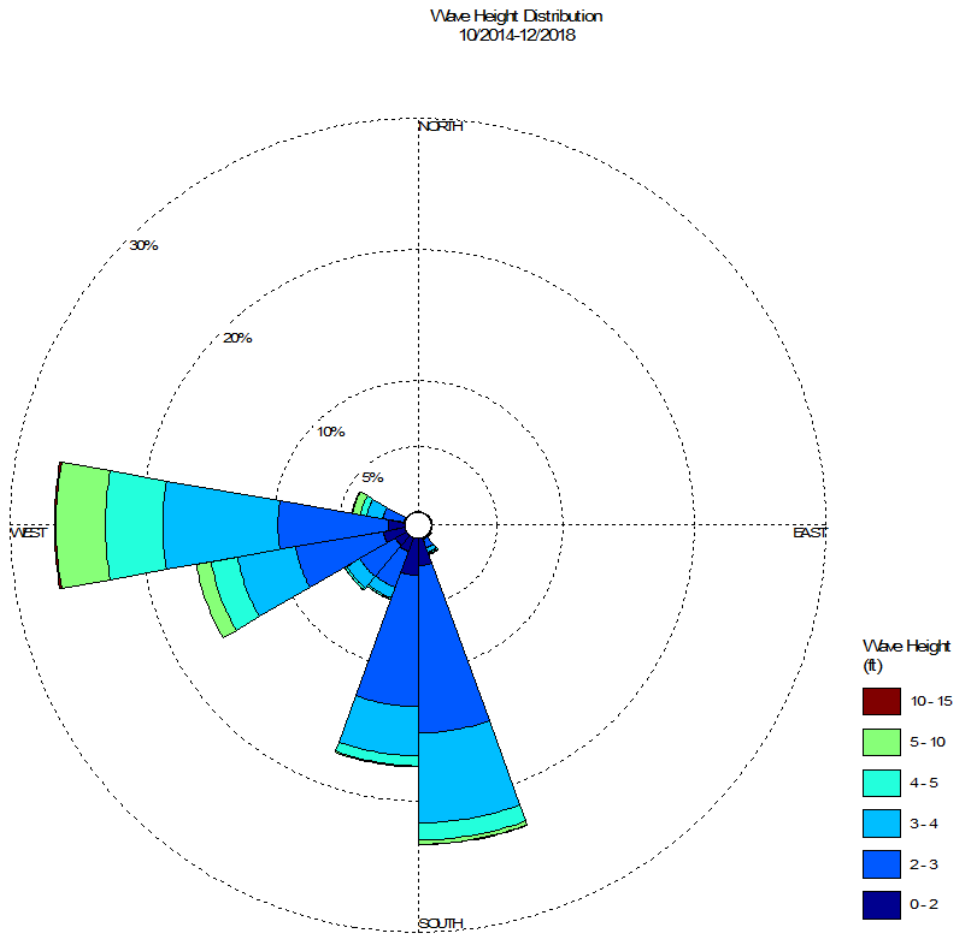
Wind data dated 1984 to 1996, Dana Point, California (U.S. Air Force 722859)
 Wind speeds are 2-minute averages
 mph: miles per hour

Wave

Wave data were collected from NOAA’s National Data Buoy Center for the closest wave buoy, San Pedro South, California Buoy, Station 46253 from 2014 through 2018 (NOAA NDBC 2019). The buoy is located approximately 29 miles west-northwest of the Site in the San Pedro Channel. The wave rose in Figure 2 depicts the distribution of waves by height and direction. While the buoy is far from the Site, it is expected that the wave rose is representative of directional distribution based on similar positioning, with an open southerly fetch and some protection from westerly waves from Santa Catalina Island (see Figure 1).

