Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

September 22, 2021

Mr. Bryon Ward, President
DANA POINT HARBOR PARTNERS, LLC
c/o BURNHAM-WARD PROPERTIES
1100 Newport Center Drive, Suite 200
Newport Beach, CA 92660

GMU Project 17-206-02
Permit No. PKG21-0490

Subject: Response to County of Orange Geotechnical Review Comments Pertaining to Precise Grading Plans, Dana Point Harbor Revitalization, Buildings 1 through 12, Commercial Component, City of Dana Point, California

References: Listed on Page 12

Dear Mr. Ward:

This correspondence presents our response to the reference (1) County of Orange Review Comments, attached to this response as Appendix A, pertaining to the submittal of the precise grading plans and details for the subject site.

RESPONSES TO GEOTECHNICAL COMMENTS

RESPONSE TO COMMENT 1.001

Geotechnical consultant must review the Precise Grading Plans and applicable details submitted to the County that will be utilized during construction of the project. Provide additional geotechnical recommendations as necessary. The approved precise grading plans and applicable details must be reviewed and signed/stamped by the geotechnical engineer and engineering geologist prior to permit issuance. Note – The currently submitted precise grading plans are incomplete and do not include the recommended Deep Soil Mixing (DSM) and Load Transfer Platform (LTP) ground improvement plans/details. Please coordinate w/ project team to ensure the geotechnical ground improvement recommendations/details are included as part of the project precise grading plans.

Acknowledged. The final precise grading plans and applicable details will be reviewed from a geotechnical perspective and signed. We will coordinate w/ project team to ensure the AGI DSM and LTP geotechnical ground improvement recommendations/details are included as part of the project precise grading plans as "For Reference Only".

RESPONSE TO COMMENT 1.002

Multiple Building Permits and Plans (Commercial Core Buildings, site walls/retaining walls, etc.) are required for completion of this project. The approved project building and structural plans and applicable details must be reviewed and signed/stamped by the project geotechnical engineer and engineering geologist prior to the applicable permit issuance.

Acknowledged. The approved project building and structural plans and applicable details will be reviewed from a geotechnical perspective and signed/stamped.

RESPONSE TO COMMENT 1.003

The approved Ground Improvement Plans (Deep Soil Mixing (DSM) and Load Transfer Platform (LTP)) and details (from GRD21-0090) must be included as a reference in the approved project building and structural plan sets.

Acknowledged. AGI sheets GI-1 through GI-5 will be included in the building and structural plan sets as reference only.

RESPONSE TO COMMENT 1.004

The submitted geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) indicates that liquefaction analysis was performed on the SPT exploratory data as a cross-check to the CPT liquefaction analysis and yielded similar results. Please provide a copy of the completed SPT liquefaction analysis as discussed in the submitted report. Provide additional recommendations as needed.

Results of the liquefaction analysis performed on SPT data of six (6) exploratory borings (DH-12, DH-17, DH-18, DH-19, DH-26, DH-51) are included as Appendix B. As stated in the submitted geotechnical report, CPT-based liquefaction analyses provide a more reliable, accurate and continuous database from which to calculate liquefaction magnitude. The SPT-based analysis was generally consistent with the results of the CPT-based analysis, but it does include a few isolated cases indicating a larger magnitude of settlement, which is not uncommon using SPT-based analysis. We do not believe these aberrations are accurate predictions of the expected earthquake-induced settlements under the considered ground motions.

RESPONSE TO COMMENT 1.005

Provide additional comment/discussion to confirm the geotechnical recommendations with respects to infiltration design and bioretention areas from the submitted project geotechnical report (GMU, Inc., report dated 5/27/21) have been incorporated into the submitted project plans. Provide additional recommendations as necessary.

The typical modular wetland systems (precast concrete structures) detailed in the submitted project plans are completely impermeable (confirmed by Tait), and satisfy the geotechnical recommendations provided.

RESPONSE TO COMMENT 1.006

At a minimum, the geotechnical site drainage recommendations should be in accordance with CBC requirements. Please confirm the report recommendations for site drainage are in accordance with CBC requirements and that the submitted project plans have incorporated your geotechnical recommendations. Provide additional geotechnical site drainage recommendations as necessary.

Page 31 of our report recommends that positive drainage of at least 2% away from the perimeters of the structures and site pavements should be incorporated into the design. The submitted project plans generally meet this recommendation. Tait Engineering should verify that site drainage is in conformance with 2019 CBC requirements beyond the recommendations within our report.

RESPONSE TO COMMENT 1.007

The submitted geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) indicates groundwater is anticipated to impact DSM columns and deep utility excavations. Please provide additional comment/discussion to confirm geotechnical recommendations to mitigate groundwater impact on construction based on review of the currently submitted project plans. Also provide comment/discussion to confirm project dewatering operations anticipated means of disposing of pumped water. Provide additional recommendations as necessary.

Shallow groundwater a common condition in projects including DSM construction is not expected to impact the DSM construction process. The DSM construction process consists of advancing a hollow stem into the ground while rotating mixing blades assist advancement by loosening the soil. As the hollow stem is advanced into and ultimately withdrawn from the DSM column location under construction, a grout slurry (consisting of cement and water) is pumped through the tip of the tooling. The rotation of the mixing blades on the tooling aim to homogenize a "soilcrete" mixture of the in-situ soils and the injected grout. Because the on-site soils are mixed-in-place, no

"open holes" are ever created, eliminating the concerns for caving soils which can be caused by shallow groundwater when using other geotechnical construction processes (drilled shafts, micropiles, etc.).
The DSM construction process will generate spoils of the "soilcrete" mixture, which are to be mixed with site soils and processed for use as onsite fill after curing, or potentially incorporated into the proposed LTP. The DSM construction process will not generate any pumped water requiring disposal.

The project general contractor, Snyder Langston, is in the process of applying for a groundwater discharge permit and will be responsible for storage and disposal of any pumped groundwater, which may be required during excavation and installation of site utilities.

RESPONSE TO COMMENT 1.008

The submitted geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) indicates estimated groundwater levels based on high tides were determined and provided in an effort to aid the project in designing underground utilities and give contractors an idea of what conditions may be encountered. Please provide additional comment/discussion on historic high groundwater elevation and high tide groundwater elevation with respects to the project stability analyses included in the submitted project documents (GMU and AGI). Provide additional data and/or updated analysis as necessary. Provide additional recommendations as necessary.

Attached as Appendix G are additional stability/lateral spread analyses of the AGI design with a groundwater level of 5' below ground surface (in reference to ground surface at the time of the investigations, and not of proposed ground surface) as described in our report, which is based on historic high groundwater at the project site. The high tide groundwater elevations shown on Plate 5 are intended to aid underground utility design and to provide estimated groundwater levels that may be encountered by contractors, but not for use in stability analyses.

The results of these additional AGI analyses do not substantially change the results (in fact the maximum estimated slope deformations in these additional analyses is 0.1" **less** than the previously provided values), and as such there is no impact on the AGI design.

In addition, the following additional items should be noted: 1) only the AGI analysis is relevant for the proposed conditions as the GMU analyses simply identified the need for lateral spreading mitigation, 2) the lateral spreading mitigation is based on an MCE earthquake which is an earthquake with a return period of 2500 years, 3) the mitigation is extremely robust.

RESPONSE TO COMMENT 1.009

The submitted geotechnical report indicates the lateral extents of the subsurface riprap in the vicinity of the proposed buttress DSM columns is uncertain and that areas of rip rap may be encountered during construction. Please provide additional comment/discussion on the potential impact of greater than anticipated rip rap section in this area on the proposed buttress DSM column construction and layout/design, including minimum 4-foot embedment into bedrock. Provide additional recommendations as necessary.

The DSM configuration included an approximately 20-feet offset from the quay walls to the nearest DSM elements. The as-built details of the quay walls provided, namely Sections A and B of Sheet 23 (by Koebig & Koebig, Inc., attached as Appendix C) indicate that the DSM column locations as configured are laterally at least 15' clear of any placed riprap/revetment stone, and will be installed through compacted fill. The 20-feet offset was intended as a conservative buffer in the event that the actual limits of placed rip rap differ from the as-built drawings.

AGI has provided an exhibit, attached as Appendix D, to illustrate potential mitigation options in the event that an isolated riprap obstruction is encountered.

RESPONSE TO COMMENT 1.01

Provide additional comment/discussion on the existing condition/performance of Buildings 2 through 5 at the subject site. Include confirmation of subsurface conditions/foundation conditions and proposed mitigation (i.e., no required mitigation/deep soil mixing columns/load transfer platform, etc.) for the proposed "minor improvements" as discussed in the submitted project geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) and submitted project plans. Provide additional recommendations as necessary.

We understand that the renovation of Buildings 2-4, 5A and 5B will generally consist of remodeling the existing buildings (constructed in the early to mid-1970's) with new doors and windows and, on some of the buildings, removing some interior and exterior walls along with new interior slab-on-grade to reconstruct their layout. In addition, some ramp and stair footings will be included in the remodel.

These buildings have performed satisfactorily since the original development with no signs of visible or no reports of significant distress. Consequently, there is no practical or economically viable way to improve the resistance of these buildings to liquefaction related deformations. It is our understanding that based on meetings between the county and the design team and the developer at the start of 2020, there was agreement reached between all parties that the modifications to the existing buildings would not require anything beyond localized strengthening of existing framing, walls, and footings (i.e., the buildings would not be subject to

2019 liquefaction criteria). However should the County require resistance to liquefaction related deformations, then these buildings would likely need to razed, ground improvement implemented and new foundations constructed.

RESPONSE TO COMMENT 1.011

Provide additional comment/discussion to confirm the basis of the geotechnical recommendations for allowable bearing value for the proposed project (i.e., 5,000 psf for Buildings 1 and 6-12 and 2,500 psf for Buildings 2-5). Specifically, address subsurface conditions, proposed mitigation, existing improvements and proposed improvements at the different locations/different allowable bearing recommendations. Include additional data (e.g. plot plan/map, subsurface data, analysis/evaluation, etc.) as necessary to support your comment/discussion. Provide additional recommendations as necessary.

The bearing value for Buildings 1 and 6-12 are based on the presence of DSM columns below the building foundations and slabs while the bearing value for Buildings 2-5 are based on locally “improved” existing soils (i.e., per our recommendations). Consequently, there is a significant difference between the two design bearing values. See AGI Calculations for DSM column supported bearing calculations (See Section 4.2 and Appendices C1 and C21 of the AGI submittal package).

RESPONSE TO COMMENT 1.012

The submitted geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) discusses the anticipated ground improvement (i.e., deep soil mixing columns/load transfer platform) construction schedule and grading pad release for construction of the proposed structure(s). In addition to the information discussed in the submitted geotechnical report, the project will also be required to provide final letter/report from geotechnical consultant of record (GMU Geotechnical, Inc.) prior to pad release for construction to confirm the preliminary recommendation for allowable bearing value (5,000 psf) for the proposed structure(s) remains valid based on the as-graded building pad conditions and DSM/LTP installation.

Acknowledged. As-graded reports during construction will confirm the validity of the recommendation of the 5,000 psf allowable bearing value.

RESPONSE TO COMMENT 1.013

The project must update the AGI, Inc., Ground Improvement Plans General Notes and Details Section 3.4 Quality Control and Quality Assurance (Sheet GI-2) must be updated to include note that written confirmation from project geotechnical consultant of record will be provided upon completion of site grading and deep soil mixing columns/load transfer platform installation to confirm preliminary recommendation for proposed structure(s) allowable bearing value of 5,000 psf remains valid. Additional recommendations shall be provided as necessary.

Acknowledged. AGI sheet GI-2 has been revised to incorporate this note, within their updated design package, attached as Appendix E.

RESPONSE TO COMMENT 1.014

Provide additional comment/discussion on the lateral spread analysis presented in the GMU Geotechnical, Inc., report dated 5/27/21 (Appendix E). Please include confirmation of location cross-sections analyzed and additional discussion on data/input values utilized for analysis. Include additional data as necessary to support your comment/discussion. Provide additional recommendations as necessary.

The cross-section labels (A-A', C-C'), labeled on the second line in the top left of the analysis sheets, correspond to the cross-sections of the same labels on GMU Plates 2 and 3 (and also correspond to the AGI cross-sections.

The basic soil parameters (unit weight, cohesion', φ') used in the analyses were derived from the extensive lab testing performed on sampled site soils, and are intended to be conservative but representative values. GMU's liquefaction analysis evaluated both CPT data (Appendix D of our report) and SPT data (Appendix B of this letter) in order to A) identify the liquefiable zones under the design seismic loading, and B) estimate the residual shear strength of the liquefied zones post-earthquake. To provide clarity, these residual strengths of liquefied zones are labeled as:

- "Liquefied Su/Sig'v" in our CPT liquefaction analysis
- "S_r/σ'_{vo}" in our SPT liquefaction analysis
- "Tau/Sigma Ratio" in our lateral spread analyses
- "Vertical Strength Ratio" in AGI's lateral spread analyses

It should be noted that the GMU lateral spreading analyses simply concludes that remediation is required. The ground modification design is based upon the AGI analyses.

RESPONSE TO COMMENT 1.015

Provide additional comment/discussion to confirm the location of the pseudostatic slope stability analysis cross-sections presented in Appendix B1 of the AGI, Inc., report dated 5/27/21. Provide updated Plates/Details as necessary to indicate the confirmed cross-section locations. Provide additional recommendations as necessary.

The cross sections AGI used in this analysis (Plate GI-5) correspond to the GMU cross-sections (Plate 2, 3). The sections are named in the bottom right corner of AGI's analysis sheets ("Section A" = the A-A' cross-section). AGI has incorporated additional section labels in the top left corners of the analysis sheets of their revised design package (Appendix E) for clarity.

RESPONSE TO COMMENT 1.016

Provide additional comment/discussion on the pseudostatic slope stability analysis presented in Appendix B1 of the AGI, Inc., report dated 5/27/21. Please include additional discussion on data/input values utilized for analysis, including Kh values, etc. Include additional data as necessary to support your comment/discussion. Provide additional recommendations as necessary.

Kh values were not selected parameters in AGI's analyses but rather result from AGI's analyses. Based on the site geometry, static loading conditions, and soil properties in the model, the Kh values were iterated until achieving a factor of safety result approximately equal to unity to represent the yield coefficient (Ky) value (by definition) for input into the lateral deformation analysis provided in Appendix B3 of the AGI design package.

RESPONSE TO COMMENT 1.017

Provide additional comment/discussion to confirm the geotechnical recommendation for the anticipated magnitude of vertical settlement (total and differential) that should be taken into account during design and construction of the proposed improvements at the completion of the proposed remedial grading/ground improvement operations. Include the geotechnical recommendation for the horizontal distance over which the anticipated magnitude of remaining vertical differential settlement will occur. Provide additional recommendations as necessary.

The magnitudes of settlement provided in the submitted geotechnical report for Buildings 1 and 6-12 were intended as conservative estimates. Actual estimated settlements as described in the AGI design submittal are 0.5" of static settlement and 0.1" of seismically induced settlement. It should also be noted that all foundations will be founded on DSM columns embedded into bedrock while the slab will be supported on a load transfer platform that is designed to span between the

DSM columns. Consequently, the potential for significant adverse settlements to affect Buildings 1 and 6-12 are very small to negligible.

Static settlements for the minor improvements associated with Buildings 2-5 are contained in our report standard and minor – i.e., less than 1' total and ½ inch differential as long as our footing subgrade recommendations are followed. Seismic settlements and lateral deformations due to spreading will be significant (similar to those calculated for Buildings 1 and 6-12). It is our understanding that based on meetings between the county and the design team and the developer at the start of 2020, there was agreement reached between all parties that the modifications to the existing buildings would not require anything beyond localized strengthening of existing framing, walls, and footings (i.e., the buildings would not be subject to 2019 liquefaction criteria). However, if it is required by the County that in order to construct the minor modifications, that the buildings must be able to stand liquefaction related deformations, then the buildings will need to demolished and ground improvement as well as new foundations will be required.

RESPONSE TO COMMENT 1.018

Update/revise the geotechnical cross-sections and plan view exhibits from the GMU Geotechnical, Inc., report dated 5/27/21 and the AGI, Inc., Design Submittal Package (or provide new exhibits if preferred) to indicate the location/limit of the recommended Load Transfer Platform (LTP) beneath Buildings 1 and 6-12 at the subject project. Provide additional recommendations as necessary.

See Plates 2 and 3 for revised plan view and cross sections, attached as Appendix F.

RESPONSE TO COMMENT 1.019

Provide updated/additional geotechnical cross-section(s) as necessary based on your review of the currently submitted project plans and your responses the review comments contained herein. At a minimum, cross-section(s) should extend beyond property lines/limits of permit as necessary to accurately depict site conditions that may impact the proposed grading and construction. Cross-section/exhibit/detail should indicate the proposed site grading/improvements, as-graded site conditions/existing improvements, anticipated subsurface conditions (e.g., geologic contacts/structure, existing improvement foundations, etc.), and the geotechnical remedial grading/ground improvement, temporary excavation and foundation recommendations from your submitted report(s).

Cross section A-A' extends beyond property lines, and collectively the cross sections provided accurately depict site conditions that may impact the proposed grading and construction. The cross sections provided indicate the proposed site grading/improvements, existing grades, and anticipated subsurface geologic conditions.

The cross sections were revised (included in attached Appendix F) to show the limits of the proposed LTP within Buildings 1 and 6-12. Plate 7 – DSM & LTP Installation Detail illustrates the remedial grading recommended at the building locations.

Given the scale of the cross sections, existing improvement foundations and other features not addressed above were excluded to avoid confusion and overcrowding.

RESPONSE TO COMMENT 1.02

Provide updated plot plan/map to indicate the location of any new cross-sections/exhibits/details prepared in response to the review comments contained herein.

Updated plan and cross-sections have been included in attached Appendix F.

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Hadi Tabatabaee
BUILDING OFFICIAL

Please do not hesitate to contact us if you have any questions regarding this response.

Respectfully submitted,

David R. Atkinson
Project Manager / Senior Engineer

Scott Ward, EIT
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
GREGORY P. SILVER
GE 2336
GEOTECHNICAL
STATE OF CALIFORNIA

Gregory P. Silver, M.Sc., PE, GE 2336
President / CEO
Principal Geotechnical Engineer

Attachments
- Appendix A – County of Orange Geotechnical Report Review Comments
- Appendix B – GMU SPT-Based Liquefaction Analyses
- Appendix C – Quay Wall As-built Drawings
- Appendix D – Riprap Obstruction Mitigation Exhibit
- Appendix E – Revised AGI Design Package
- Appendix F – Revised GMU Plates 2 and 3
- Appendix G – Additional AGI Stability/Lateral Spread Analyses

(Electronic copy submitted)

cc: SMS Architects
Attn: Mr. Brandon Dedmon (electronic copy)

Tindall Consulting
Attn: Mr. John Tindall (electronic copy)

Tait Engineering
Attn: Mr. Jake Vandervis (electronic copy)

sw/17-206-02 PKG21-0490 DPH Commercial Component Response Letter (9-22-21)

REFERENCES

(1) County of Orange Geotechnical Comments, PKG21-0490– Dana Point Harbor Revitalization: Buildings 1 through 12 – Commercial Component, City of Dana Point, California, First Submittal, submittal date June 18, 2021, plan check date July 26, 2021, prepared by Ryan Rose of OC Public Works.

(2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Commercial Component, City of Dana Point, California," dated May 27, 2021 (GMU Project 17-206-02).

(3) "Dana Point Harbor Revitalization – Buildings 6-12 and Surface Parking Lot Precise Grading Plans, Dana Point, California 92629," prepared by Tait Engineering, dated May 28, 2021.