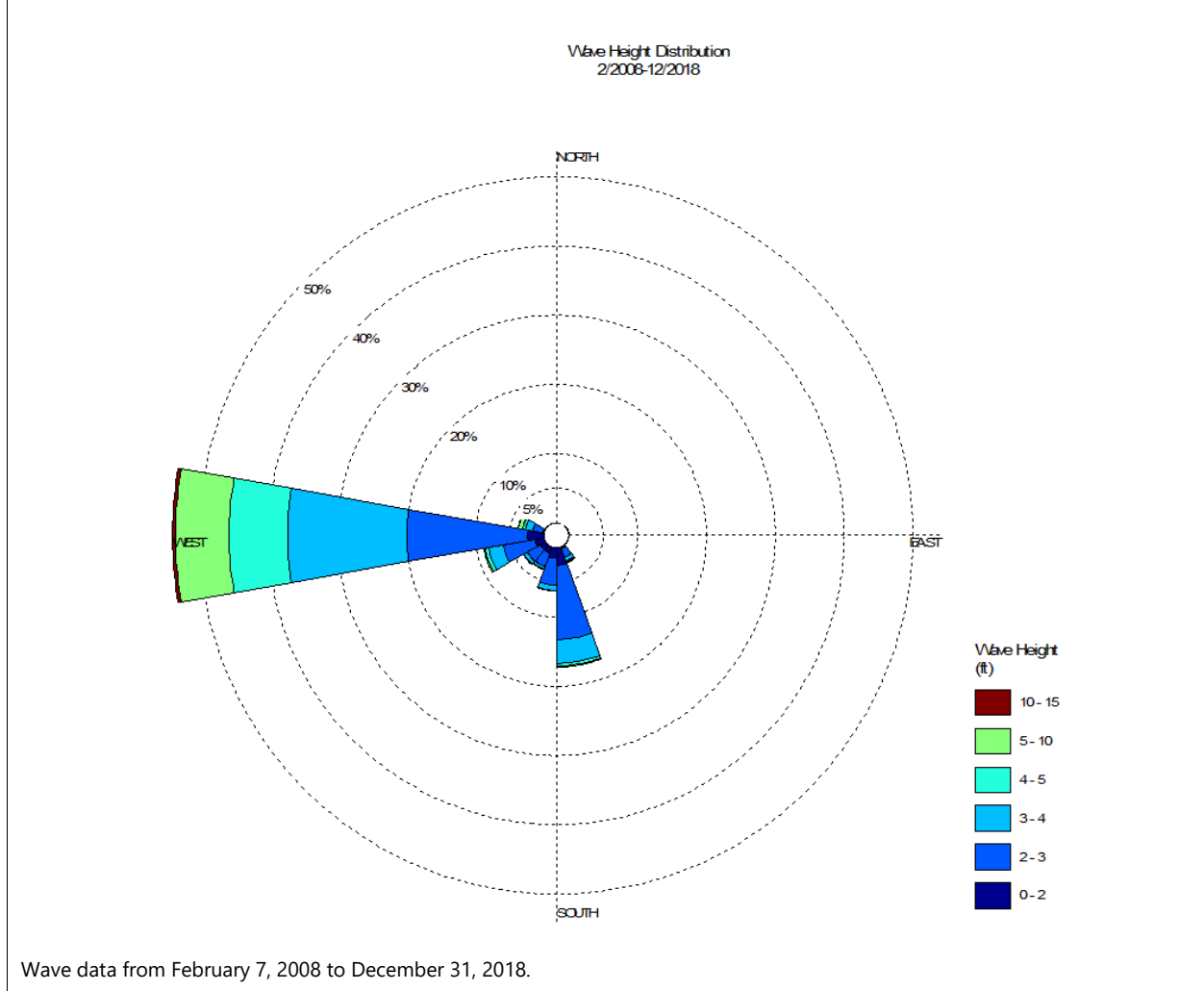
Additionally, wave buoy data from farther afield with a longer record was evaluated as well (the San Pedro, California, Station 46222 from 2004 to 2018 [NOAA NDBC 2019]). The buoy is located approximately 37 miles west-northwest of the Site in the San Pedro Channel (see Figure 1). The wave rose in Figure 3 depicts the distribution of waves by height and direction. This longer-established station has more exposure to waves from the west from the open Pacific Ocean and is more protected from southerly waves by Santa Catalina Island. However, both stations have wave heights of similar magnitude.

Figure 2
Wave Height Distribution: Buoy Station 46253



Wave data from October 20, 2014 to December 31, 2018.

Figure 3
Wave Height Distribution: Buoy Station 46222



Existing Coastal Hazards

Existing coastal hazards that can impact the Site include extreme astronomical tides, storm waves, and storm surge (due to wind and wave set up during storms).

Extreme Tidal Levels

Highest astronomical tide (HAT) at the Los Angeles station is 7.3 feet above mean lower low water (MLLW) (NOAA Tides and Currents 2019; 7.1 feet above NAVD88), which is almost 2 feet above MHHW. The HAT elevation is 3.5 feet below the lowest finished floor elevation (10.8 feet MLLW; 10.6 feet NAVD88).