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APPENDIX A

County of Orange Geotechnical Report Review Comments

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OC DEVELOPMENT SERVICES

PLAN CHECK COMMENTS	
Permit Application No.	**PKG21-0490**
Plan Check No.	**First Submittal-PKG21-0490**
Plan Check Date	**07-26-2021**
Applicant	**Junior Mazariegos**
Submittal Date	**06-18-2021**

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
1.001	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Geotechnical consultant must review the Precise Grading Plans and applicable details submitted to the County that will be utilized during construction of the project. Provide additional geotechnical recommendations as necessary. The approved precise grading plans and applicable details must be reviewed and signed/stamped by the geotechnical engineer and engineering geologist prior to permit issuance. Note – The currently submitted precise grading plans are incomplete and do not include the recommended Deep Soil Mixing (DSM) and Load Transfer Platform (LTP) ground improvement plans/details. Please coordinate w/project team to ensure the geotechnical ground improvement recommendations/details are included as part of the project precise grading plans.		Required	

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1.003	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	The approved Ground Improvement Plans (Deep Soil Mixing (DSM) and Load Transfer Platform (LTP) and details (from GRD21-0090) must be included as a reference in the approved project building and structural plan sets.		Required	
1.004	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	The submitted geotechnical report (GMU Geotechnical, Inc., dated 5/27/21) indicates that liquefaction analysis was performed on the SPT exploratory data as a cross-check to the CPT liquefaction analysis and yielded similar results. Please provide a copy of the completed SPT liquefaction analysis as discussed in the submitted report. Provide additional recommendations as necessary.		Required	
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			submitted project documents (GMU and AGI). Provide additional data and/or updated analysis as necessary. Provide additional recommendations as necessary.			
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1.011	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide additional comment/discussion to confirm the basis of the geotechnical recommendations for allowable bearing value for the proposed project (i.e. 5,000 psf for Buildings 1 and 6-12 and 2,500 psf		Required	

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
			for Buildings 2-5). Specifically, address subsurface conditions, proposed mitigation, existing improvements and proposed improvements at the different locations/different allowable bearing recommendations. Include additional data (e.g. plot plan/map, subsurface data, analysis/evaluation, etc.) as necessary to support your comment/discussion. Provide additional recommendations as necessary.			
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#	Review	Category	Comment	Applicant Response	Status	File Name & Page
			transfer platform installation to confirm preliminary recommendation for proposed structure(s) allowable bearing value of 5,000 psf remains valid. Additional recommendations shall be provided as necessary.			
1.014	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide additional comment/discussion on the lateral spread analysis presented in the GMU Geotechnical, Inc., report dated 5/27/21 (Appendix E). Please include confirmation of location of cross-sections analyzed and additional discussion on data/input values utilized for analysis. Include additional data as necessary to support your comment/discussion. Provide additional recommendations as necessary.		Required	
1.015	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide additional comment/discussion to confirm the location of the pseudostatic slope stability analysis cross-sections presented in Appendix B1 of the AGI, Inc., report dated 5/27/21. Provided updated Plates/Details as necessary to indicate the confirmed cross-section locations. Provide additional recommendations as necessary.		Required	
1.016	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide additional comment/discussion on the pseudostatic slope stability analysis presented in Appendix B1 of the AGI, Inc., report dated 5/27/21. Please include additional discussion on data/input values utilized for analysis, including Kh values, etc. Include additional data as necessary to support your comment/discussion. Provide additional recommendations as necessary.		Required	

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1.017	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide additional comment/discussion to confirm the geotechnical recommendation for the anticipated magnitude of vertical settlement (total and differential) that should be taken into account during design and construction of the proposed improvements at the completion of the proposed remedial grading/ground improvement operations. Include the geotechnical recommendation for the horizontal distance over which the anticipated magnitude of remaining vertical differential settlement will occur. Provide additional recommendations as necessary.		Required	
1.018	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Update/revise the geotechnical cross-sections and plan view exhibits from the GMU Geotechnical, Inc., report dated 5/27/21 and the AGI, Inc., Design Submittal Package (or provide new exhibits if preferred) to indicate the location/limit of the recommended Load Transfer Platform (LTP) beneath Buildings 1 and 6/12 at the subject project. Provide additional recommendations as necessary.		Required	
1.019	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide updated/additional geotechnical cross-section(s) as necessary based on your review of the currently submitted project plans and your responses the review comments contained herein. At a minimum, cross-section(s) should extend beyond property lines/limits of permit as necessary to accurately depict site conditions that may impact the proposed grading and construction. Cross-section/exhibit/detail should indicate the proposed site grading/improvements, as-		Required	

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			graded site conditions/existing improvements, anticipated subsurface conditions (e.g. geologic contacts/structure, existing improvement foundations, etc.), and the geotechnical remedial grading/ground improvement, temporary excavation and foundation recommendations from your submitted report(s).			
1.02	Geotechnical Review-PKG21-0490 Ryan Rose	Geotechnical/Geology Check List	Provide updated plot plan/map to indicate the location of any new cross-sections/exhibits/details prepared in response to the review comments contained herein.		Required	
2.001	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	Amphitheater as shown on Sheet 12 must be accessible. Please provide wheelchair spaces with dispersion per Section 11B221 of 2019 CBC.		Required	
2.002	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	Curved walkways shown on Sheet 12 must comply with ramp requirements with handrails if slope exceeds 5%.		Required	
2.003	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	It appears that ramp is required at right side of Sheet 14.		Required	
2.004	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	Sloped walkway shown on right side of Sheet 15 needs to comply with ramp requirements with handrails if slope exceeds 5%.		Required	
2.005	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	It appears that directional accessible signage are required at many locations. Please add these on Architectural site		Required	

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
			plans			
2.006	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	As EV spaces are shown, some of these must be accessible and comply with Sections 11B228.3 and 11B-812. Please identify.		Required	
2.007	ADA Review-PKG21-0490 Chi Yang	Miscellaneous Plan Check List	Detectable warning dimensions shown on Sheet 32 must comply with 2010 ADA Standards and 2019 CBC. As these two requirements are not exactly the same, please revise detail to comply with the most restrictive dimensions.		Required	
3.001	Grading Review-PKG21-0490 Jung-Tsun Yean		All Sheets: Show Permit No. GRD21-0090.		Required	/First Submittal/PKG21-0490.grading plan.pdf 1.0
3.002	Grading Review-PKG21-0490 Jung-Tsun Yean		Details Sheets: Add Construction Note Numbers to the detail views.		Required	/First Submittal/PKG21-0490.grading plan.pdf 34.0
3.003	Grading Review-PKG21-0490 Jung-Tsun Yean		Provide site data: project area, disturbed area, square footage of the total impervious and the pervious areas.		Required	/First Submittal/PKG21-0490.grading plan.pdf 1.0

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
3.004	Grading Review-PKG21-0490 Jung-Tsun Yean		Indicate Property Lines, Limits of grading/permit, and Limits of off-site grading.		Required	/First Submittal/PKG21-0490.grading plan.pdf 3.0
3.005	Grading Review-PKG21-0490 Jung-Tsun Yean		Indicate Property Lines, Limits of grading/permit, and Limits of off-site grading.		Required	/First Submittal/PKG21-0490.grading plan.pdf 8.0
3.006	Grading Review-PKG21-0490 Jung-Tsun Yean		Check the Grade %		Required	/First Submittal/PKG21-0490.grading plan.pdf 10.0
3.007	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevatioin		Required	/First Submittal/PKG21-0490.grading plan.pdf 12.0
3.008	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevatioin		Required	/First Submittal/PKG21-0490.grading plan.pdf 12.0
3.009	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevatioin		Required	/First Submittal/PKG21-0490.grading plan.pdf 13.0

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3.01	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevatioin		Required	/First Submittal/PKG21-0490.grading plan.pdf 14.0
3.011	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevatioin		Required	/First Submittal/PKG21-0490.grading plan.pdf 15.0
3.012	Grading Review-PKG21-0490 Jung-Tsun Yean		Typical lot drainage: Minimum 2% for impervious area, 5% for pervious area, and 2% for swale draining away from a building pad (per 2016CBC Sec.1804.4).		Required	/First Submittal/PKG21-0490.grading plan.pdf 16.0
3.013	Grading Review-PKG21-0490 Jung-Tsun Yean		%grade may be reduced if supported by a geotechnical evaluation and approved by Building Official. Geotechnical consultant shall file a Request of Variance.		Required	/First Submittal/PKG21-0490.grading plan.pdf 16.0
3.014	Grading Review-PKG21-0490 Jung-Tsun Yean		Show Pad elevation		Required	/First Submittal/PKG21-0490.grading plan.pdf 16.0
3.015	Grading Review-PKG21-0490 Jung-Tsun Yean		Show Pad elevation		Required	/First Submittal/PKG21-0490.grading plan.pdf 17.0

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3.016	Grading Review-PKG21-0490 Jung-Tsun Yean		Obtain Encroachment Permits for all off-site improvements.		Required	/First Submittal/PKG21-0490.grading plan.pdf 21.0
3.017	Grading Review-PKG21-0490 Jung-Tsun Yean		Show street center line, R/W and width.		Required	/First Submittal/PKG21-0490.grading plan.pdf 21.0
3.018	Grading Review-PKG21-0490 Jung-Tsun Yean		Obtain Encroachment Permits for all off-site improvements.		Required	/First Submittal/PKG21-0490.grading plan.pdf 22.0
3.019	Grading Review-PKG21-0490 Jung-Tsun Yean		Provide Section Views: 1. Show property lines or grading limits. 2. Show horizontal distances / setbacks / slopes / % grade. 3. Show vertical dimensions including the structural heights. 4. Show existing / proposed grade lines and earthwork (cut/fill/over-excavation per soil report).		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.02	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevations of all Building Pad.		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0

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3.021	Grading Review-PKG21-0490 Jung-Tsun Yean		Show actual grade % per plan.		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.022	Grading Review-PKG21-0490 Jung-Tsun Yean		Typical lot drainage: Minimum 2% for impervious area, 5% for pervious area, and 2% for swale draining away from a building pad (per 2016CBC Sec.1804.4).		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.023	Grading Review-PKG21-0490 Jung-Tsun Yean		%grade may be reduced if supported by a geotechnical evaluation and approved by Building Official. Geotechnical consultant shall file a Request of Variance.		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.024	Grading Review-PKG21-0490 Jung-Tsun Yean		Show the proposed earthwork as indicated in the soil report.		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.025	Grading Review-PKG21-0490 Jung-Tsun Yean		Show actual grade % per plan.		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.026	Grading Review-PKG21-0490 Jung-Tsun Yean		?%		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
3.027	Grading Review-PKG21-0490 Jung-Tsun Yean		Show PAD Elevation		Required	/First Submittal/PKG21-0490.grading plan.pdf 24.0
3.028	Grading Review-PKG21-0490 Jung-Tsun Yean		Provide a Hydraulic Table listing Pipe size, S, Q, V, Dn, Dc, etc.		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0
3.029	Grading Review-PKG21-0490 Jung-Tsun Yean		Show HGL on Profile		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0
3.03	Grading Review-PKG21-0490 Jung-Tsun Yean		Show Q and V on Profile		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0
3.031	Grading Review-PKG21-0490 Jung-Tsun Yean		The comments on this sheet shall apply to all storm drain plans.		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0
3.032	Grading Review-PKG21-0490 Jung-Tsun Yean		Provide detail views of all Construction Notes except pipe lines and OC STD plans.		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0

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3.033	Grading Review-PKG21-0490 Jung-Tsun Yean		Show trench and backfill details of HDPE pipes.		Required	/First Submittal/PKG21-0490.grading plan.pdf 26.0
3.034	Grading Review-PKG21-0490 Jung-Tsun Yean		Show HGL on Profile		Required	/First Submittal/PKG21-0490.grading plan.pdf 27.0
3.035	Grading Review-PKG21-0490 Jung-Tsun Yean		Show Q and V on Profile		Required	/First Submittal/PKG21-0490.grading plan.pdf 27.0
3.036	Grading Review-PKG21-0490 Jung-Tsun Yean		The comments on this sheet shall apply to all storm drain plans.		Required	/First Submittal/PKG21-0490.grading plan.pdf 27.0
3.037	Grading Review-PKG21-0490 Jung-Tsun Yean		Typical: Show max. velocity in each reach on Storm Drain Profile per WSPG.		Required	/First Submittal/PKG21-0490.grading plan.pdf 27.0
3.038	Grading Review-PKG21-0490 Jung-Tsun Yean		Provide a normal flow hydraulic data table listing Line ID, Size, Sta., Q, V, S%,Dn and Dc.		Required	/First Submittal/PKG21-0490.grading plan.pdf 27.0

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3.039	Grading Review-PKG21-0490 Jung-Tsun Yean		All sheets: Stamped and singed by both CE and GE.		Required	/First Submittal/PKG21-0490.grading plan.pdf 1.0
3.04	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Provide Hydraulics Table on Storm Drain Design Sheets		Required	/First Submittal/PKG21-0490.H&H Report.pdf 143.0
3.041	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Provide Complete Information of Appendix E.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 149.0
3.042	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Show HGL on the Storm Drain Profiles		Required	/First Submittal/PKG21-0490.H&H Report.pdf 143.0
3.043	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		The Stationing of WSPG shall be consistent with the stationing of Storm Drain Plan in Grading Plan Set.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 133.0
3.044	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Show HGL on Storm Drain Profiles.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 133.0

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3.045	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Provide Complete Input and Output Data of WSPG.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 133.0
3.046	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Provide Complete Information of Appendix C		Required	/First Submittal/PKG21-0490.H&H Report.pdf 133.0
3.047	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Indicate the drainage facilities to be built under different permits or were built by others.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 14.0
3.048	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Distinguish the drainage facilities to be constructed under GRD21-0090.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 14.0
3.049	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Hydrology Maps: Provide Existing and proposed Hydrology Maps for Permit GRD21-0090 Condition with the following format: a.Show project boundaries, drainage boundaries, grading limits and permit limits. b.Delineate the major drainage boundary for each outlet point, and sub-drainage boundaries for concentration points. c.Show off-site runoff patterns (with arrow heads). d.Show on-site runoff patterns (with arrow		Required	/First Submittal/PKG21-0490.H&H Report.pdf 14.0

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			heads). e. Show the existing site drainage and how it ties into drainage of surrounding or adjacent areas. f. Show the proposed site drainage and how it ties into drainage of surrounding or adjacent areas. g. Highlight the proposed drain lines, catch basins and outlets in the hydrology map. h. Indicate the pipe sizes and slopes. i. Show design discharge (Q) and drainage area (A) at each outlet point.			
3.05	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Distinguish the facilities to be constructed under this permit and the facilities to be built or were built by others.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 2.0
3.051	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Incomplete submittal. Appendices C, E, and F were missing.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 2.0
3.052	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Provide Complete Information of Appendix F.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 150.0
3.053	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		GRD21-0090		Required	/First Submittal/PKG21-0490.H&H Report.pdf 1.0

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3.054	Hydrology & Hydraulics Review-PKG21-0490 Jung-Tsun Yean		Show permit number on the cover page and the hydrology maps.		Required	/First Submittal/PKG21-0490.H&H Report.pdf 1.0
3.055	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Show Grading Permit No. GRD21-0090		Required	/First Submittal/PKG21-0490.wqmp.pdf 1.0
3.056	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Provide Complete Information		Required	/First Submittal/PKG21-0490.wqmp.pdf 2.0
3.057	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Owner's Certification: Signed and dated by the owner.		Required	/First Submittal/PKG21-0490.wqmp.pdf 2.0
3.058	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Show WQMP ID: WQ21-0033 on the O&M Plan		Required	/First Submittal/PKG21-0490.wqmp.pdf 198.0
3.059	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Provide PA application number and GRD permit number.		Required	/First Submittal/PKG21-0490.wqmp.pdf 5.0

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
3.06	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Copy [WQ01] attached to this section.		Required	/First Submittal/PKG21-0490.wqmp.pdf 5.0
3.061	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Pervious/Impervious areas shall be consistent with what shown in the grading plan.		Required	/First Submittal/PKG21-0490.wqmp.pdf 7.0
3.062	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Pervious/Impervious areas shall be consistent with what shown in the grading plan.		Required	/First Submittal/PKG21-0490.wqmp.pdf 11.0
3.063	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Pervious/Impervious areas shall be consistent with what shown in the grading plan.		Required	/First Submittal/PKG21-0490.wqmp.pdf 15.0
3.064	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Describe LID BMP design criteria and provide sizing details of LID BMPs including volumes and flow rates of DCV.		Required	/First Submittal/PKG21-0490.wqmp.pdf 31.0
3.065	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Provide a Summary Table of LID BMPs listing DMA, Area, C value, Q(required), Q(proposed), BMP model number, dimensions and footprints (a simplified table from Attachment E).		Required	/First Submittal/PKG21-0490.wqmp.pdf 31.0

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3.066	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Show WQMP ID: WQ21-0033		Required	/First Submittal/PKG21-0490.wqmp.pdf 1.0
3.067	Water Quality Review-PKG21-0490 Jung-Tsun Yean		WQ21-0033 GRD21-0090.		Required	/First Submittal/PKG21-0490.wqmp.pdf 1.0
3.068	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Those page numbers don't match.		Required	/First Submittal/PKG21-0490.wqmp.pdf 4.0
3.069	Traffic Engineering Review-PKG21-0490 Tony Small		Attach WQMP Site Plan and Maintenance Access Plan to Grading Plan Set.		Required	/First Submittal/PKG21-0490.grading plan.pdf 1.0
3.07	Traffic Engineering Review-PKG21-0490 Tony Small		Sht 6 Add construction note #11 (see plan)		Required	/First Submittal/PKG21-0490.grading plan.pdf 6.0
3.071	Traffic Engineering Review-PKG21-0490 Tony Small		Sht 6 striping not per Accessible stalls (see plan)		Required	/First Submittal/PKG21-0490.grading plan.pdf 6.0

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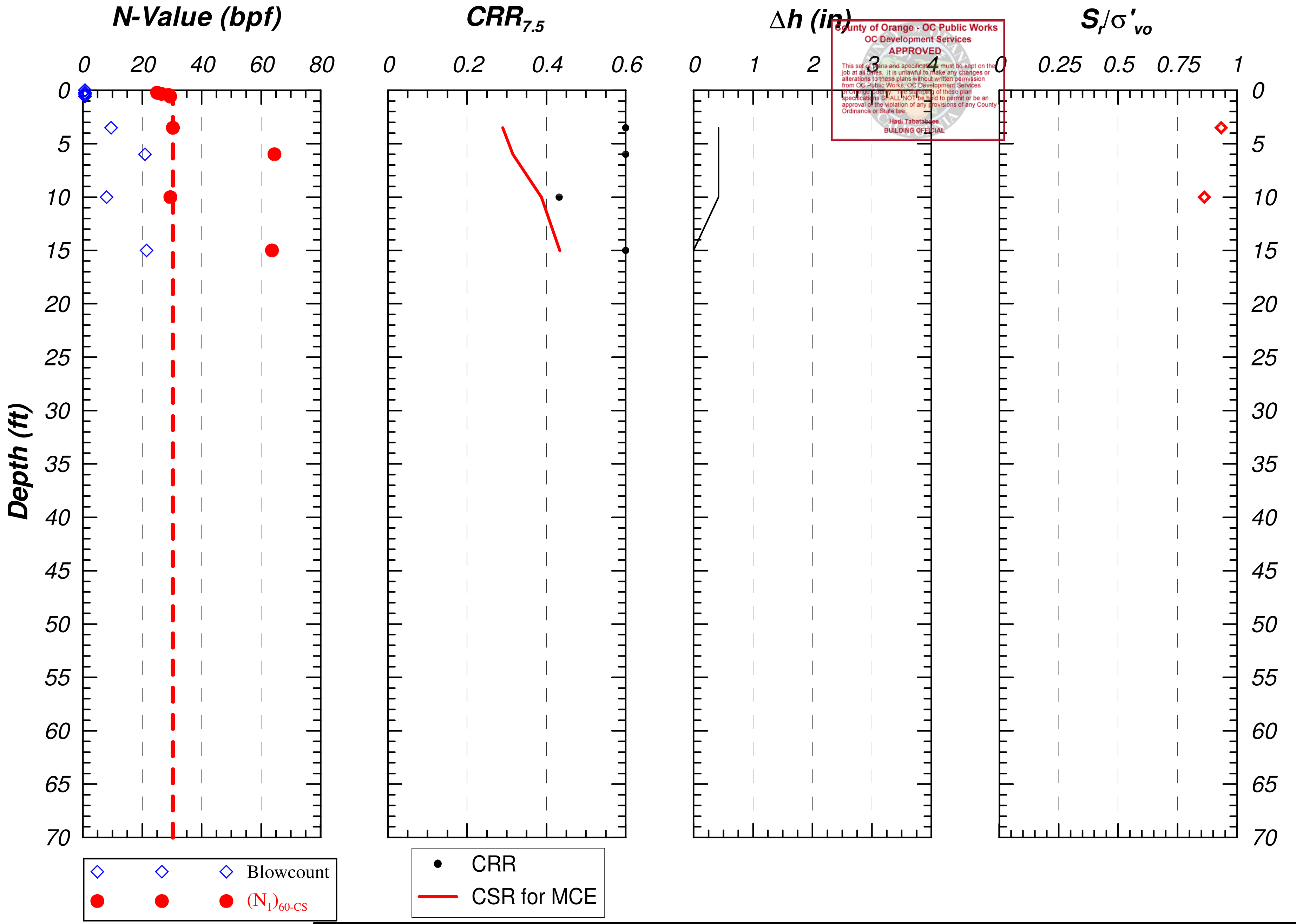
3.072	Traffic Engineering Review-PKG21-0490 Tony Small		Construction note #5 to read OCPW Std Plan 1201		Required	/First Submittal/PKG21-0490.grading plan.pdf 12.0
3.073	Water Quality Review-PKG21-0490 Jung-Tsun Yean		Attach WQMP Exhibit and Maintenance Access Plan to the Grading Plan Set.		Required	

APPENDIX B

GMU SPT-Based Liquefaction Analyses



Project Name Dana Point Harbor Commercial Component	Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction Drill Hole DH-12
Project No. 11-161-00	Figure D-2