FEMA Coastal Flooding

FEMA's Flood Insurance Study for Orange County (FEMA 2019) divides the Dana Point Harbor into various zones (see Figure 4). Just outside the breakwaters, the 100-year coastal wave runup elevation is 43.8 feet NAVD88 (44 feet MLLW; FEMA 2019, Table 26). However, within the breakwaters, the 100-year runup elevation drops to 17 feet NAVD88 and down to 8 feet NAVD88 within the marina.

Figure 4
FEMA Flood Insurance Rate Map



FEMA Flood Insurance Rate Map, Orange County, California; panel 504 of 539

Waves and Currents

Offshore Extreme Waves

Wave data from Station 46222¹ (Figure 3) was used to estimate extreme wave heights for return periods of 2, 5, 10, 25, 50, and 100 years. The results of the extreme value analysis are shown in Table 3. These values represent offshore, deep-water waves and do not necessarily reflect heights at the Site, as waves will reduce based on depths and shoreline geometry resulting in wave shoaling, refraction, diffraction, and reflection.

¹ Station 46253, while closer to the Site, was not used, as there are insufficient data for an extreme analysis.

Table 3
Extreme Deep-Water Wave Heights

2-Year	5-Year	10-Year	25-Year	50-Year	75-Year	100-Year
12.9 feet	14.8 feet	16.0 feet	17.5 feet	18.6 feet	19.1 feet	19.6 feet

Note:

Wave data dated September 8, 2004, to December 31, 2018 (National Data Buoy Center Station 46222)

Marina Waves, Wind Setup, and Currents

“Modeling Study of Dana Point Harbor, California: littoral sediment transport around a semi-permeable breakwater” (Li et al. 2015) presents wave and current transmission through the western breakwater. A significant wave height of 0.6 to 0.7 meter (2 to 2.3 feet) outside of the breakwater can equate to a 0.05- to 0.07-meter (0.16- to 0.23-foot) wave on the harbor side. However, the marinas are more protected from waves by the inner island housing, parking, and parks (see Figure 1).

Wind setup within the marina was estimated using the procedure outlined in *Estuary and Coastline Hydrodynamics* (Ippen 1966) and resulted in setup of less than 0.1 foot for the 100-year return period.

Currents inside the harbor are mainly wind- and tide-driven with small magnitudes of less than 4 centimeters per second (cm/s), compared to outside the harbor, where currents can be greater than 10 cm/s regularly and greater than 50 cm/s under storm conditions (Li et al. 2015).

As waves within the marinas are likely to be locally generated wind-driven waves (or wakes²), a fetch limited wave analysis was conducted assuming the largest potential fetches of the marina. Table 4 shows the potential wave heights using the 35-mph 75-year wind potential (Table 2).

Table 4
Potential in Marina Wind-Waves

Location	Fetch	Depth	Wave
East Marina	0.5 mile	11 feet	1.0 foot; 1.6 seconds
West Marina	0.4 mile	11 feet	0.9 foot; 1.5 seconds
Boat Launch	0.4 mile	15 feet	0.9 foot; 1.5 seconds

Note:

All scenarios assume a 75-year wind speed of 35 mph (Table 2).

Outer Basin Waves

In extreme storm conditions, the eastern breakwater can be overtopped, resulting in waves in the Outer Basin that could affect the proposed marina floats in that area. The eastern breakwater has a

² Not reviewed in this analysis, as vessels should be operating under no wake conditions

crest elevation of approximately +14 feet MLLW. A depth of approximately 30 feet outside of the breakwater could potentially allow a 75-year deep-water wave of more than 19 feet to reach the breakwater and cause overtopping, resulting in waves in the Outer Basin.

Everest International Consultants, Inc. (Everest), prepared a Wave Uprush Analysis for the Harbor Revitalization effort, concluding that the 100-year return period wave conditions at the Outer Basin have a significant wave height of 2.1 to 2.3 feet and a peak period of 15.5 seconds (Everest 2014).

Overtopping

Overtopping was estimated using the *Manual on Wave Overtopping of Sea Defences and Related Structures* (EurOtop2018).

While the marina seawalls will be repaired where needed, they will not be extended. The seawalls currently have a top elevation of +10 feet MLLW. Given the highest astronomical tide of +7.3 feet MLLW, and a potential in-marina wind-wave of 1 foot, no overtopping is expected.