DH-1.xls, DH-1.grf

Date: Oct. 2013

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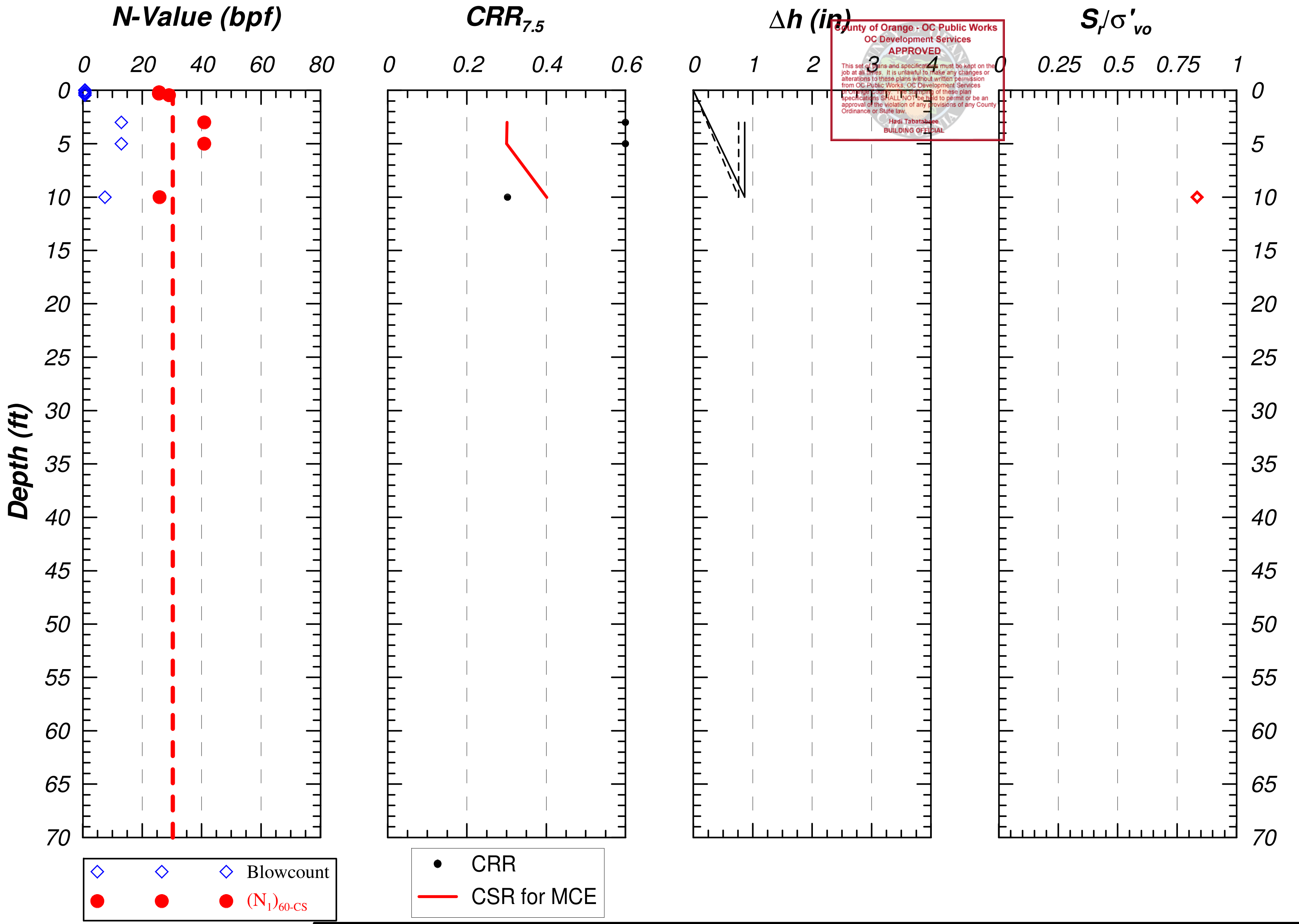
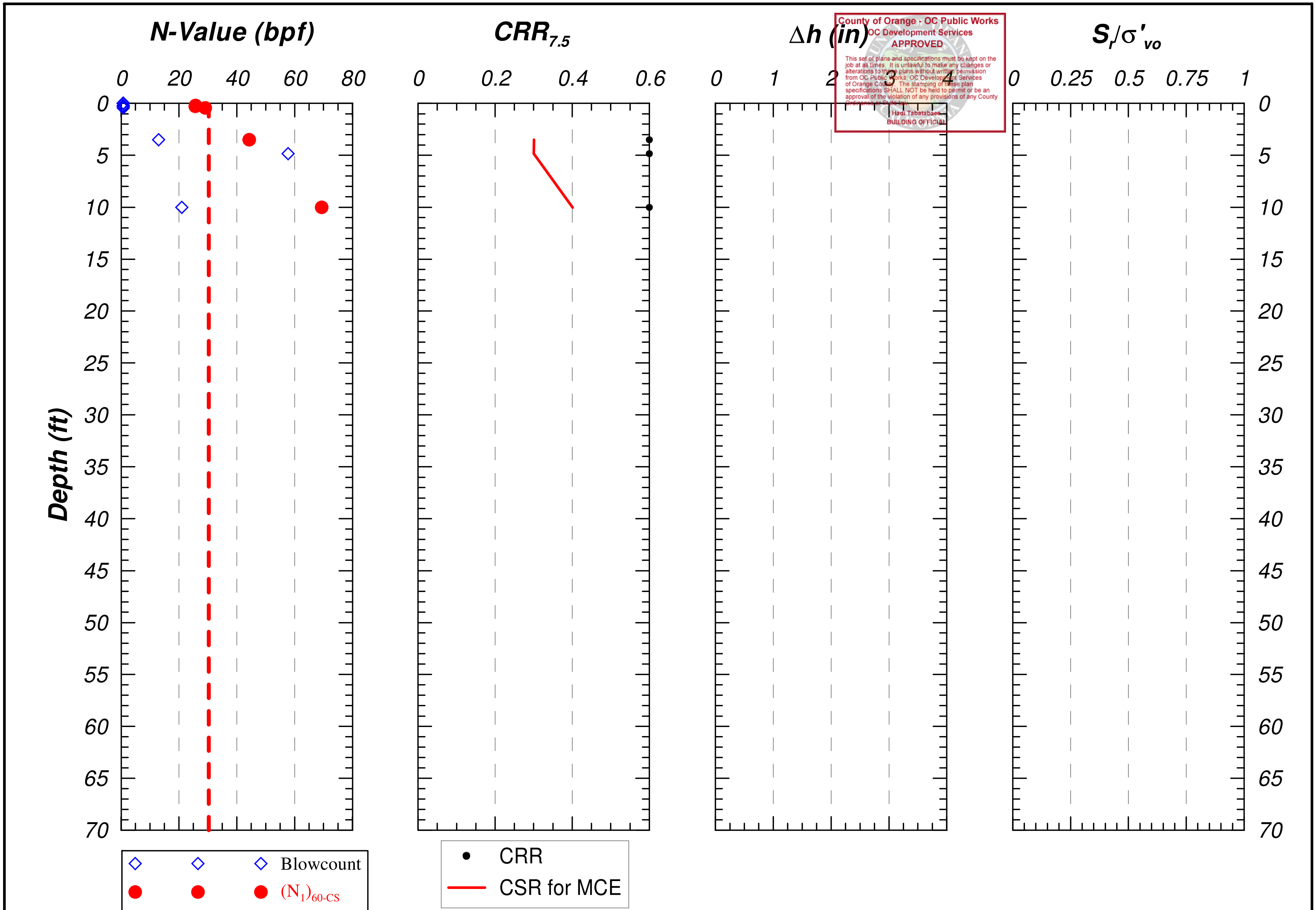
Approval: Geotechnical Reports
Permits: BNR21-0245



	Project Name Dana Point Harbor Commercial Component	Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction Drill Hole DH-17
GMU	Project No. 11-161-00	Figure D-3

DH-1.xls, DH-1.grf

Date: Oct. 2013

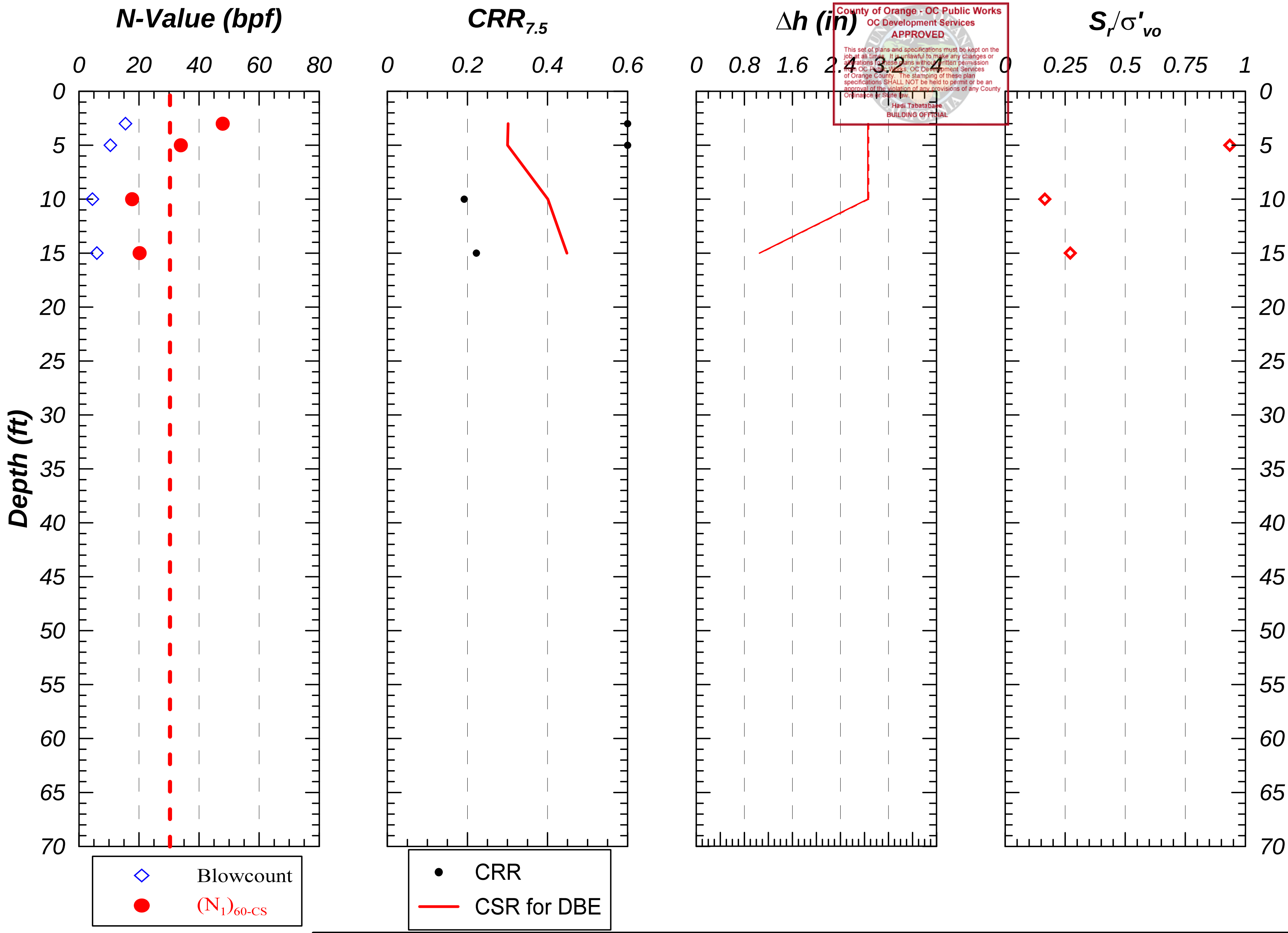


GMU	Project Name Dana Point Harbor Commercial Component Project No. 17-206-02	**Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction** **Drill Hole DH-18** **Figure D-4**

DH-1.xls, DH-1.grf

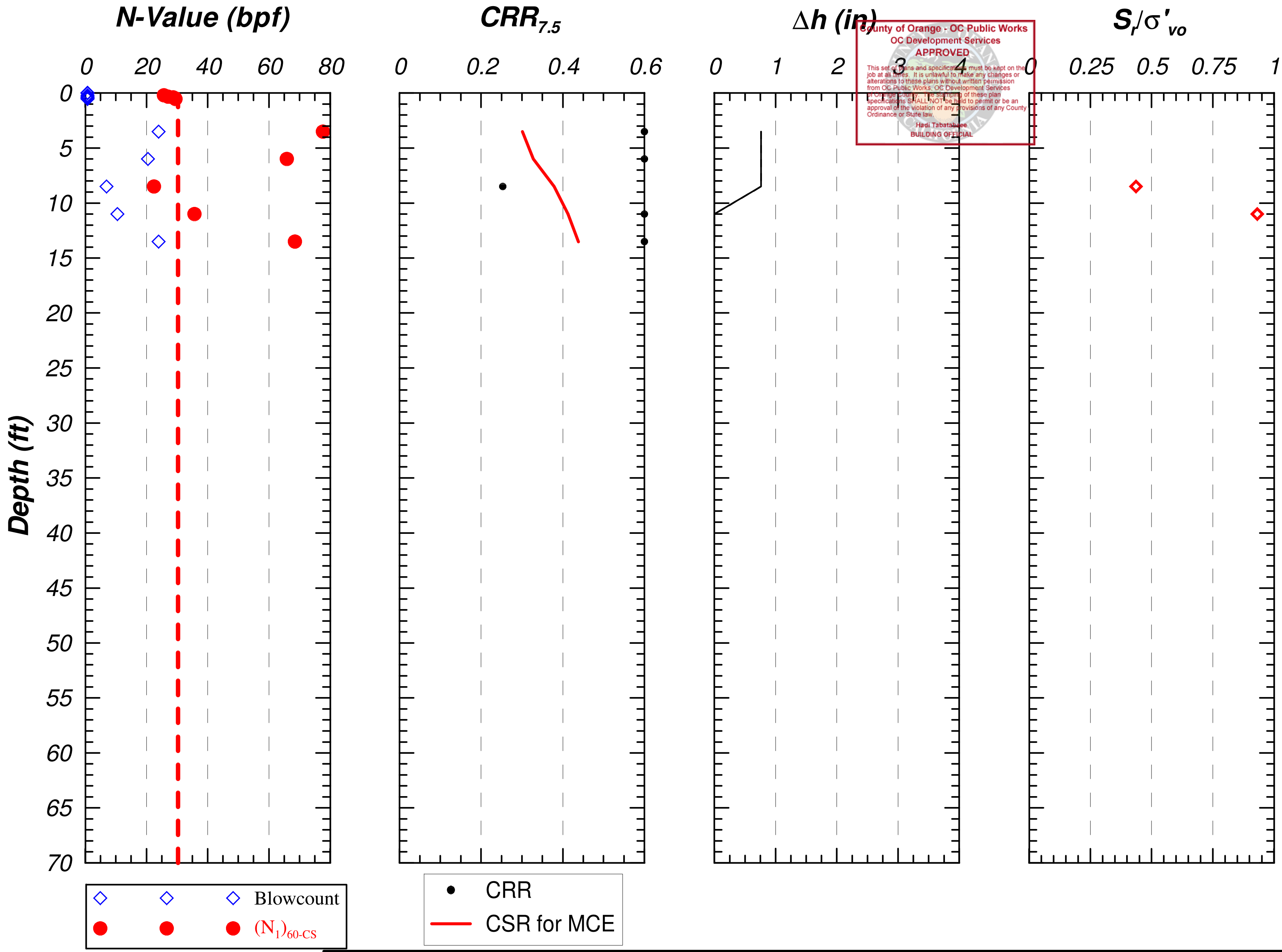
Date: Oct. 2013

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245



Project Name Dana Point Harbor Commercial Component	Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction
Project No. 11-161-00	Drill Hole DH-19

Figure D-16



GMU

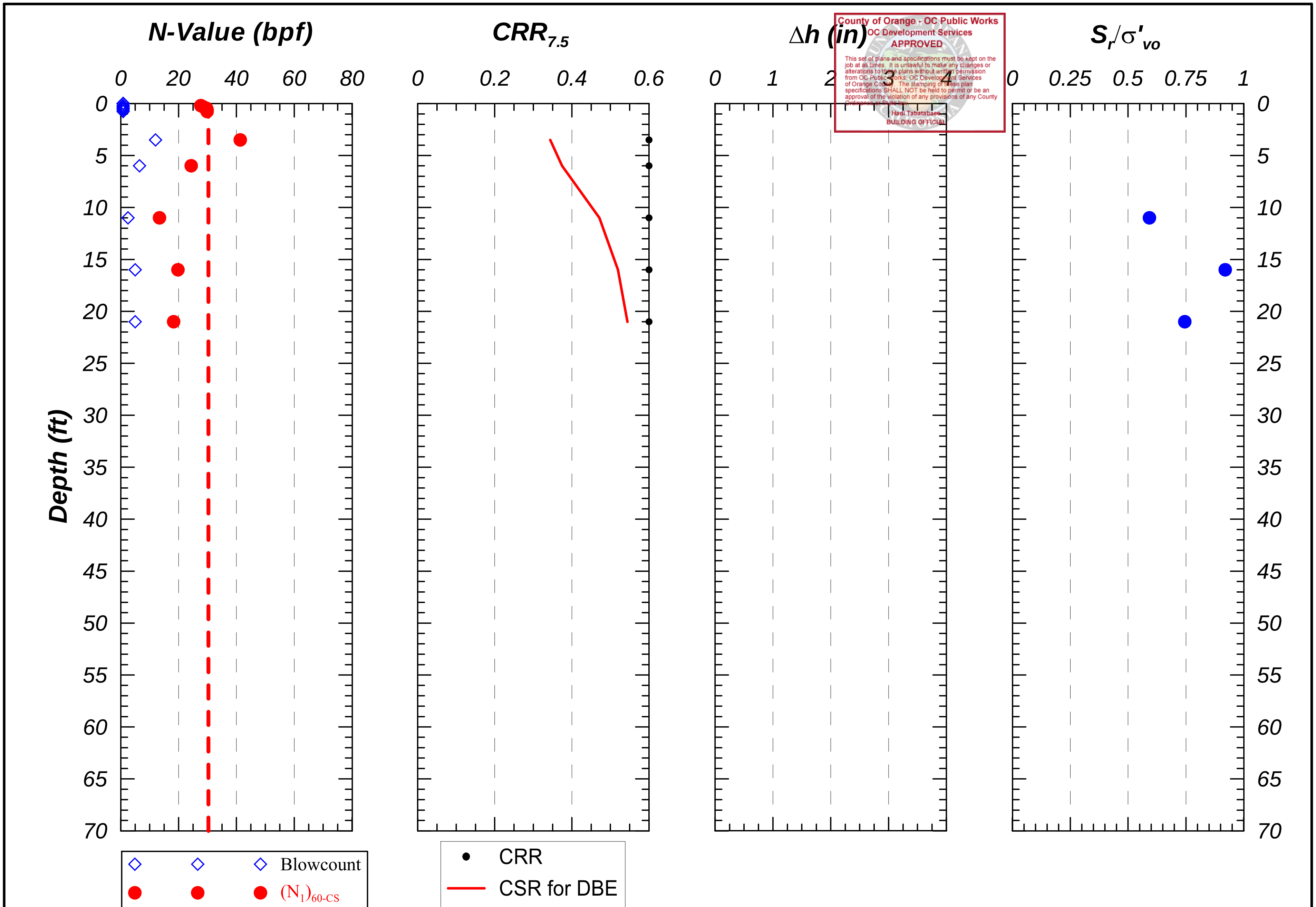
Project Name
Dana Point Harbor
Commercial Component
Project No.
17-206-02

Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction
Drill Hole DH-26

Figure D-7

DH-1.xls, DH-1.grf

Date: Oct. 2013



GMU GEOTECHNICAL, INC.

Project Name
Dana Point Harbor
Commercial Component

Project No.
17-206-02

Integrated SPT Method for Estimating Subsurface Stratification & Liquefaction
Drill Hole DH-51

Figure D-12

DH-1.xls, DH-1.grf

Date: Oct. 2013

APPENDIX C

Quay Wall As-Built Drawings

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

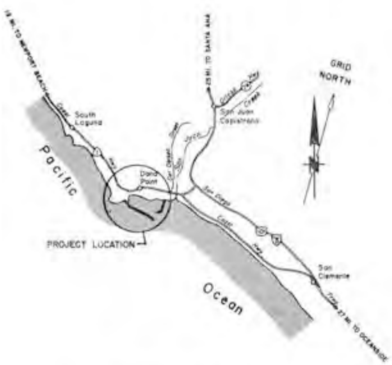
Hadi Tabatabaee
BUILDING OFFICIAL

ORANGE COUNTY HARBOR DISTRICT

DANA POINT HARBOR

DANA POINT, CALIFORNIA

HEAVY CONSTRUCTION



VICINITY MAP

Recommended for Approval by:
Director of Harbors and Beaches

ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800	
PLANS PREPARED BY KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA	DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION TITLE SHEET & VICINITY MAP
JOB NO. 1-417 DATE 9-24-68	APPROVED
DATE OCTOBER, 1968 SCALE AS SHOWN	SHEET 1 OF 30 — D10.5-1

INDEX TO DRAWINGS

SHEET NO.	TITLE
1	TITLE SHEET & VICINITY MAP
2	INDEX TO DRAWINGS, LEGEND & GENERAL NOTES
3	INDEX TO FINISHED GRADING PLANS
4	INDEX TO SECTIONS & TRANSITION DETAILS
5	SURVEY CONTROL I
6	SURVEY CONTROL II
7	SURVEY CONTROL III
8	DEWATERING REQUIREMENTS
9	FINISHED GRADING PLAN - AREA IA & AREA IB
10	FINISHED GRADING PLAN - AREA II
11	FINISHED GRADING PLAN - AREA III
12	FINISHED GRADING PLAN - AREA IV
13	FINISHED GRADING PLAN - AREA V
14	FINISHED GRADING PLAN - AREA VI
15	FINISHED GRADING PLAN - AREA VII
16	FINISHED GRADING PLAN - AREA VIII
17	DELETED
17A	FINISHED GRADING PLAN - AREA IX
18	TYPICAL GRADING SECTIONS I
19	TYPICAL GRADING SECTIONS II
20	TYPICAL GRADING SECTIONS III
21	TYPICAL GRADING SECTIONS IV
22	TYPICAL GRADING SECTIONS V
23	TYPICAL REVETMENT SECTIONS
24	REVETMENT TRANSITION DETAILS I
25	REVETMENT TRANSITION DETAILS II
26	REVETMENT TRANSITION DETAILS III

SHEET NO.	TITLE
27	BOAT RAMP - PLAN & SECTIONS
28	BOAT RAMP - DETAILS
29	DEL OBISPO STREET - PROFILES I
30	DEL OBISPO STREET - PROFILES II
31	DRAINAGE PLAN
32	DRAINAGE PROFILES I
33	DRAINAGE PROFILES II
34	DRAINAGE DETAILS I
35	DRAINAGE DETAILS II
36	BRIDGE ARCHITECTURAL PLAN, ELEVATION AND MISCELLANEOUS DETAILS
37	BRIDGE HAND RAIL AND MISCELLANEOUS DETAILS
38	CONCRETE REVETTED SLOPE TYPICAL PLAN ELEVATIONS & DETAILS
39	BRIDGE STRUCTURAL PLAN AND SECTION
40	BRIDGE TYPICAL SECTIONS AND BOX GIRDER DETAILS
41	BRIDGE TYPICAL BENT AND APPROACH STRUCTURE DETAILS
42	QUAY WALL DETAILS
43	RETAINING WALLS - PLANS & ELEVATIONS
44	RETAINING WALLS - DETAILS
45	BRIDGE ELECTRICAL PLAN AND ELEVATION
46	BRIDGE ELECTRICAL MISCELLANEOUS DETAILS
	CAPRON PROPERTY GRADING DRAWINGS
47	CAPRON PROPERTY ROUGH GRADING PLAN
48	CAPRON PROPERTY - PRIORITY OF GRADING
49	CAPRON PROPERTY - TYPICAL SECTIONS
50	CAPRON PROPERTY - DRAINAGE DETAILS
51	PIER MODIFICATION STRUCTURAL & MISCELLANEOUS DETAILS

LEGEND

BOUNDARY OF HARBOR DISTRICT PROPERTY

SURVEY CONTROL LINE

12 EXISTING GRADE CONTOUR

TOP OF SLOPE

APPROXIMATE NATURAL FORMATION SURFACE

FLOW LINE

-15 DREDGING DEPTH IN FEET (BY OTHERS)