The potential Outer Basin 100-year wave of 2.3 feet results in approximately 6 liters per second per linear meter (l/s/m) of overtopping, which has the potential to cause damage to seawalls if the crest is not protected (USACE 2008, Table VI-5-6).

Summary

The expected lifetime of the coastal structures is 75 years. Therefore, the existing coastal hazards are based on a similar return period. The specific coastal hazards for this project are summarized in Table 5.

Table 5
Summary of Existing Coastal Hazards

Existing Coastal Hazard	Value
MSL	+2.8 feet MLLW
MHHW	+5.5 feet MLLW
HAT	+7.3 feet MLLW
75-year significant deep-water wave height ¹	19.1 feet
75-year significant marina wave height ²	1 foot
75-year marina wave on HAT	+7.8 feet MLLW
HAT marina overtopping	None

Notes:

1. Based on wave buoy data analysis (Table 3)
2. Based on fetch limited wave data (Table 4)

As Table 5 shows, tidal events and a 75-year wave event will not impact the uplands, as the seawall crest is at an elevation of +10 feet MLLW and finished floor elevations range from 10.6 to 12.5 feet NAVD88 (10.8 to 12.7 feet MLLW) behind the protective seawall.

Additionally, a 100-year significant wave height of 2.3 feet (75-year not included in referenced material; Everest 2014) can be expected within the Outer Basin, resulting in a 100-year Outer Basin wave elevation on the HAT of +8.5 feet MLLW. This elevation is below the boating service facilities, drystack, and seawall; however, as the Overtopping section outlines, it can result in overtopping of approximately 6 l/s/m, which has the potential to cause damage to seawalls if the crest is not protected.

Future Coastal Hazards

Future coastal hazards that may impact the Site include the current coastal hazards identified above, with the addition of increased water levels due to predicted SLR. SLR estimates for the Site were taken from CCC's *Sea Level Rise Policy Guidance* (CCC 2018) for Los Angeles (the closest station). The various ranges of SLR estimates are outlined in Table 6.

Uncertainties exist in estimates for SLR due to numerous issues related to understanding the physics and assumptions associated with predictive modeling (NRC 2012). These uncertainties increase as the projection period increases, with large uncertainties in predictions of SLR at 2100 and beyond.

For the Site, CCC guidance recommends the medium-high risk aversion (a 0.5% probability SLR exceeds) based on the project type. The medium-high risk aversion scenario should be used for projects with greater consequences and/or a lower ability to adapt, such as residential and commercial structures. The time frame used to evaluate impacts to the Site due to predicted SLR is based on the design life of the proposed structures (CCC 2018). As discussed above, the design life of the coastal facilities is expected to be approximately 75 years. Therefore, a medium-high risk aversion SLR estimate for 2100 should be used for design: +6.7 feet.

Table 6
Projected Sea Level Rise (feet) for Los Angeles

Year	Low Risk Aversion	Medium-High Risk Aversion	Extreme Risk Aversion
2030	0.5	0.7	1.0
2040	0.7	1.2	1.7
2050	1.0	1.8	2.6
2060	1.3	2.5	3.7
2070	1.7	3.3	5.0
2080	2.2	4.3	6.4
2090	2.7	5.3	8.0
2100	3.2	6.7	9.9
2110*	3.3	7.1	11.5
2120*	3.8	8.3	13.8
2130*	4.3	9.7	16.1

Notes:

* Most climate model experiments do not extend beyond 2100. Use of projects beyond 2100 should be done with caution and acknowledgement of increased uncertainty around these projects (CCC 2018).

Low Risk Aversion: Upper limit of "likely range" (approximately 17% probability SLR exceeds)
 Medium-High Risk Aversion: 1-in-200 chance (0.5% probability SLR exceeds)
 Extreme Risk Aversion: Single scenario (no associated probability)

The projected tidal elevations at the Site based on the projected SLR estimates for 2100 are summarized in Table 7. For comparison, the range of projected tidal elevations based on the low risk aversion and extreme risk aversion SLR estimates are also provided.

Table 7
Potential 2100 Tidal Levels at the Site¹

Tidal Level	Current Conditions ²	Low Risk Aversion	Medium-High Risk Aversion	Extreme Risk Aversion
HAT	7.3	10.5	14.0	17.2
MHHW	5.5	8.7	12.2	15.4
MSL	2.8	6.0	9.5	12.7
NAVD88	0.2	3.4	6.9	10.1
MLLW	0.0	3.2	6.7	9.9

Notes:

1. All elevations are in feet, relative to the current tidal epoch (1983 to 2001) MLLW elevation.
2. Existing tidal datums are provided in Table 1.