WORKING POINT

-10 REQUIRED BASIN DEPTH IN FEET (MINIMUM) SEE NOTE 6 HEREON

A / 2

SECTION OR DETAIL IDENTIFICATION

4 SHEET ON WHICH SECTION OR DETAIL IS REFERENCED

DRAWING ON WHICH SECTION OR DETAIL APPEARS

GENERAL NOTES

1. STATIONS INDICATED ON ROAD PLAN AND PROFILE ARE MEASURED ALONG CENTERLINE.
2. THE CONTRACTOR SHALL DEWATER THE CONSTRUCTION AREA AS INDICATED AND SPECIFIED. IT IS IMPERATIVE THAT THE AREA SURROUNDING AND INCLUDING THE BOAT RAMP BE COMPLETED WITHIN 240 DAYS AFTER AWARD OF CONTRACT, AS INDICATED ON SHEET 8 OF THESE DRAWINGS. AT THIS TIME ALL CONSTRUCTION IN THE DESIGNATED AREA SHALL BE COMPLETE AND THE AREA SHALL BE TURNED OVER TO THE ORANGE COUNTY HARBOR DISTRICT, TOGETHER WITH THE SOUTHEASTERLY 50 FEET OF DEL OBISPO STREET FROM PACIFIC COAST HIGHWAY TO STATION 84 + 00
3. THE LOWER LIMITS OF BOTH CONCRETE AND STONE REVETTED SLOPES HAVE BEEN INDICATED HEREIN BASED ON THE INFORMATION AVAILABLE. HOWEVER, BECAUSE THE LIMITS ARE DEPENDENT ON THE DEPTH OF THE NATURAL FORMATION, THE ACTUAL LOCATION OF THE LOWER LIMITS WILL BE FIELD-DETERMINED DURING CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF SECTIONS A/23, B/23, C/23, D/23, E/23, C/26 & D/26
4. ALL COORDINATES, GRID LINES, AND BEARINGS SHOWN ON THESE DRAWINGS ARE BASED ON THE HARBOR GRID SYSTEM EXCEPT WHEN OTHERWISE NOTED. THE HARBOR GRID IS BASED UPON THE BEARING OF THE LONGEST SECTION OF THE WEST BREAKWATER, WHICH IS S. 73° 40' E. ON THE LAMBERT SYSTEM, BUT WHICH IS ARBITRARILY TAKEN AS DUE EAST ON THE HARBOR GRID. THE ORIGIN OF THE HARBOR GRID SYSTEM IS SUCH THAT THE NORTHERLY LIMIT OF THE BOAT BASINS IS EXACTLY N. 2000, WHILE THE CENTERLINE OF THE CAUSEWAY AND BRIDGE IS EXACTLY E. 8050. THE ORIGIN OF THE HARBOR GRID, IN TERMS OF LAMBERT COORDINATES, IS N. 474,520.932 AND E. 1,550,090.335.
5. ALL ELEVATIONS HEREIN ARE BASED ON MEAN LOWER LOW WATER (MLLW) DATUM. PROJECT BENCH MARK IS CALIFORNIA STATE LAND COMMISSION MONUMENT B-4061, ELEVATION 15.75, LOCATED ON THE SOUTHWESTERLY SIDE OF THE RAMP ONTO THE EXISTING DANA POINT PIER.
6. THE TERMS "REQUIRED BASIN DEPTH" AND "EXCAVATE TO - 8" (OR - 10 OR - 12), MEAN THAT THE MINIMUM ACCEPTABLE DEPTH IS THE ELEVATION SHOWN. DEEPER AREAS SHALL REMAIN AT NATURAL DEPTH. PINNACLES IN DEEPER AREAS, WHICH PROJECT ABOVE THE REQUIRED MINIMUM, SHALL BE REMOVED TO THE INDICATED DEPTH. OVER EXCAVATION OF NOT MORE THAN ONE FOOT IN WATER AREAS WILL BE PERMITTED.
7. IN AREAS WHERE CONCRETE OR OTHER CONSTRUCTION IS TO BE PLACED ON CUT SURFACES OF NATURAL FORMATION, OVER EXCAVATED AREAS SHALL BE FILLED WITH THE MATERIAL OF WHICH THE OVERLYING CONSTRUCTION IS COMPOSED.
8. UNLESS OTHERWISE INDICATED, THE NORTH ARROWS SHOWN HEREIN REFER TO HARBOR GRID NORTH

ASBUILT
SEP 2 1970

REV.	DESCRIPTION	DATE
A	ADDED 17-A & 51, DELETED 17	9-19-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3900

PLANS PREPARED BY
KK KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/628-3162

JOB NO. 1-417
DATE 9-24-68
APPROVED:

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
INDEX TO DRAWINGS
LEGEND & GENERAL NOTES

DATE OCTOBER, 1968
SCALE NONE
SHEET 2 OF 51
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL

REV.	DESCRIPTION	DATE
A	REVISED AREA IX	9-19-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KK KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
INDEX TO FINISHED GRADING PLANS

JOB NO. 1-417
DATE 9-24-68
APPROVED:
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 3 OF 51
D10.5-1

REV	DESCRIPTION	DATE
A	ADDED FILL, WEST END	9-19-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
INDEX TO SECTIONS & TRANSITION DETAILS

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 4 OF 51
D 10.5-1

CURVE DATA

	Δ	R	T	L	REMARKS
Δ_1	44°46'14"	1000'	411.87'	781.39'	℄ DEL OBISPO STREET
Δ_2	04°16'35"	1000'	37.34'	74.64'	"
Δ_3	22°14'09"	500'	98.26'	194.04'	"
Δ_4	51°13'42"	700'	335.60'	625.87'	℄ OUTBOUND RDWY.
Δ_5	06°27'28"	700'	39.49'	78.90'	"

SEE SHEET 6

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

SURVEY CONTROL I

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 5 OF 51
D 10.5-1

CURVE DATA

	Δ	R	T	L	REMARKS
Δ3	22°14'09"	500'	98.26'	194.04'	℄ DEL OBISPO ST.
Δ6	135°00'00"	125'	301.78'	~~147.26'~~ 294.52	CONTROL LINE
Δ7	45°00'00"	350'	144.97'	274.89'	" "

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
SURVEY CONTROL II

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 6 OF 51
D10.5-1

CURVE DATA					
	Δ	R	T	L	REMARKS
Δ_3	22°14'09"	500'	98.26'	194.04'	℄ DEL OBISPO ST.
Δ_8	120°00'00"	125'	216.51'	~~130.90'~~	CONTROL LINE
Δ_9	60°00'00"	350'	202.07'	~~366.52'~~ 261.80'	" "

While the information shown is believed to be accurate the Harbors, Beaches and Parks District will not be responsible for omissions, errors or inaccuracies.

PLAN A/7
1" = 100'

REV.	DESCRIPTION	DATE
A	ADDED FILL WEST END	9-19-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

JOB NO. I-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
1901 BAYSIDE DRIVE NEWPORT BEACH, CALIFORNIA 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
SURVEY CONTROL III

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 7 OF 51
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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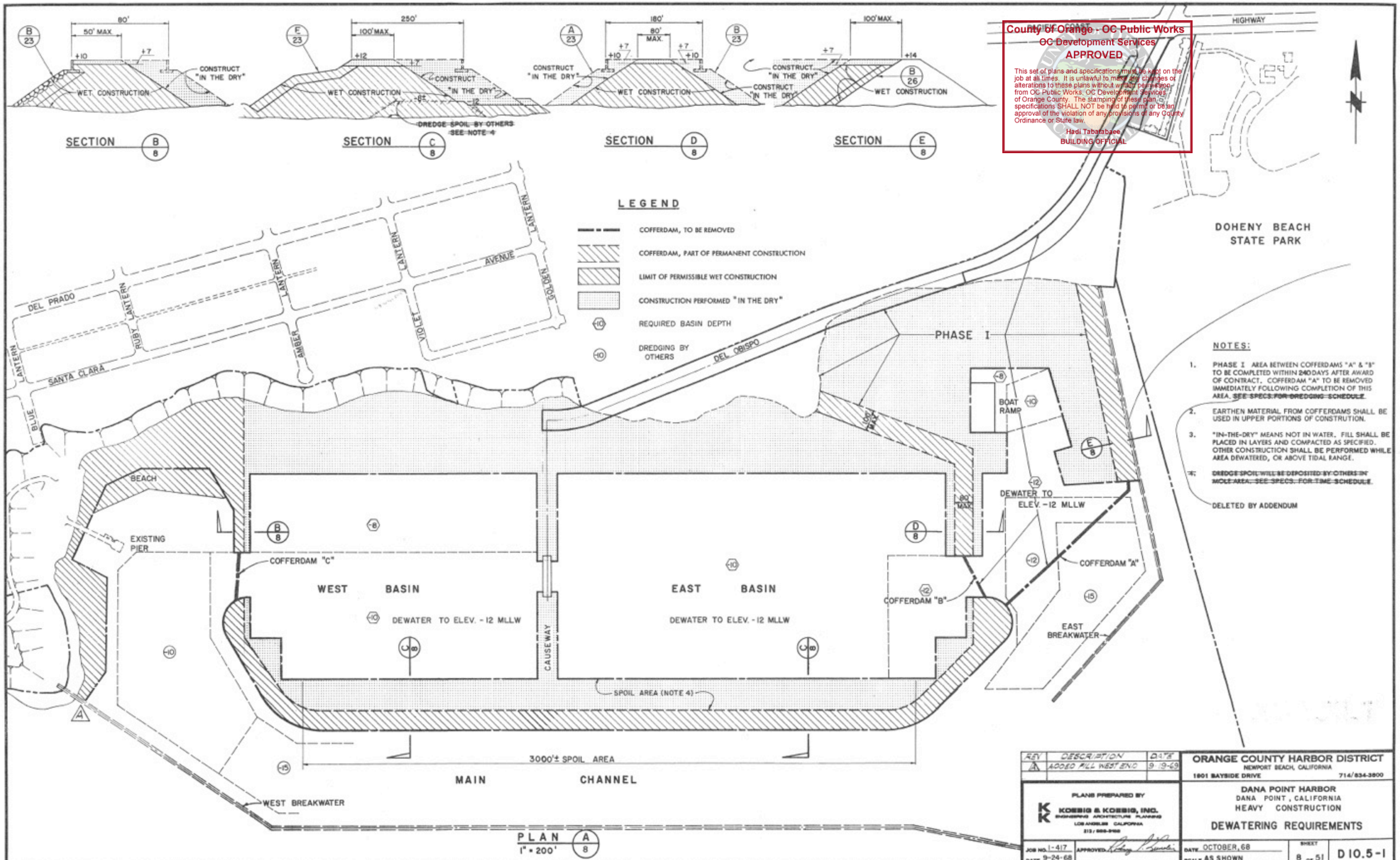
Hadi Tabatabaee
BUILDING OFFICIAL



LEGEND

- COFFERDAM, TO BE REMOVED
- COFFERDAM, PART OF PERMANENT CONSTRUCTION
- LIMIT OF PERMISSIBLE WET CONSTRUCTION
- CONSTRUCTION PERFORMED "IN THE DRY"
- (-10) REQUIRED BASIN DEPTH
- (-10) DREDGING BY OTHERS

NOTES:

1. PHASE I AREA BETWEEN COFFERDAMS "A" & "B" TO BE COMPLETED WITHIN 240 DAYS AFTER AWARD OF CONTRACT. COFFERDAM "A" TO BE REMOVED IMMEDIATELY FOLLOWING COMPLETION OF THIS AREA. ~~SEE SPECS. FOR DREDGING SCHEDULE.~~
2. EARTHEN MATERIAL FROM COFFERDAMS SHALL BE USED IN UPPER PORTIONS OF CONSTRUTION.
3. "IN-THE-DRY" MEANS NOT IN WATER. FILL SHALL BE PLACED IN LAYERS AND COMPACTED AS SPECIFIED. OTHER CONSTRUCTION SHALL BE PERFORMED WHILE AREA DEWATERED, OR ABOVE TIDAL RANGE.
4. ~~DREDGE SPOIL WILL BE DEPOSITED BY OTHERS IN MOLE AREA. SEE SPECS. FOR TIME SCHEDULE.~~

DELETED BY ADDENDUM

REV	DESCRIPTION	DATE
1	ADDED FILL WEST END	9-19-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
DEWATERING REQUIREMENTS

JOB NO. 1-417
DATE 9-24-68
APPROVED
DATE OCTOBER, 68
SCALE AS SHOWN
SHEET 8 OF 51
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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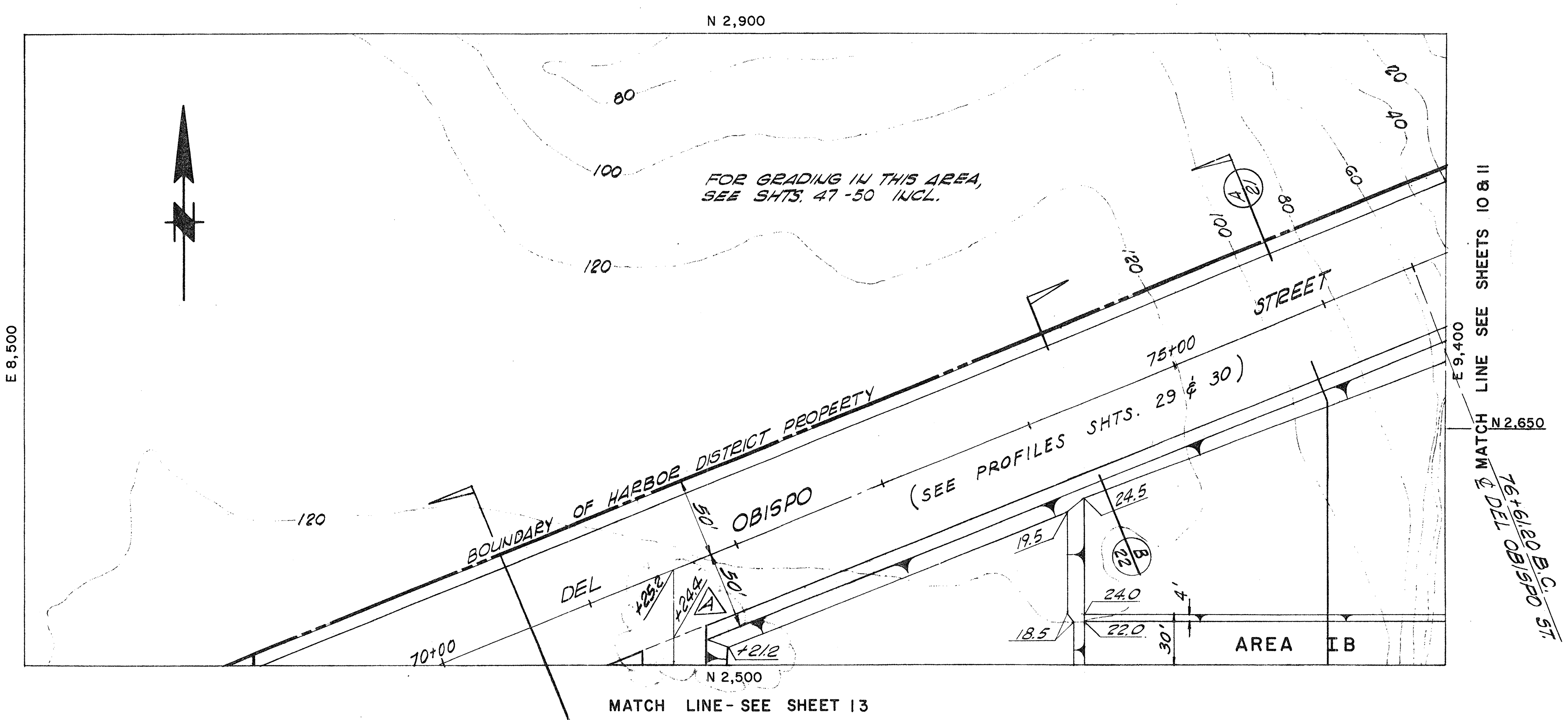
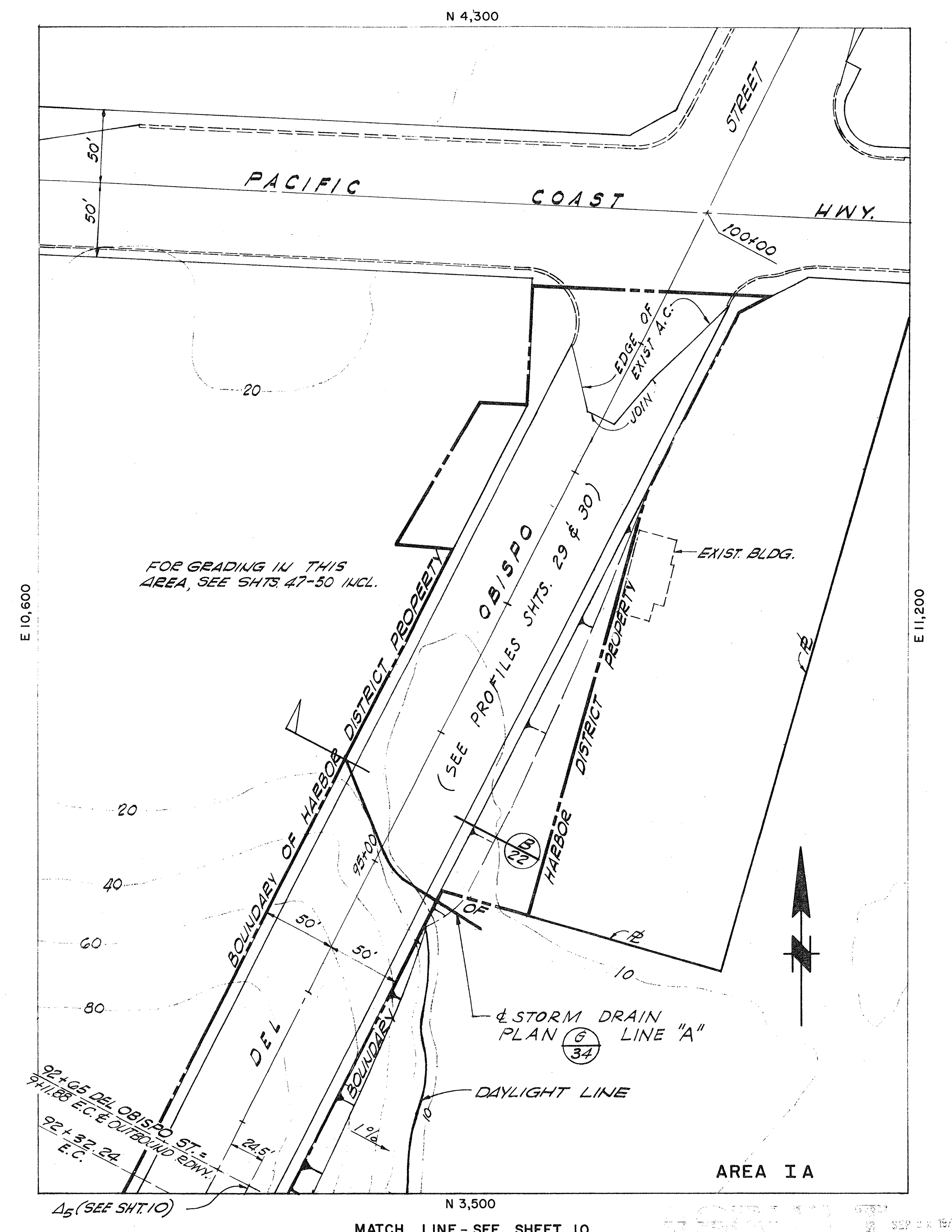
Hadi Tabatabaee
BUILDING OFFICIAL



PLAN A/9
1" = 50'



PLAN B/9
1" = 50'

REV.	DESCRIPTION	DATE
A	CHANGED GRADES	10-27-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney L. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

FINISHED GRADING PLAN-AREA IA & AREA IB

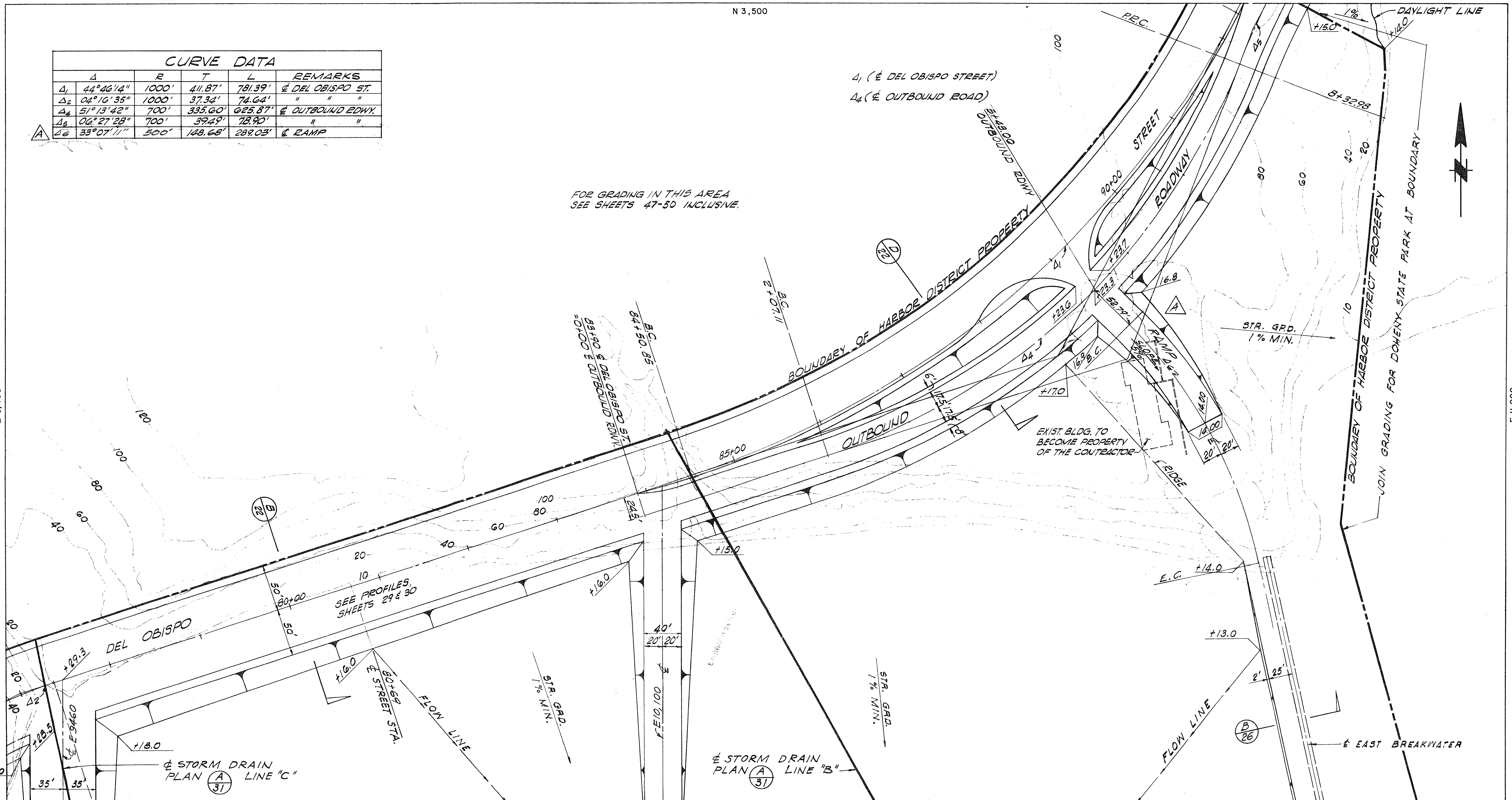
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 9 OF 50
D10.5-1

MATCH LINE - SEE SHEET 9

N 3,500

CURVE DATA

	Δ	R	T	L	REMARKS
Δ_1	44°46'14"	1000'	411.87'	781.39'	℄ DEL OBISPO ST.
Δ_2	04°16'35"	1000'	37.34'	74.64'	" " "
Δ_4	51°13'42"	700'	335.60'	625.87'	℄ OUTBOUND RDWY.
Δ_5	06°27'28"	700'	39.49'	78.90'	" "
A Δ_6	33°07'11"	500'	148.68'	289.03'	℄ RAMP



MATCH LINE - SEE SHEET 9

E 9,400

N 2,650

MATCH LINE - SEE SHEET 11

PLAN A/10
1" = 50'

ASBUILT

REV.	DESCRIPTION	DATE
A	CHANGED GRADES	10-27-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

FINISHED GRADING PLAN-AREA II

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 10 OF 50 (1)
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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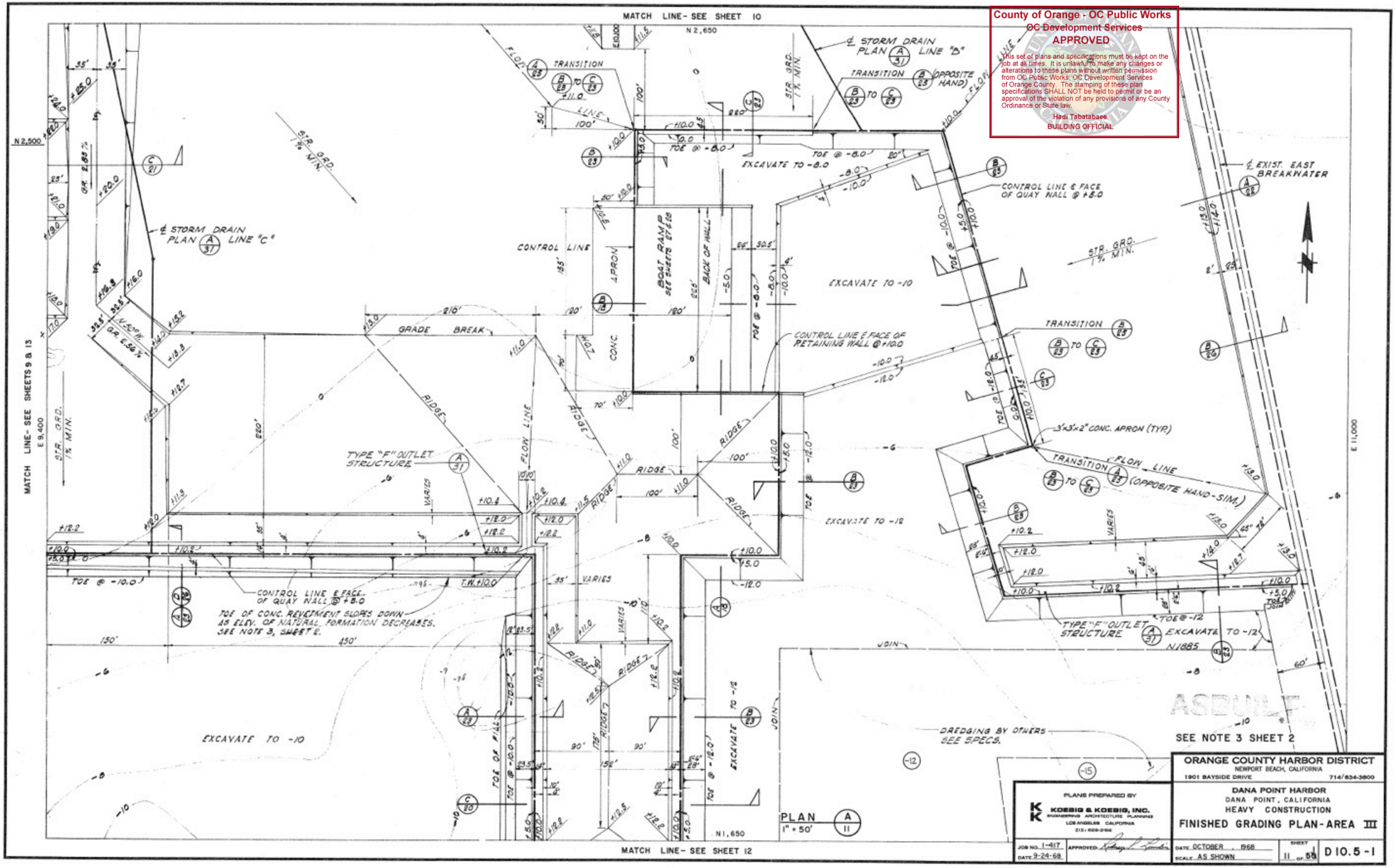
Hadi Tabatabaee
BUILDING OFFICIAL



ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-2166

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN-AREA III

JOB NO. 1-417
DATE 9-24-68
APPROVED: [signature]
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 11 OF 58
D 10.5 - I

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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Hadi Tabatabaee
BUILDING OFFICIAL

CURVE DATA

	Δ	R	T	L	REMARKS
Δ_6	135°00'00"	125'	301.78	~~147.26~~	CONTROL LINE
Δ_7	45°00'00"	350'	144.97'	274.89'	" "

294.52

REV.	DESCRIPTION	DATE
4	CHANGED GRADES	10-27-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN - AREA IV

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 12 OF 50 (51)
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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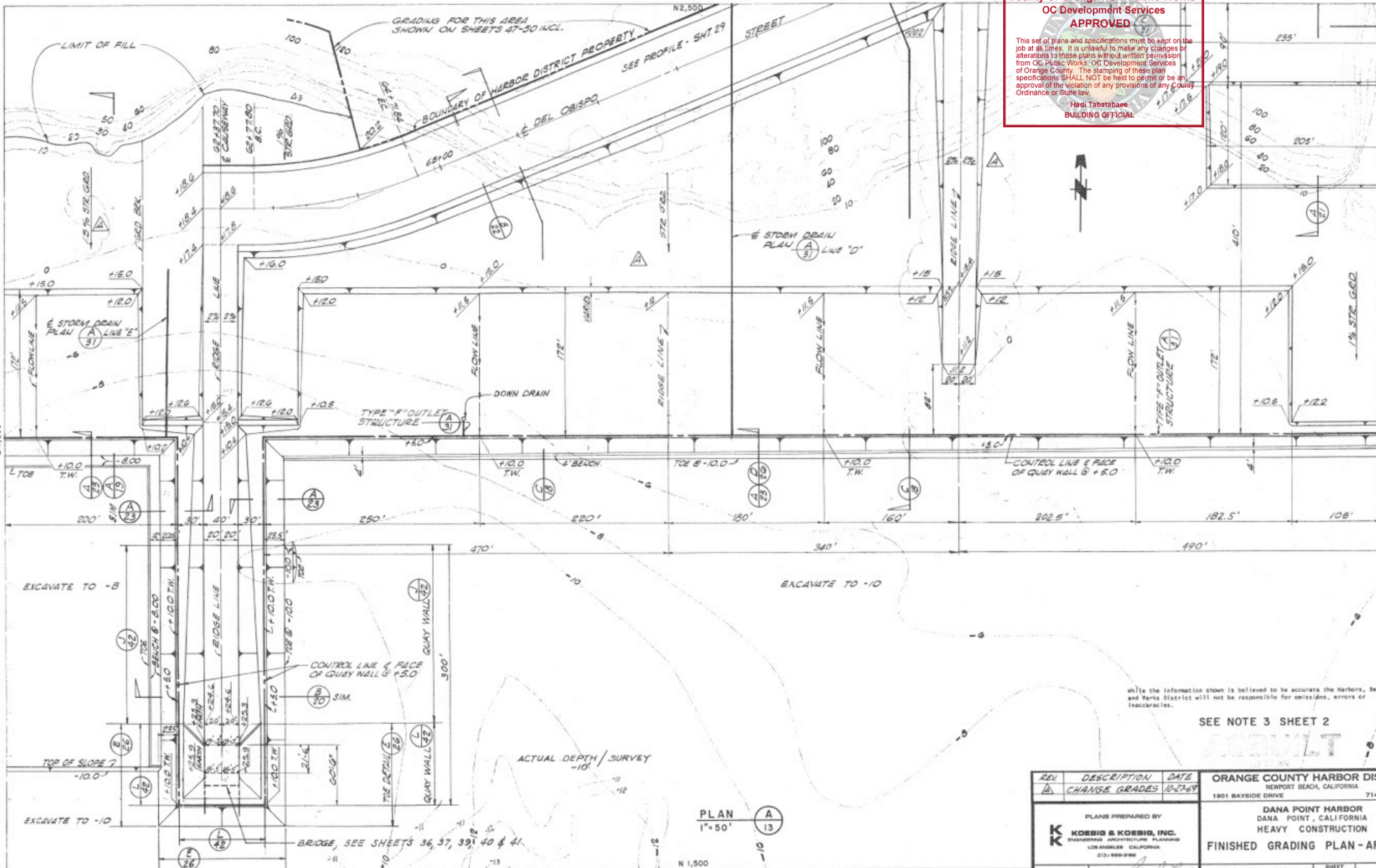
Hadi Tabatabaee
BUILDING OFFICIAL

MATCH LINE - SEE SHEET 9



MATCH LINE - SEE SHEET 15
MATCH LINE - SEE SHEETS 11 & 12

While the information shown is believed to be accurate the Harbors, Beaches and Parks District will not be responsible for omissions, errors or inaccuracies.

SEE NOTE 3 SHEET 2

REV.	DESCRIPTION	DATE
A	CHANGE GRADES	10-27-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

FINISHED GRADING PLAN - AREA V

JOB NO. 1-417
DATE 9-24-68
APPROVED:
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 13 OF 56
D 10.5 - 1

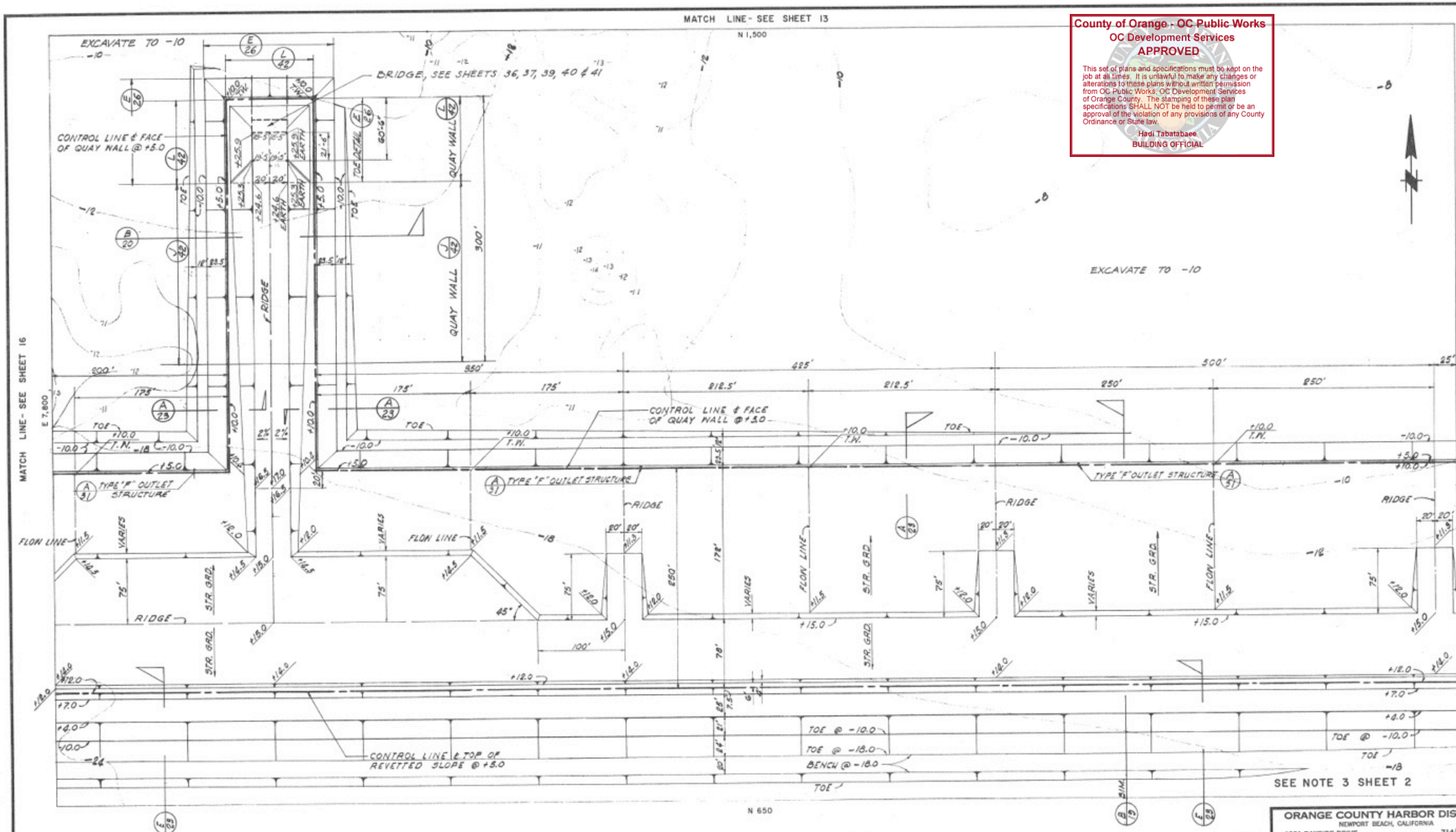
MATCH LINE - SEE SHEET 14

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Hadi Tabatabaee
BUILDING OFFICIAL



While the information shown is believed to be accurate the Harbors, Beaches and Parks District will not be responsible for omissions, errors or inaccuracies.

PLAN (A/14)
1" = 50'

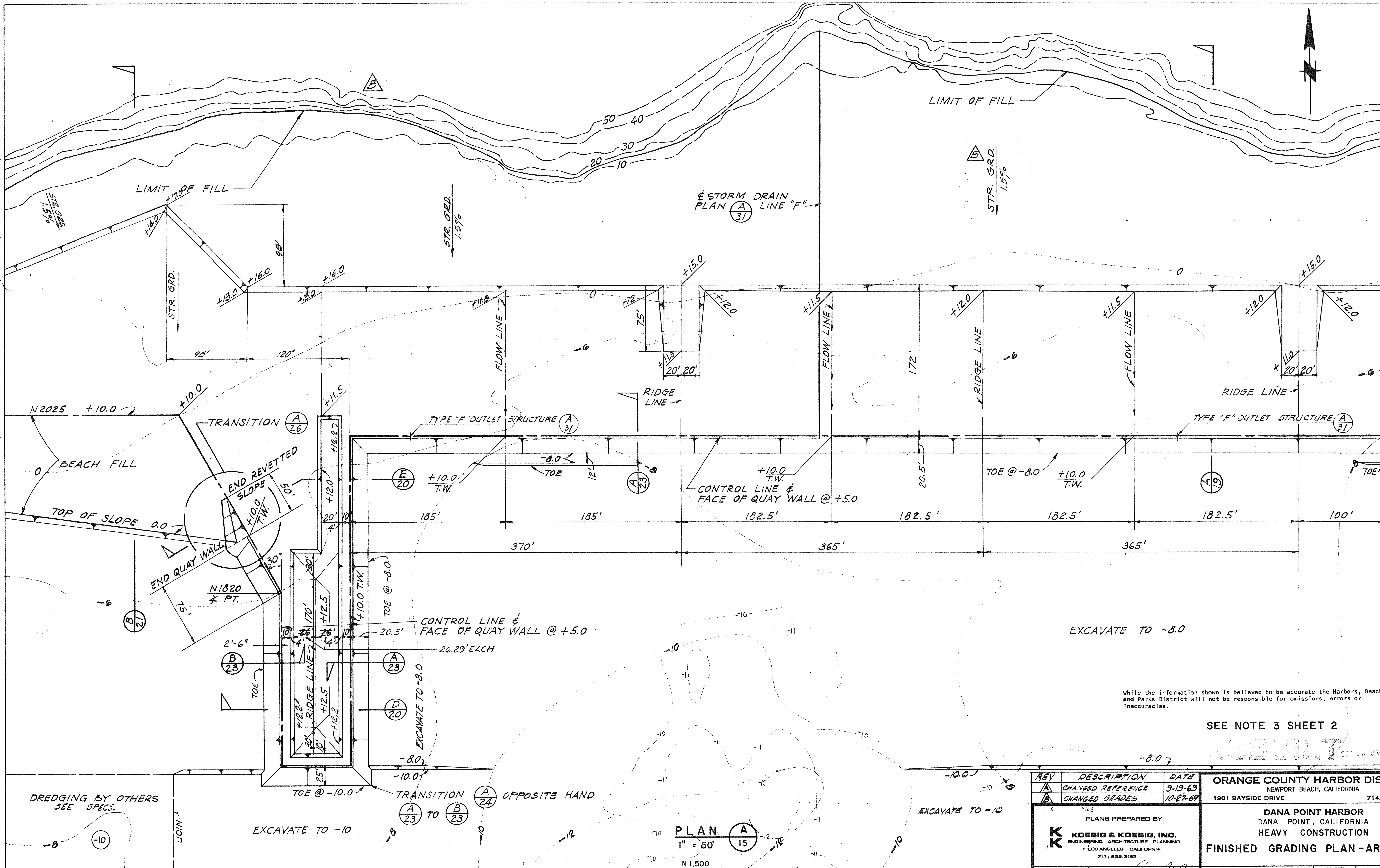
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3162
JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN - AREA VI

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 14 OF 58
D10.5-1

AS BUILT



While the information shown is believed to be accurate the Harbors, Beaches and Parks District will not be responsible for omissions, errors or inaccuracies.

SEE NOTE 3 SHEET 2

AS BUILT SEP 2 1970

MATCH LINE - SEE SHEET 16

REV	DESCRIPTION	DATE
A	CHANGED REFERENCE	9-19-69
B	CHANGED GRADES	10-27-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

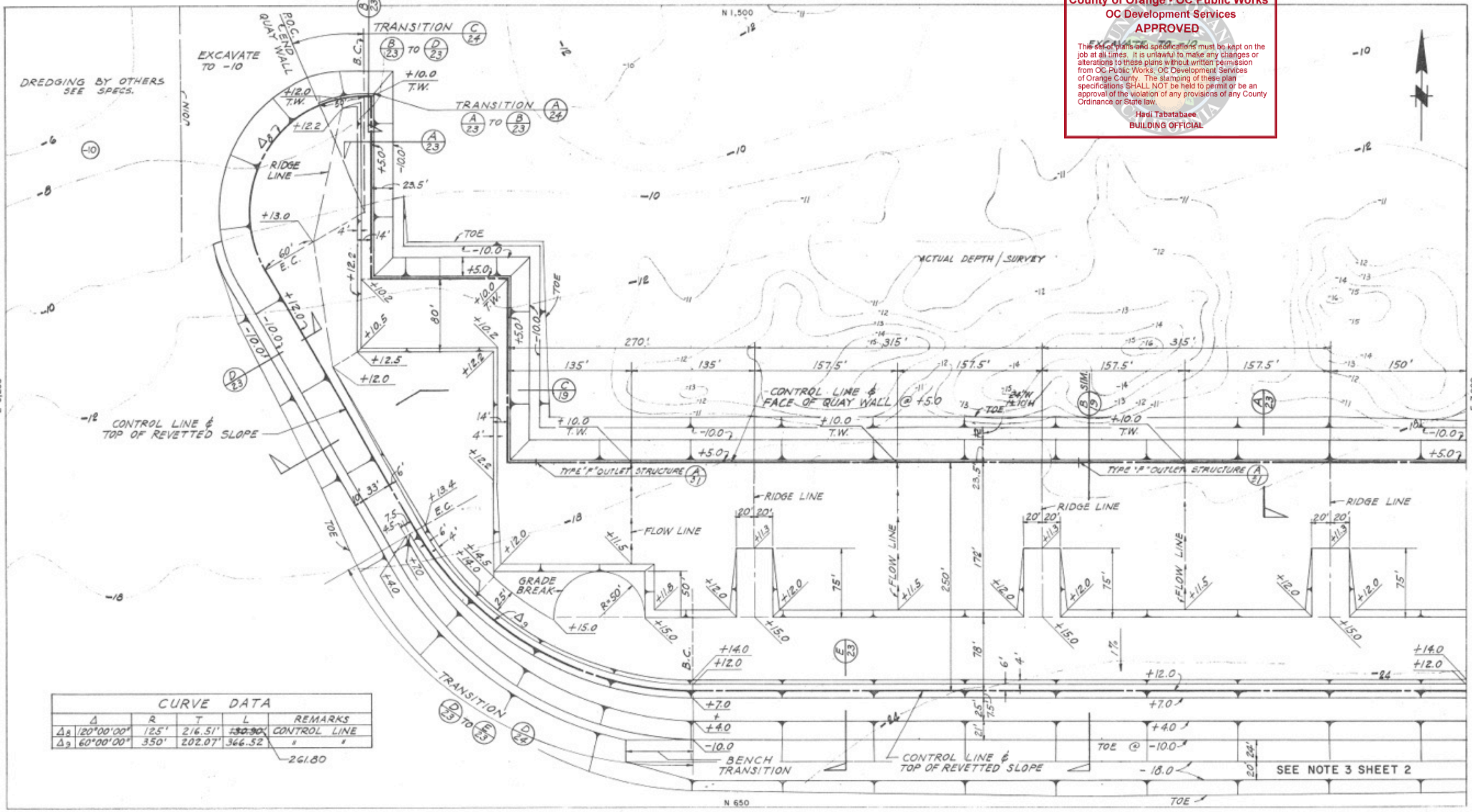
JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN - AREA VII

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 15 OF 51
D10.5-1

MATCH LINE - SEE SHEET 15



	CURVE DATA			
Δ	R	T	L	REMARKS
Δ_8 120°00'00"	125'	216.51'	~~130.90~~	CONTROL LINE
Δ_9 60°00'00"	350'	202.07'	366.52	" "

261.80

PLAN (A/16)
1" = 50'

While the information shown is believed to be accurate the Harbors, Beaches and Parks District will not be responsible for omissions, errors or inaccuracies.