Future coastal hazards for the Site combine current coastal hazards due to storm events and increases in water level due to projected SLR. The deep-water wave heights are considered to be the same for existing and future conditions. As shown in Table 7, inundation, even at low risk aversion, is possible, and for medium-high risk aversion inundation could occur above mean sea level.

Table 8 outlines the predicted future coastal hazards for the Site.

Table 8
Summary of Future Coastal Hazards

Future Coastal Hazard	Value ¹
2100 MSL	9.5 feet MLLW
2100 MHHW	12.2 feet MLLW
2100 HAT	14.0 feet MLLW
75-year significant deep-water wave height ¹	19.1 feet
75-year significant marina wave height ²	1 foot
75-year marina wave on 2100 HAT	14.5 feet MLLW
2100 HAT marina overtopping	Inundated

Notes:

1. All elevations are in feet, relative to the current tidal epoch (1983 to 2001) MLLW elevation
2. Based on wave buoy data analysis (Table 3)

As Table 8 shows, with the addition of SLR, the current +10 feet MLLW seawall crest elevation will be inundated by 2100 MHHW (12.2 feet MLLW; 12 feet NAVD88). With storm waves (75-year of 1 foot and 100-year of 2.3 feet) on top of the higher water levels with SLR (reaching elevations of 14.5 to 15.2 feet MLLW [14.3 to 15 feet NAVD88] on HAT), the potential wave damage to the buildings is increased.

Because inundation beyond the seawall is predicted with the 2100 SLR (and as early as 2070), future adaptive measures must be considered (see the Future Adaptive Measures section).

Comparison to Previous Studies

As mentioned in the Outer Basin Waves section, previous studies have been conducted for the area. Table 9 compares the updated analysis to the 2014 *Coastal Engineering Support Services – Wave Uprush Analysis* prepared by Everest. The 2014 study references 100-year wave heights versus the 75-year wave heights used in the updated study.

Table 9
Comparison of Coastal Hazards: 2014 and Updated Analysis

Future Coastal Hazard	2014 Everest Analysis ^{1,2}	Updated Analysis ^{1,3}
2100 SLR	16.5 to 66 inches (1.4 to 5.5 feet)	6.7 feet
2100 MHHW	6.8 to 10.9 feet MLLW	12.2 feet MLLW
2100 HAT	9.0 to 13.2 feet MLLW ⁴	14.0 feet MLLW
75-year significant marina wave height ³	--	1 foot
100-year significant Outer Basin wave height ²	2.3 feet	--
75-year marina wave on 2100 HAT	--	14.5 feet MLLW
100-year Outer Basin wave on 2100 HAT	10.2 to 14.3 feet MLLW ⁴	--
2100 HAT marina overtopping	Inundated	Inundated

Notes:

1. All elevations are in feet, relative to the current tidal epoch (1983 to 2001) MLLW elevation
 2. Wave Uprush Analysis (Everest 2014)
 3. Table 8
 4. Everest used highest observed water level (7.7 feet MLLW) versus HAT (7.3 feet).
- : not applicable

Future Adaptive Measures

With increased water levels due to SLR, the existing seawall (+10 feet MLLW) is expected to be inundated (Table 8); therefore, future adaptations will be required to prevent flooding and damage to the buildings.

Potential adaptive measures include raising the buildings' finished floor elevations or extend the seawall.









SLR effects should be continually monitored to ensure the seawall is extended before inundation can result in flooding of the facilities.

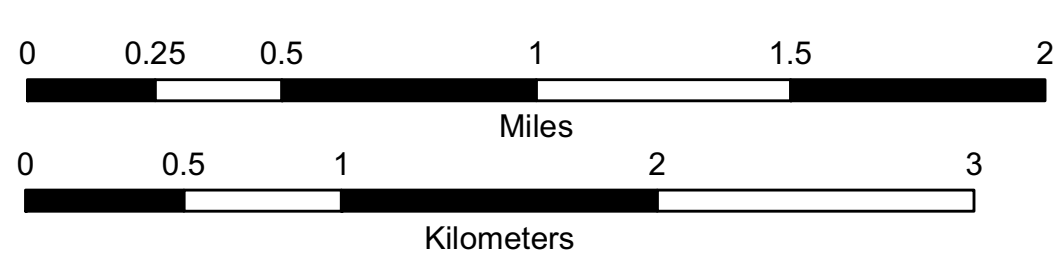
References

- CCC (California Coastal Commission), 2018. *Sea Level Rise Policy Guidance. Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits.* Science Update unanimously adopted – November 7, 2018.
- EurOtop (Van der Meer, J.W., N.W.H. Allsop, T. Bruce, J. De Rouck, A. Kortenhaus, T. Pullen, H. Schüttrumpf, P. Troch, and B. Zanuttigh), 2018. *Manual on Wave Overtopping of Sea Defences and Related Structures.* Second Edition 2018.
- Everest (Everest International Consultants, Inc.), 2014. Letter to: David Rocha, OC Dana Point Harbor/Project Management. Regarding: Dana Point Harbor Revitalization Commercial Core Project Coastal Engineering Support Services – Wave Uprush Analysis. April 7, 2014.
- FEMA, 2019. *FEMA Flood Insurance Study: Orange County, California and Incorporated Areas.* Flood Insurance Study Number: 06059CV001C. Version Number 2.3.3.1. Revised: March 21, 2019.
- Li, H., L. Lin, C.-C. Lu, C.W. Reed, and A.T. Shak, 2015. "Modeling Study of Dana Point Harbor, California: littoral sediment transport around a semi permeable breakwater." *Journal of Ocean Engineering and Marine Energy* 1(2):181–192.
- Ippen, Arthur, 1966. *Estuary and Coastline Hydrodynamics.* McGraw-Hill Book Company. 1966.
- NOAA (National Oceanic and Atmospheric Administration) Tides and Currents, 2019. Station ID 9410660. Accessed March 14, 2019. Available at: <https://tidesandcurrents.noaa.gov/stationhome.html?id=9410660>.
- NOAA NDBC (National Data Buoy Center), 2019. National Data Buoy Center. Available at: <http://www.ndbc.noaa.gov>.
- NRC (National Research Council), 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington, Past, Present, and Future.*
- USACE (U.S. Army Corps of Engineers), 2008. *Coastal Engineering Manual.* EM 1110-2-1100. 2008.

California Flood Risk: Sea Level Rise Dana Point Quadrangle



-  Interstate
-  US Highway
-  State Highway
-  County Highway
-  Current Coastal Base Flood (approximate 100-year flood extent)
-  Sea Level Rise Scenario Coastal Base Flood + 1.4 meters (55 inches)
-  Landward Limit of Erosion High Hazard Zone in 2100
-  Coastal Zone Boundary



Created by the Pacific Institute, Oakland, California, 2009.
Project funded by the California Energy Commission's Public Interest Energy Research Program, CalTrans, and the California Ocean Protection Council

Grid coordinates:
UTM Zone 11N meters
NAD83 GCS degrees

Adjoining Quadrangles:

1	2	3
4	5	6
7	8	

- 1: Laguna Beach
- 2: San Juan Capistrano
- 3: *not printed*
- 4: *not printed*
- 5: San Clemente
- 6: *not printed*
- 7: *not printed*
- 8: San Onofre Bluff



This information is being made available for informational purposes only. Users of this information agree by their use to hold blameless the State of California, and its respective officers, employees, agents, contractors, and subcontractors for any liability associated with its use in any form. This work shall not be used to assess actual coastal hazards, insurance requirements, or property values and specifically shall not be used in lieu of Flood Insurance Studies and Flood Insurance Rate Maps issued by the Federal Emergency Management Agency (FEMA).

Data Sources: US Geological Survey, Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Coastal Services Center (CSC), Scripps Institution of Oceanography, Philip Williams and Associates, Inc. (PWA), US Department of Agriculture (USDA), California Coastal Commission, and National Aeronautics and Space Administration (NASA). Imagery from ESRI and i-cubed.