REV.	DESCRIPTION	DATE
A	ADDED MATCH LINE	9-19-68

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/623-3162
JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN - AREA VIII
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 16 OF 51
D 10.5-1

AS BUILT

SUPERSEDES SHEET 17

REV.	DESCRIPTION	DATE
A	CHANGED GRADES	10-27-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

JOB NO. 1-417.10
DATE 9-19-69
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
FINISHED GRADING PLAN - AREA IX

DATE SEPTEMBER, 1969
SCALE AS SHOWN
SHEET 17-A OF 51
D 10.5 - 1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

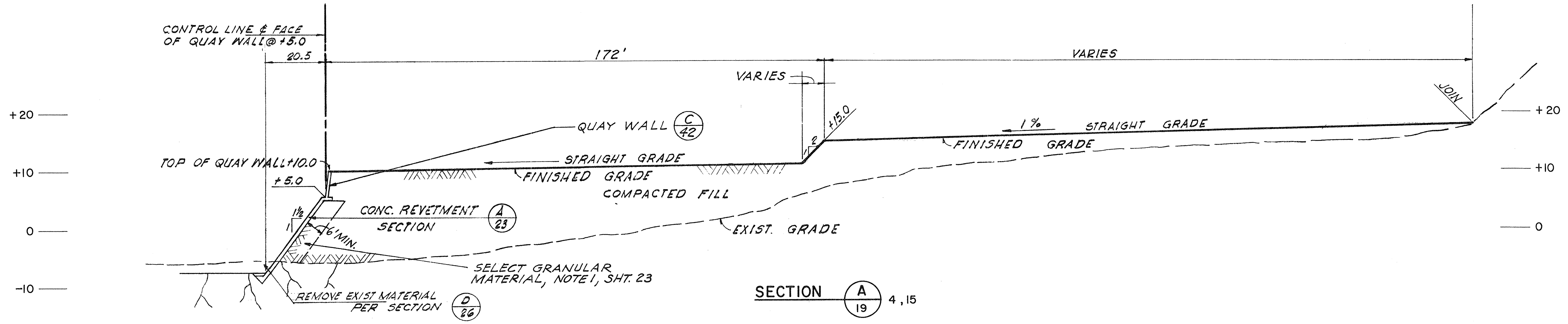
SCALE: HORIZ. 1" = 20' VERT. 1" = 10'

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182
JOB NO. 1-417
DATE 9-24-68
APPROVED:

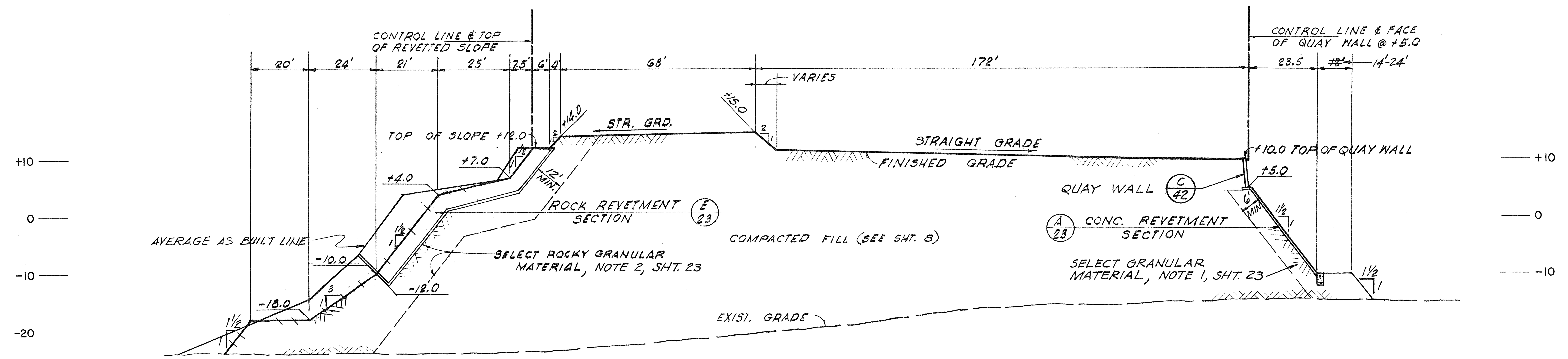
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
TYPICAL GRADING SECTIONS I

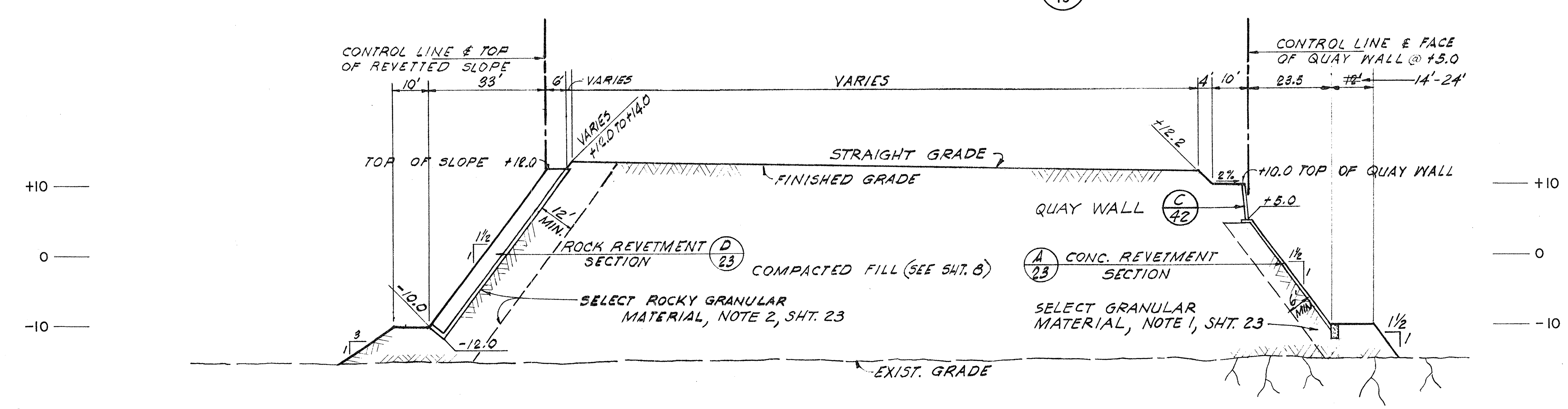
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 18 OF 59
D10.5-1



SECTION A/19 4, 15



SECTION B/19 4,12,14 & 16



SECTION C/19 4, 16

ASBUILT
SEP 2 / 1970

SCALE: HORIZ. 1" = 20'
VERT. 1" = 10'

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

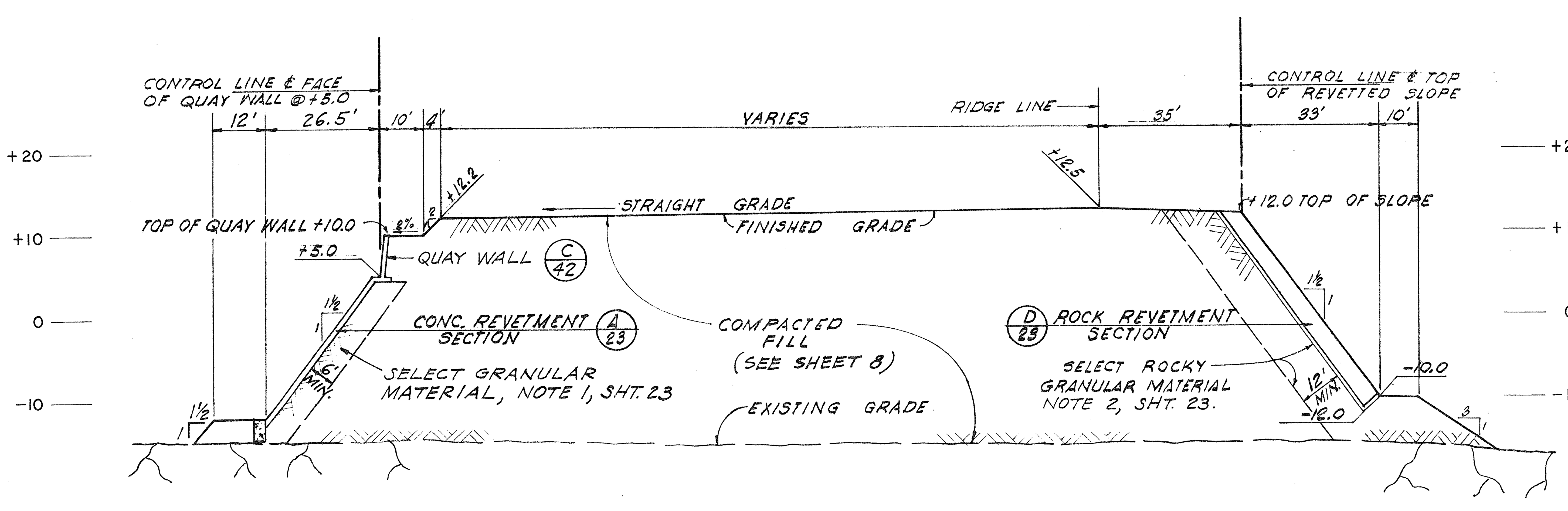
JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

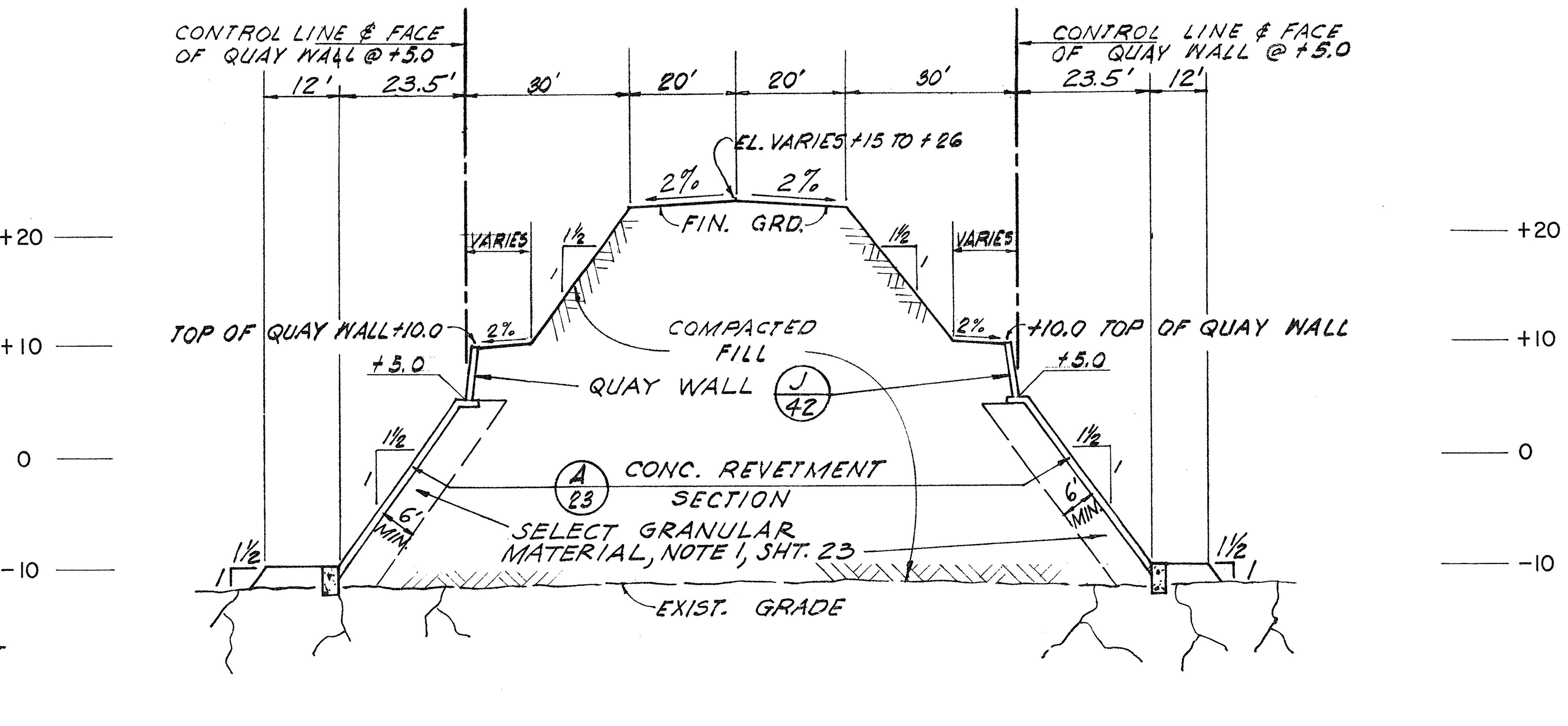
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

TYPICAL GRADING SECTIONS II

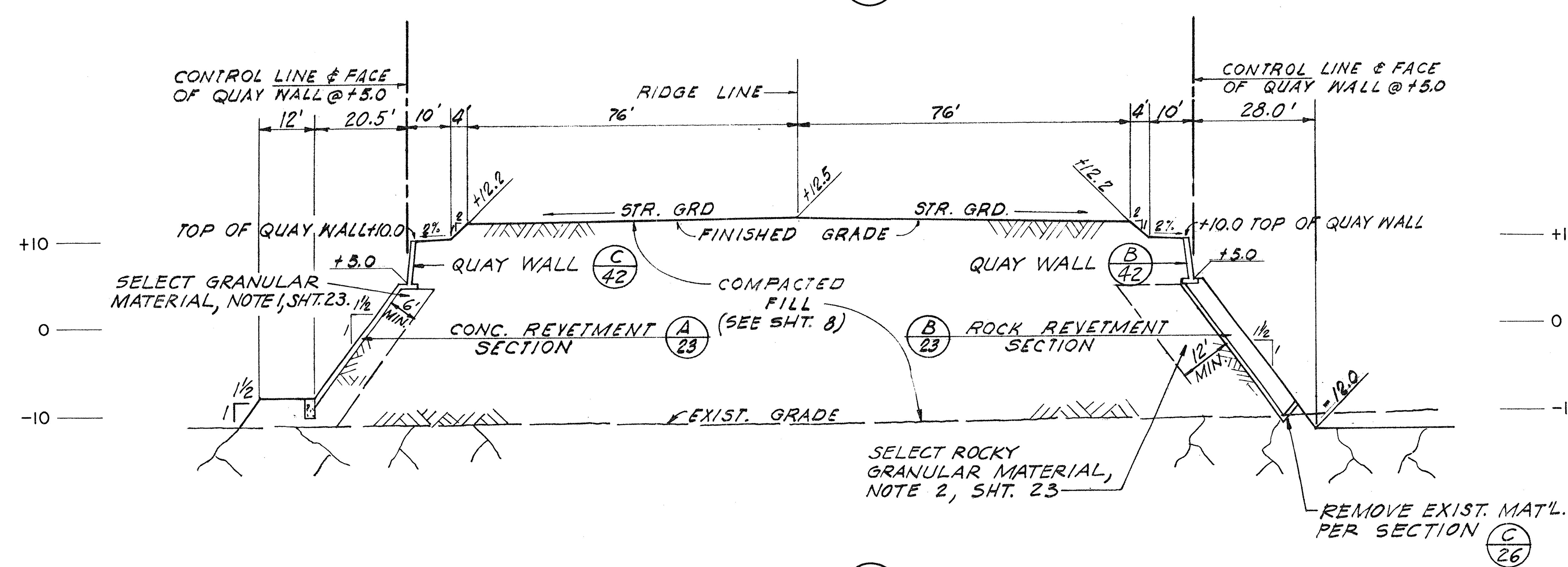
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 19 OF 50
D 10.5-1



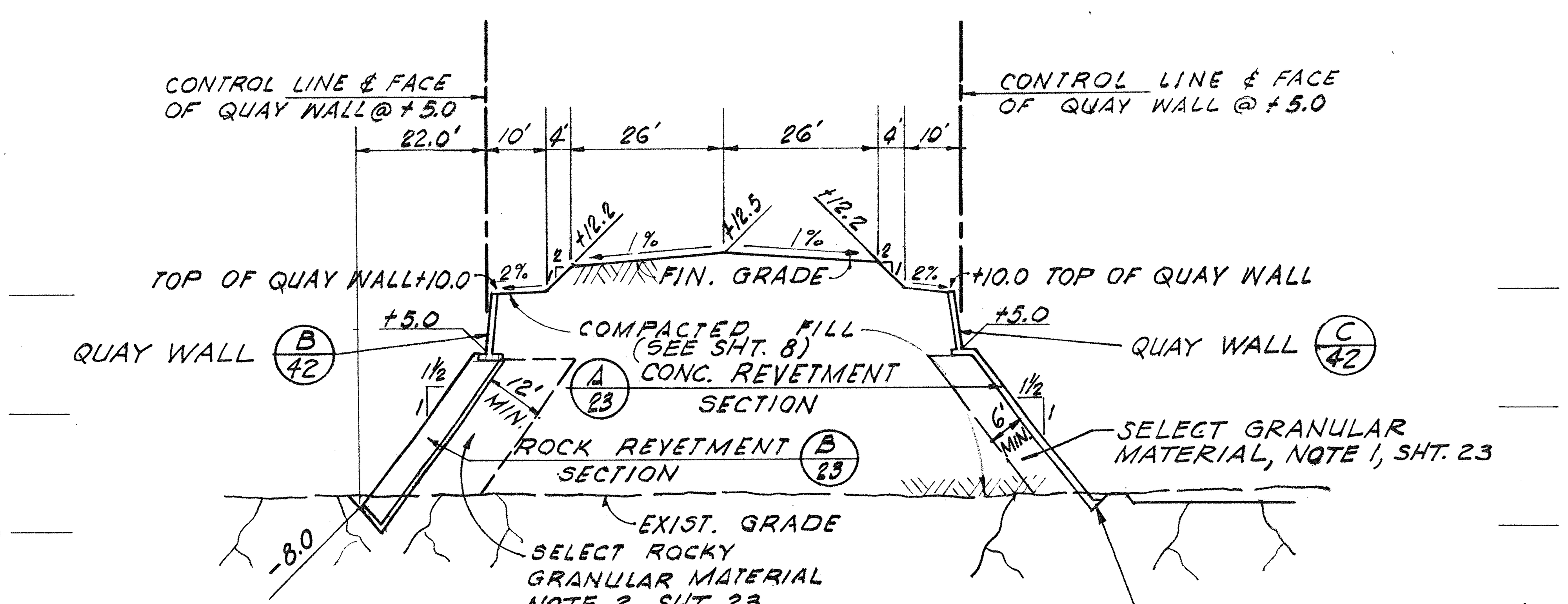
SECTION A/20 4,12



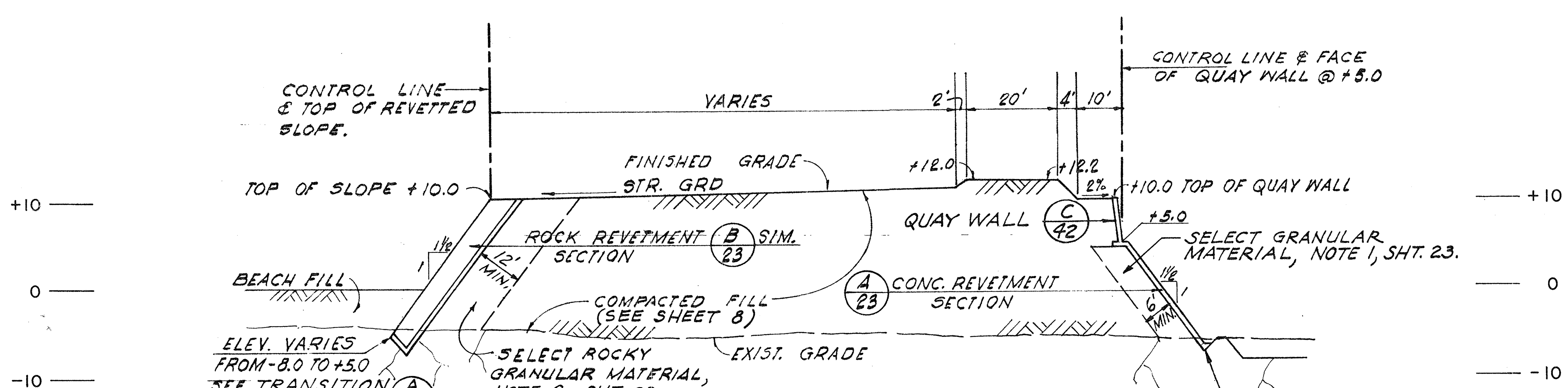
SECTION B/20 4,13,14



SECTION C/20 4,11



SECTION D/20 4,15



SECTION E/20 4,15

SCALE: HORIZ. 1" = 20' VERT. 1" = 10'

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/628-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3600

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

TYPICAL GRADING SECTIONS III

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 20 OF 50
D 10.5-1

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

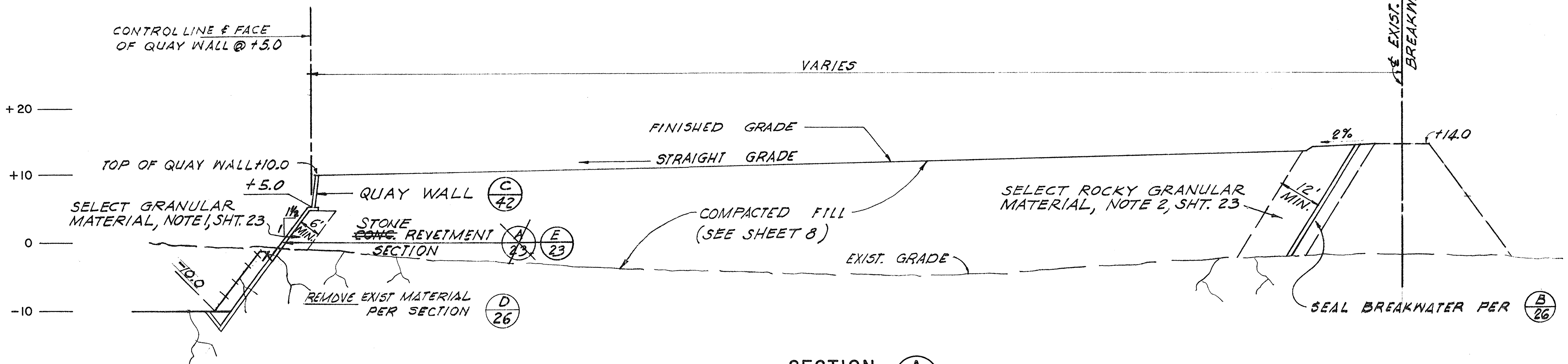
JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