Map extents match USGS 7.5 minute topographic maps

Enter an address or city



WATER LEVEL

10ft

9ft

8ft

7ft

6ft

5ft

4ft

3ft

2ft

1ft

Current MHHW

UNITS

SEA LEVEL RISE

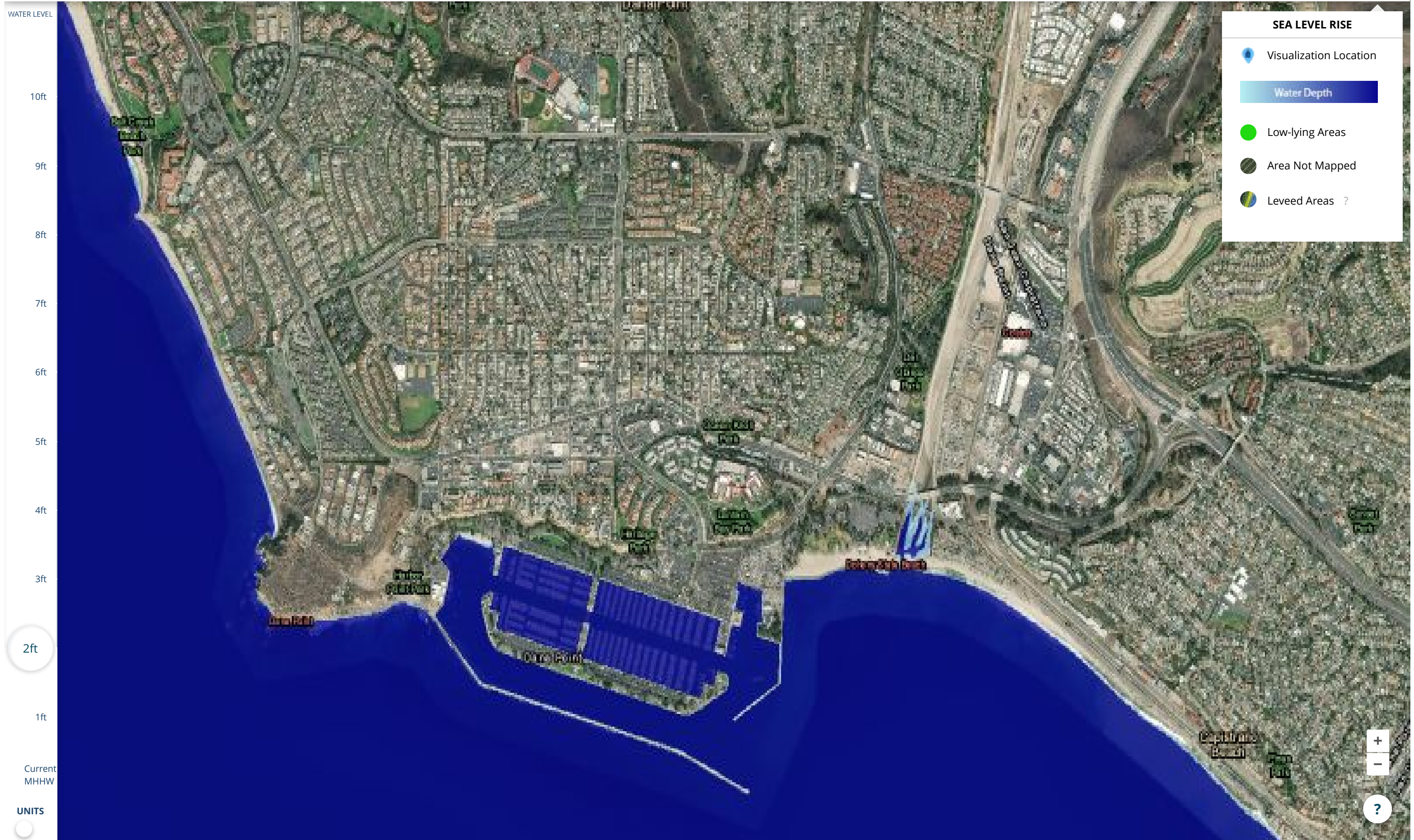
Visualization Location

Water Depth

Low-lying Areas

Area Not Mapped

Leveed Areas ?