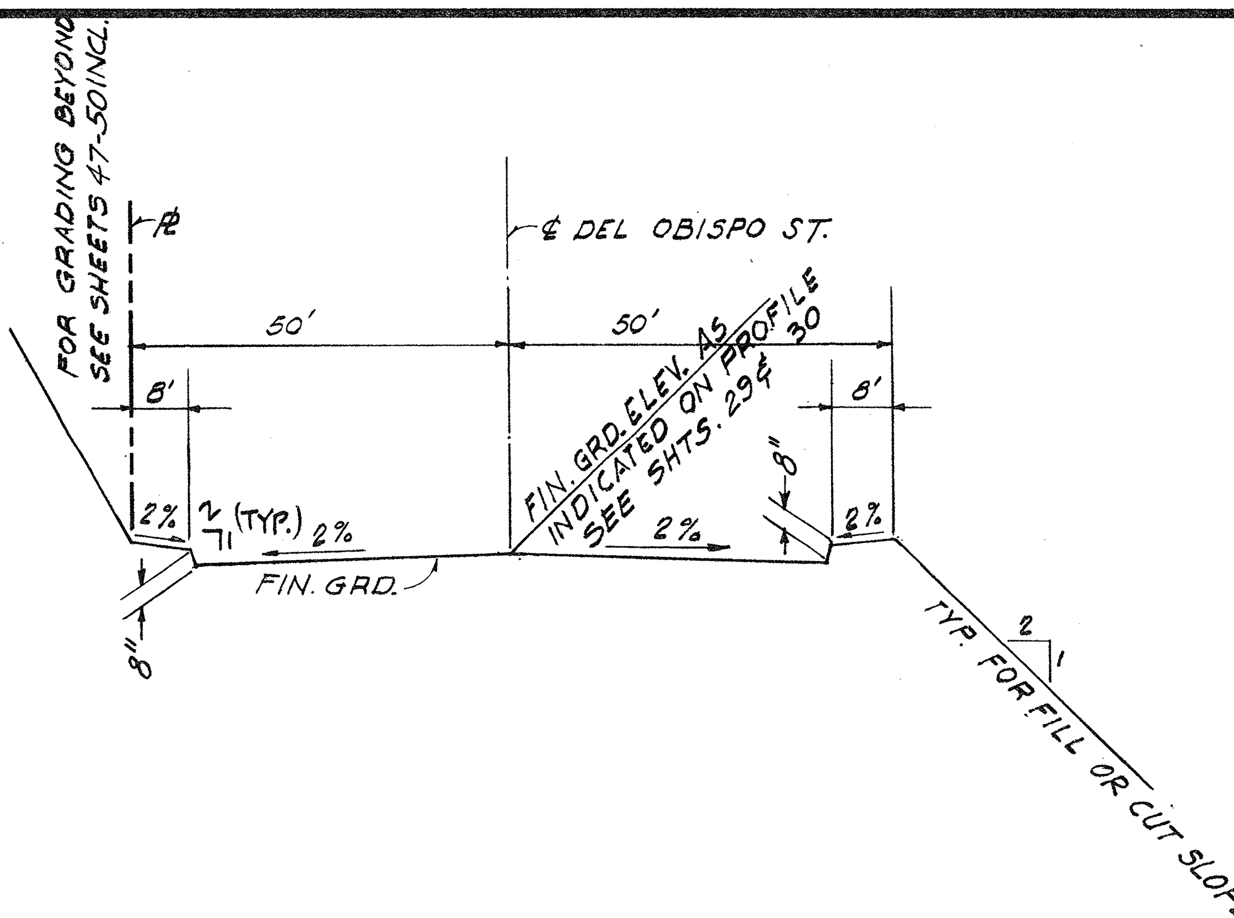
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

TYPICAL GRADING SECTIONS IV

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 21 OF 50
D10.5-1



SECTION A/22 4, 11



SECTION B/22 4, 9, 10, 13

SECTION D/22 4, 10

SEP 2 8 1970

SCALE: HORIZ. 1" = 20'
VERT. 1" = 10'

PLANS PREPARED BY KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213 / 629-3192	ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800
JOB NO. 1-417 DATE 9-24-68 APPROVED:	DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION TYPICAL GRADING SECTIONS V
	DATE OCTOBER, 1968 SCALE AS SHOWN SHEET 22 OF 50 D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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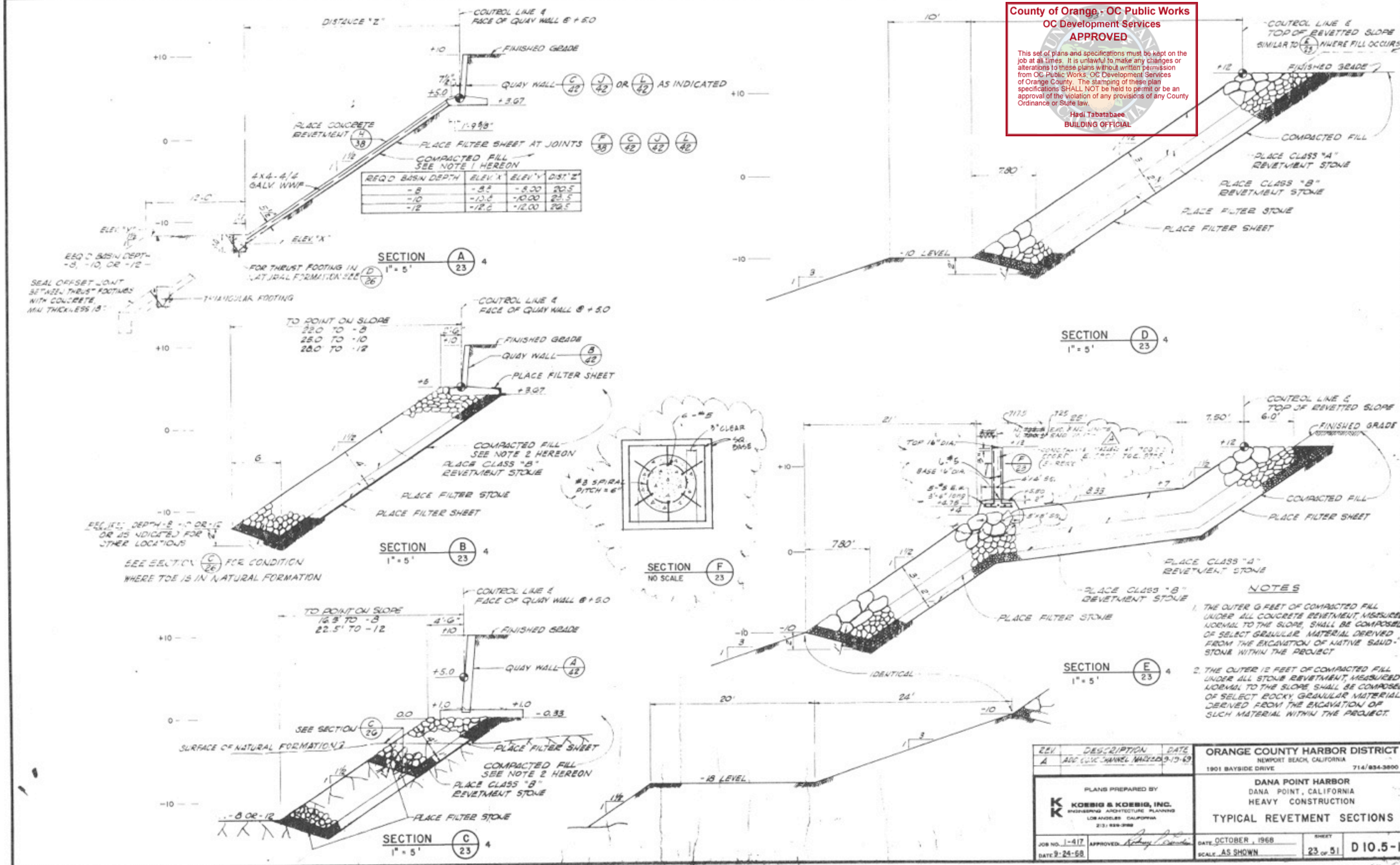
Hadi Tabatabaee
BUILDING OFFICIAL



REQ'D BASIN DEPTH	ELEV 'X'	ELEV 'Y'	DIST 'Z'
-8	-8.5	-8.00	20.5
-10	-10.6	-10.00	23.5
-12	-12.6	-12.00	29.5

NOTES

1. THE OUTER 6 FEET OF COMPACTED FILL UNDER ALL CONCRETE REVETMENT, MEASURED NORMAL TO THE SLOPE, SHALL BE COMPOSED OF SELECT GRANULAR MATERIAL DERIVED FROM THE EXCAVATION OF NATIVE SAND-STONE WITHIN THE PROJECT.
2. THE OUTER 12 FEET OF COMPACTED FILL UNDER ALL STONE REVETMENT, MEASURED NORMAL TO THE SLOPE, SHALL BE COMPOSED OF SELECT ROCKY, GRANULAR MATERIAL DERIVED FROM THE EXCAVATION OF SUCH MATERIAL WITHIN THE PROJECT.

REV.	DESCRIPTION	DATE
A	ADD CONC. CHANNEL MARKER	9-15-69

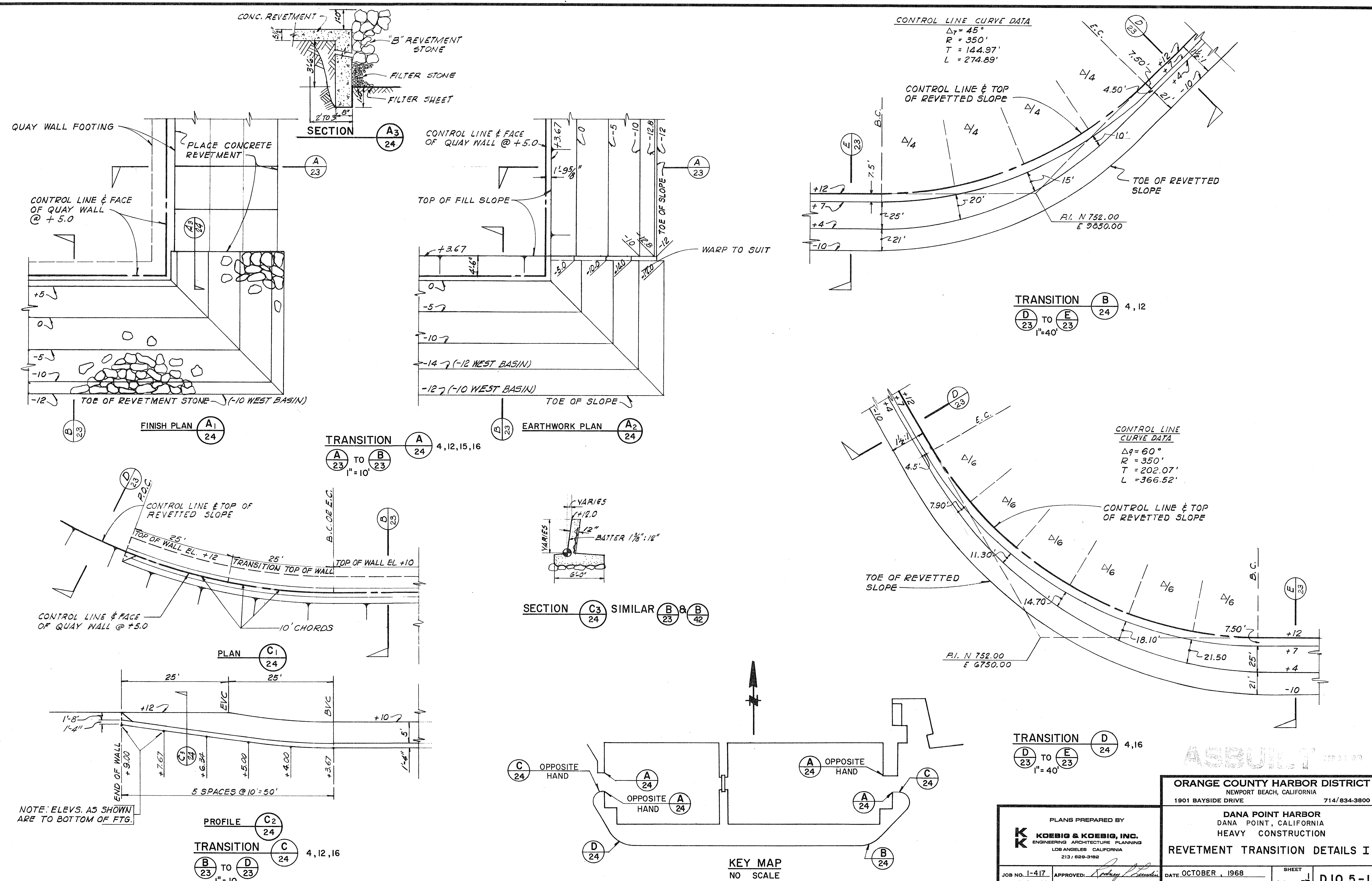
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA

JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
TYPICAL REVETMENT SECTIONS

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 23 OF 51
D 10.5-1



PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/628-3182

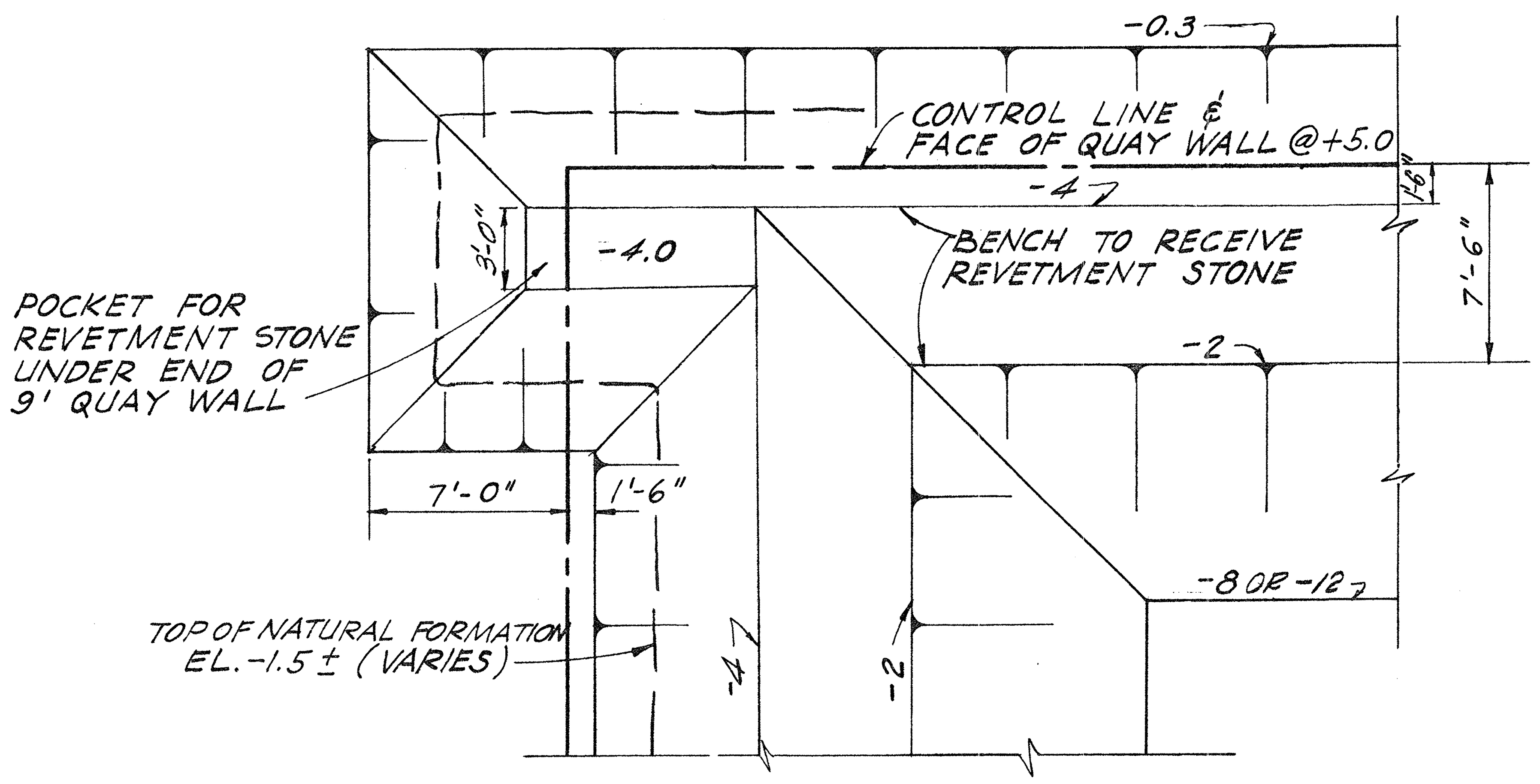
JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

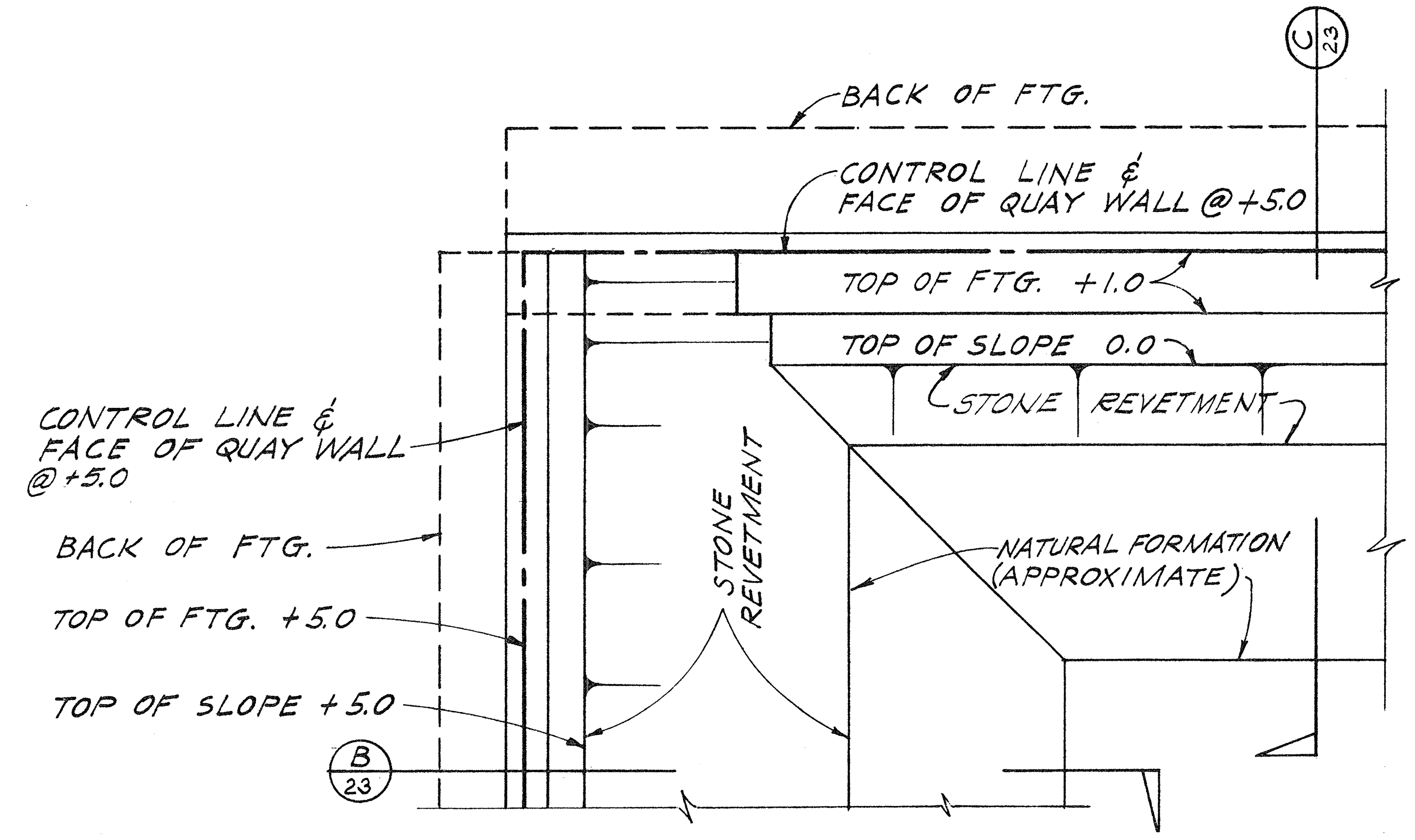
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

REVETMENT TRANSITION DETAILS I

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 24 OF 50
D10.5-1

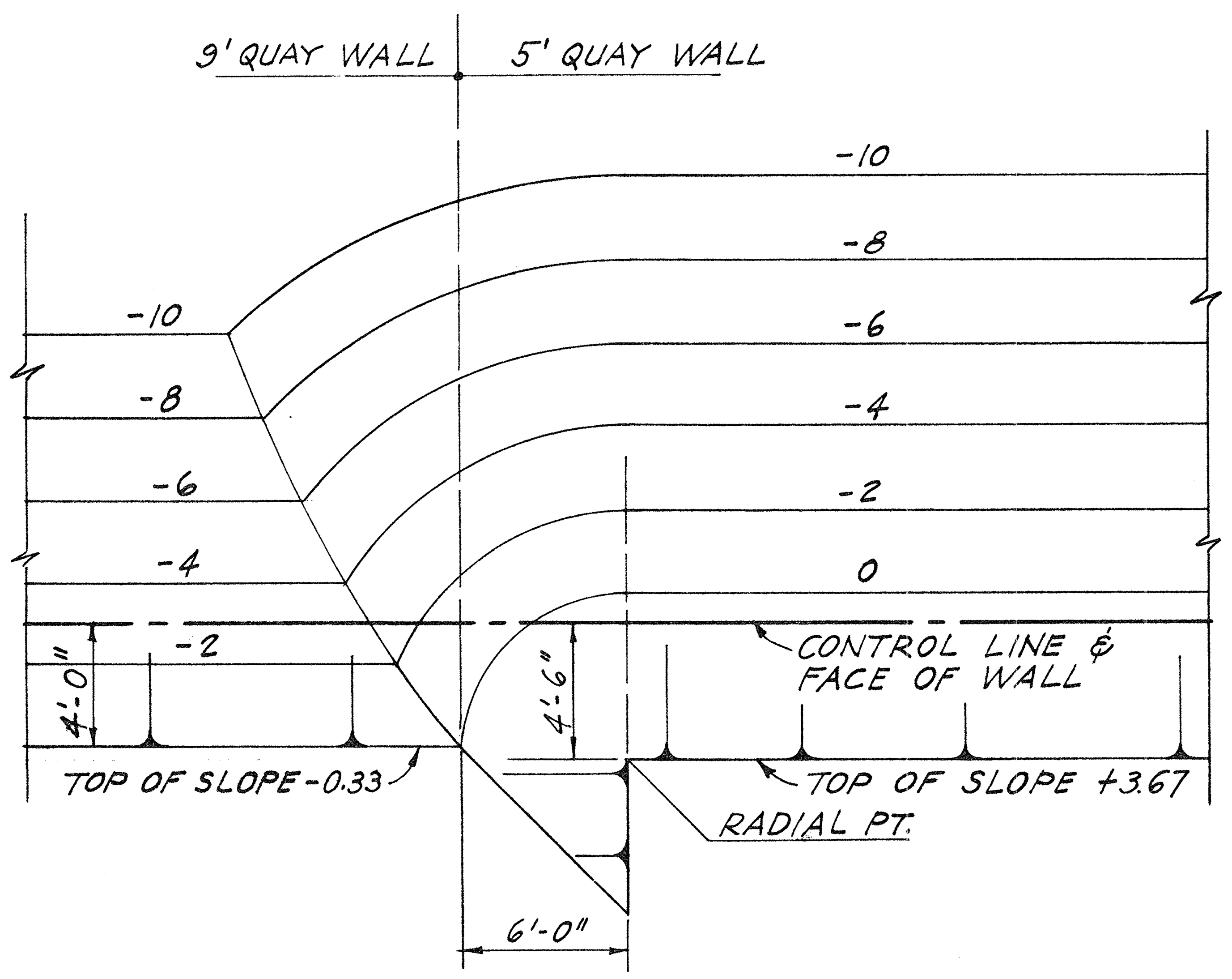


EARTHWORK PLAN (A1/25)