Enter an address or city



WATER LEVEL

10ft

9ft

8ft

7ft

6ft

5ft

4ft

3ft

2ft

1ft

Current MHHW

UNITS

VULNERABILITY

High Med Low

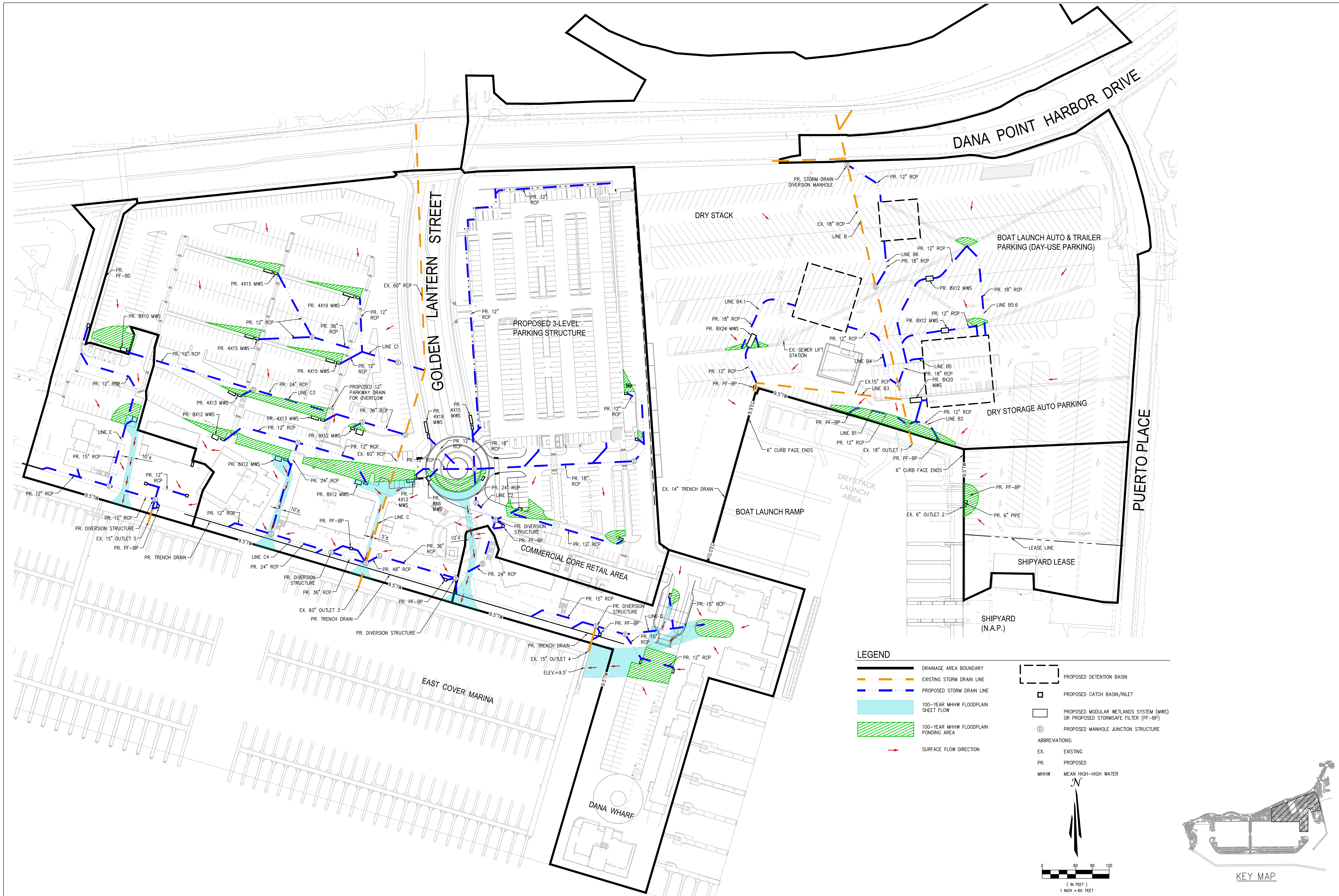
Water Depth

Low-lying Areas

Area Not Mapped



Appendix P – Floodplain Exhibit



7					
6					
5					
4					
3					
2					
1					
NO.	DATE	REVISIONS	ENGR.	APPROV.	DATE

PREPARED UNDER THE SUPERVISION OF: 701 N. Parkcenter Drive
 Santa Ana, CA 92705
TAIT
 Since 1964
 Los Angeles Sacramento San Francisco Dallas Phoenix
 Ontario San Diego Boise Denver Portland
 DESIGN ENGINEER R.C.E. No. DATE

DRAWN BY: DATE
 DESIGNED BY: DATE
 CHECKED BY: DATE
 RECOMMENDED BY: DATE

DANA POINT HARBOR REVITALIZATION

DANA POINT HARBOR PARTNERS, LLC



FLOODPLAIN MAP

COMMERCIAL CORE AREA MASTER PLAN OF DRAINAGE

SHT 1 OF 1

K:\Drawings\ME\WCD3810 - Dana Point Harbor\ENR\Hydrology\Master\WCD3810 Floodplain Exhibit\Layout PLOTTED: 12/5/2019 2:26:43 PM BY Edm: Medina