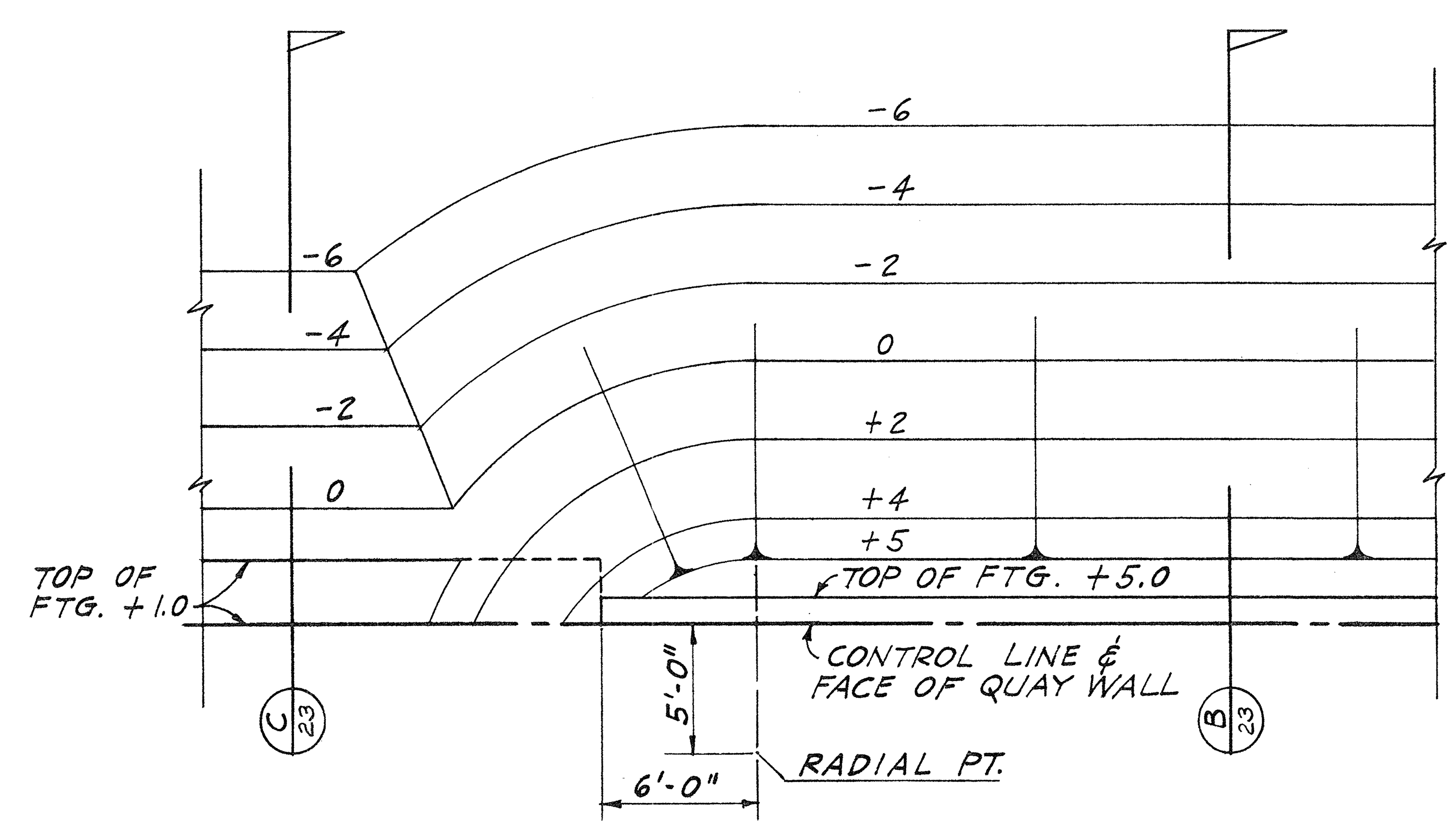


FINISH PLAN (A2/25)

TRANSITION (A/25) 4, 11
(B/23) TO (C/23)
1" = 5'



EARTHWORK PLAN (B1/25)



FINISH PLAN (B2/25)

TRANSITION (B/25) 4, 11
(B/23) TO (C/23)
1" = 5'

NOTE:
TOE ELEVATION VARIES AT THE VARIOUS LOCATIONS WHERE THESE DETAILS APPLY. CONTINUE EARTHWORK AND FINISH SLOPES DOWN TO PROPER ELEVATIONS FOR BENCH TO RECEIVE REVETMENT STONE AND FOR TOE OF SLOPE.

ASBUILT

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

REVETMENT TRANSITION DETAILS II

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney L. Lundin
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 25 OF 50
D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
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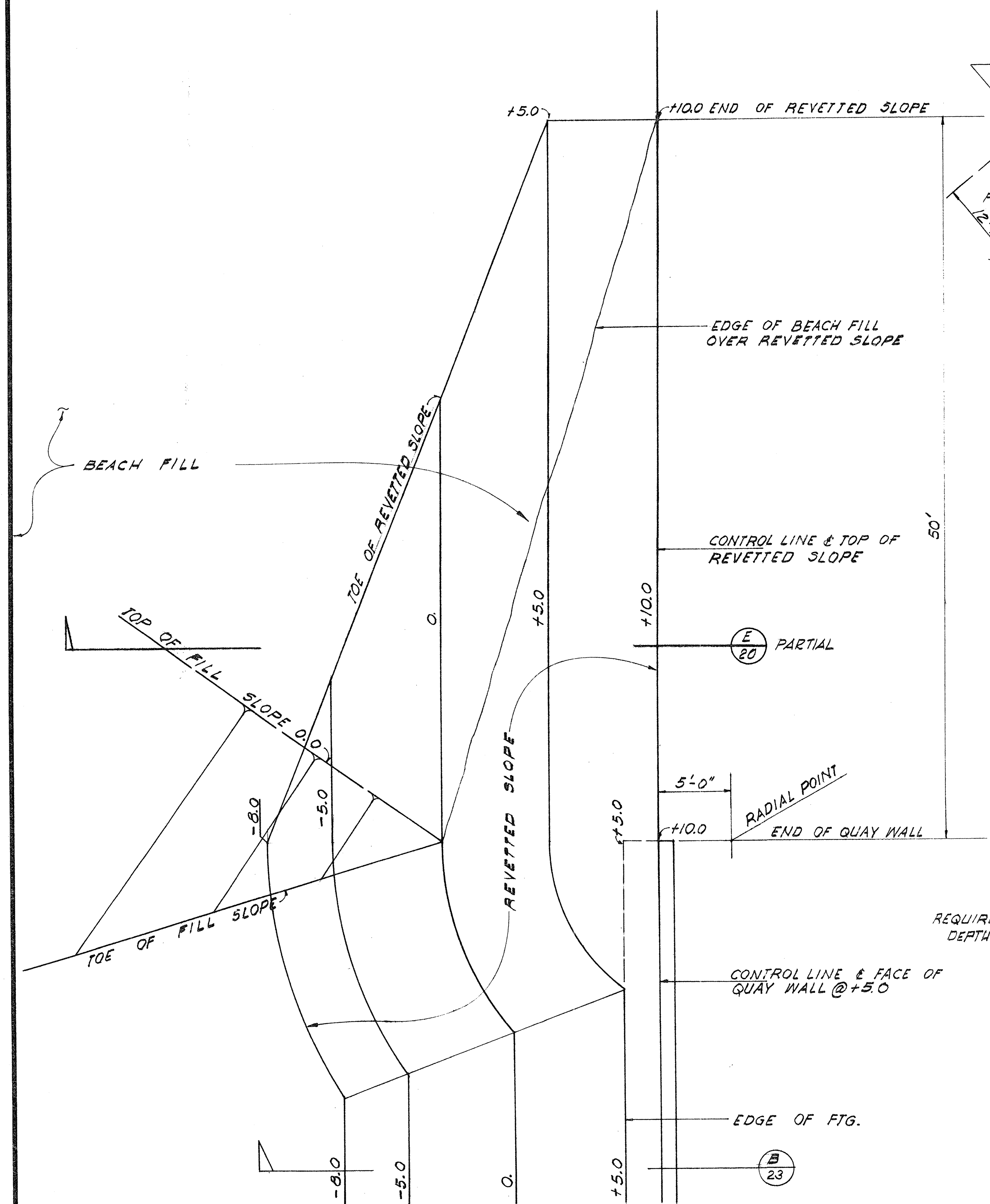
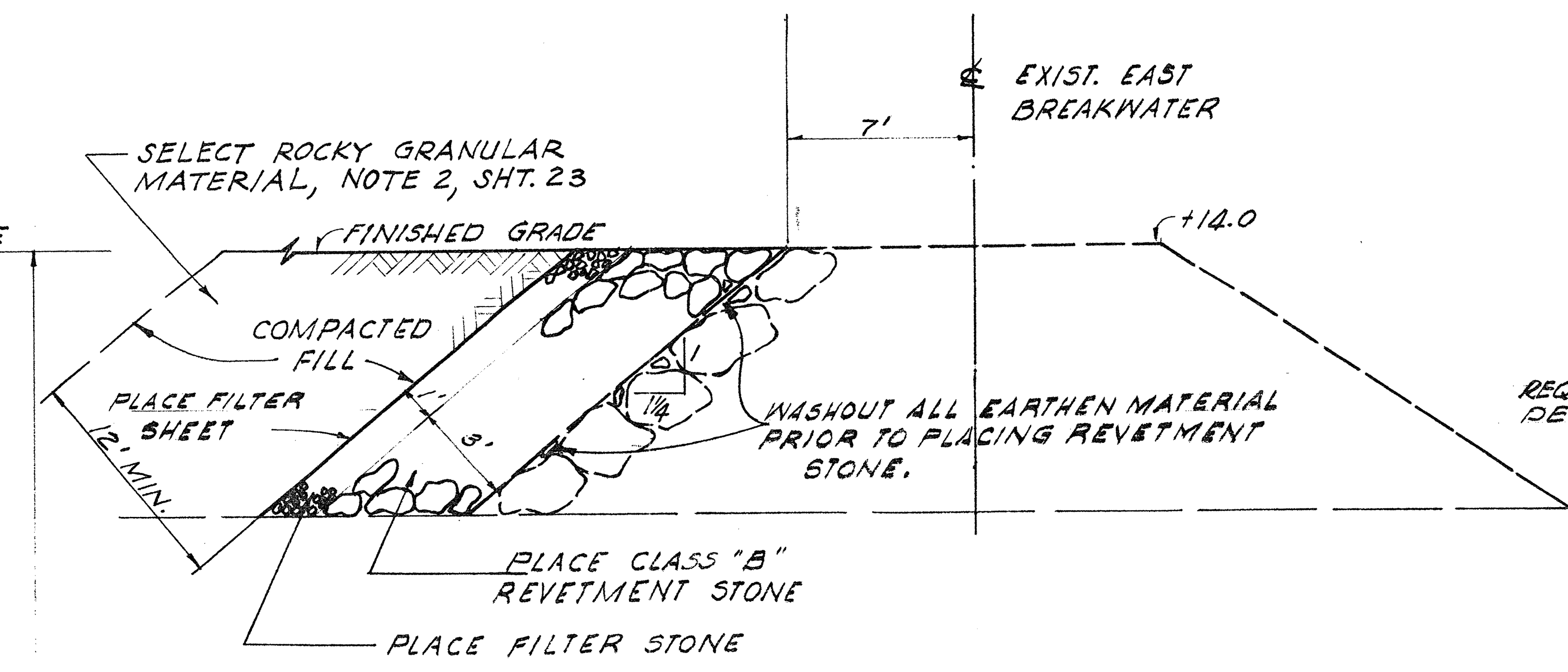
Hadi Tabatabaee
BUILDING OFFICIAL

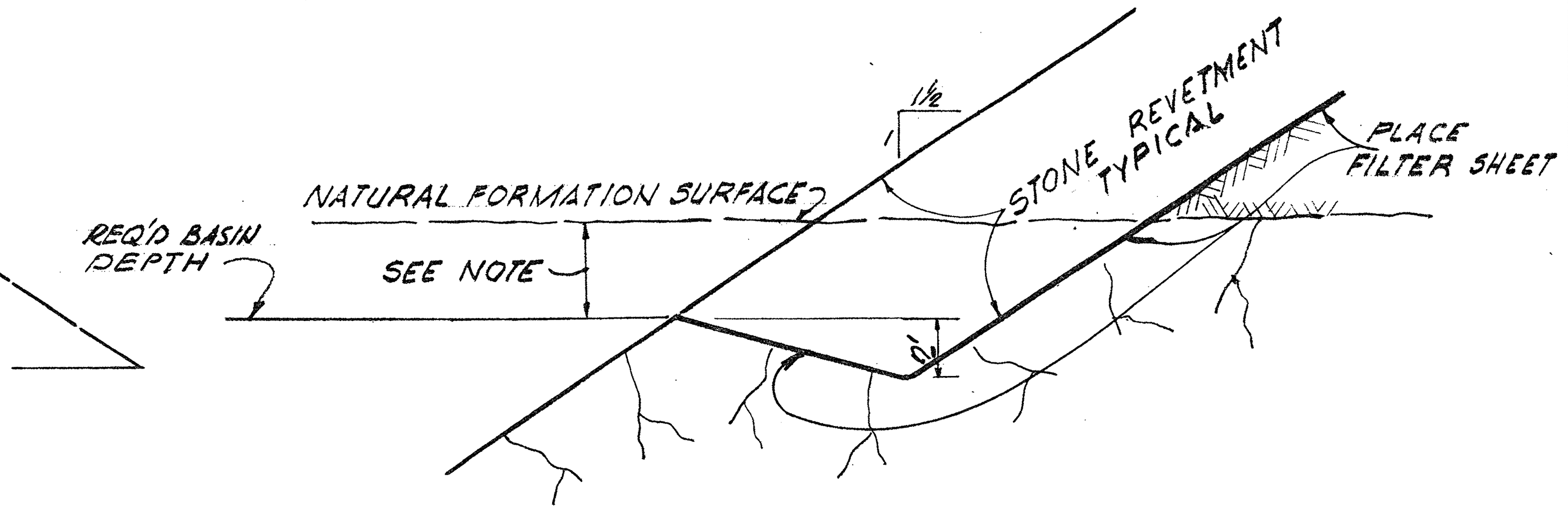


TRANSITION (A / 26) 4,15
1" = 5'



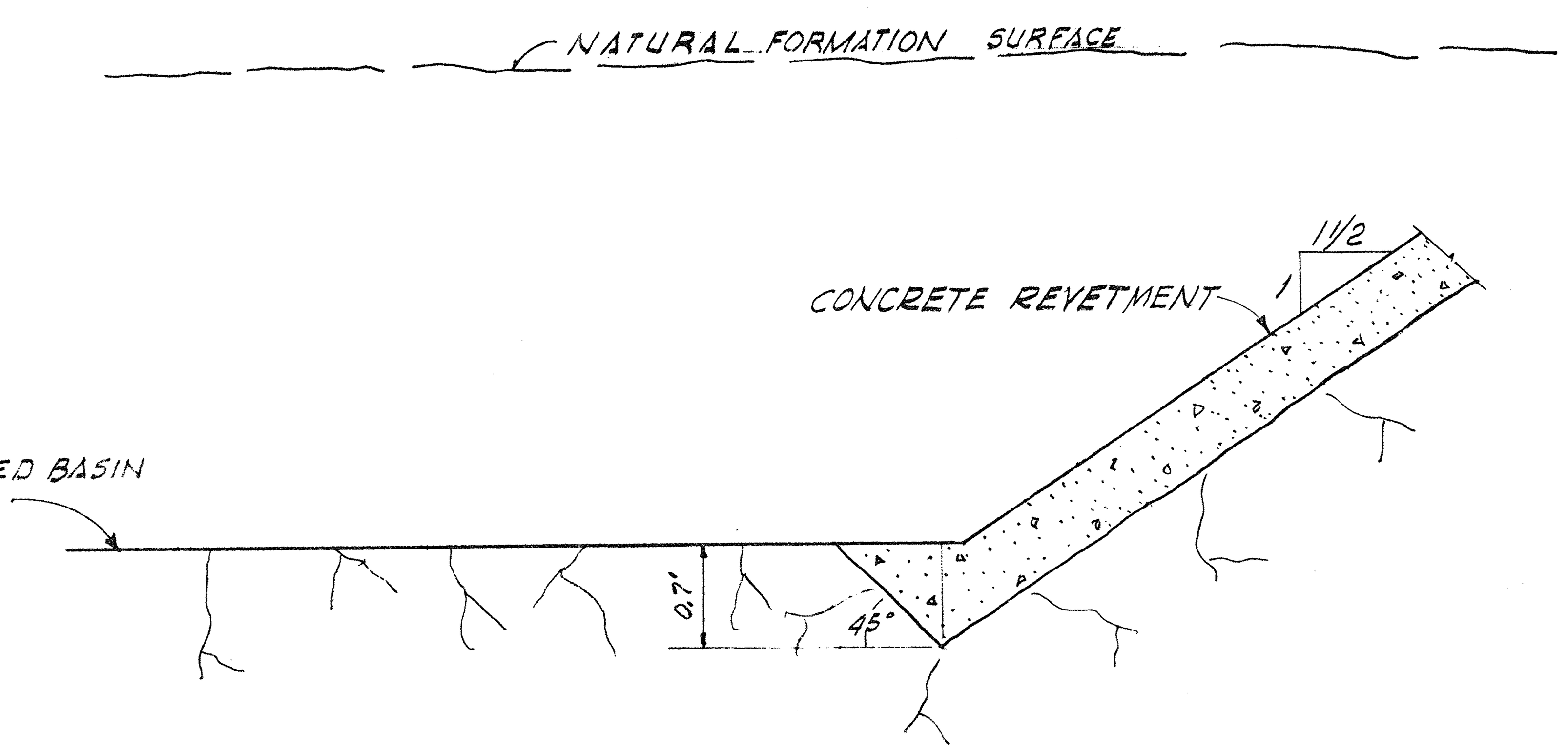
SEALING AT EAST & WEST BREAKWATERS
(TYPICAL THROUGHOUT LENGTH OF EARTH FILL)

SECTION (B / 26) 4,8,11
1" = 5'

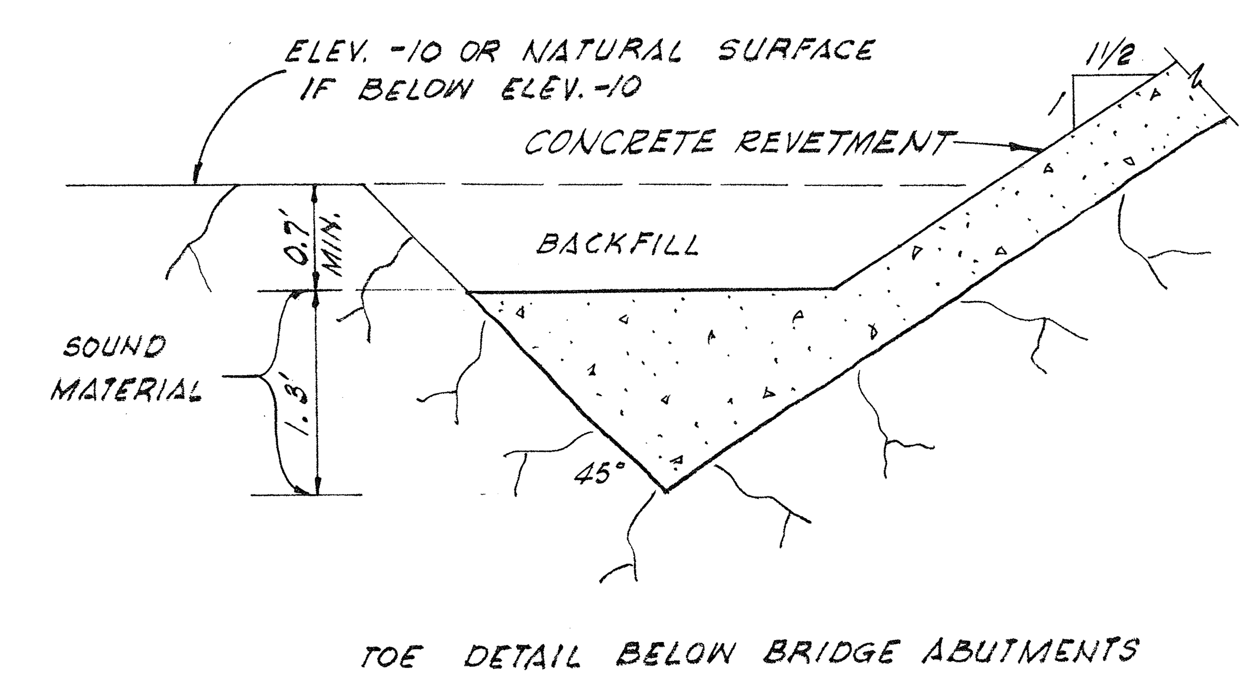


NOTE: REMOVE LOOSE, SOFT, OR WEATHERED MATERIAL AS NEEDED TO OBTAIN REASONABLY SOUND MATERIAL FOR FINISHED SURFACES.

SECTION (C / 26)
1" = 5'



SECTION (D / 26) 23
1" = 1'

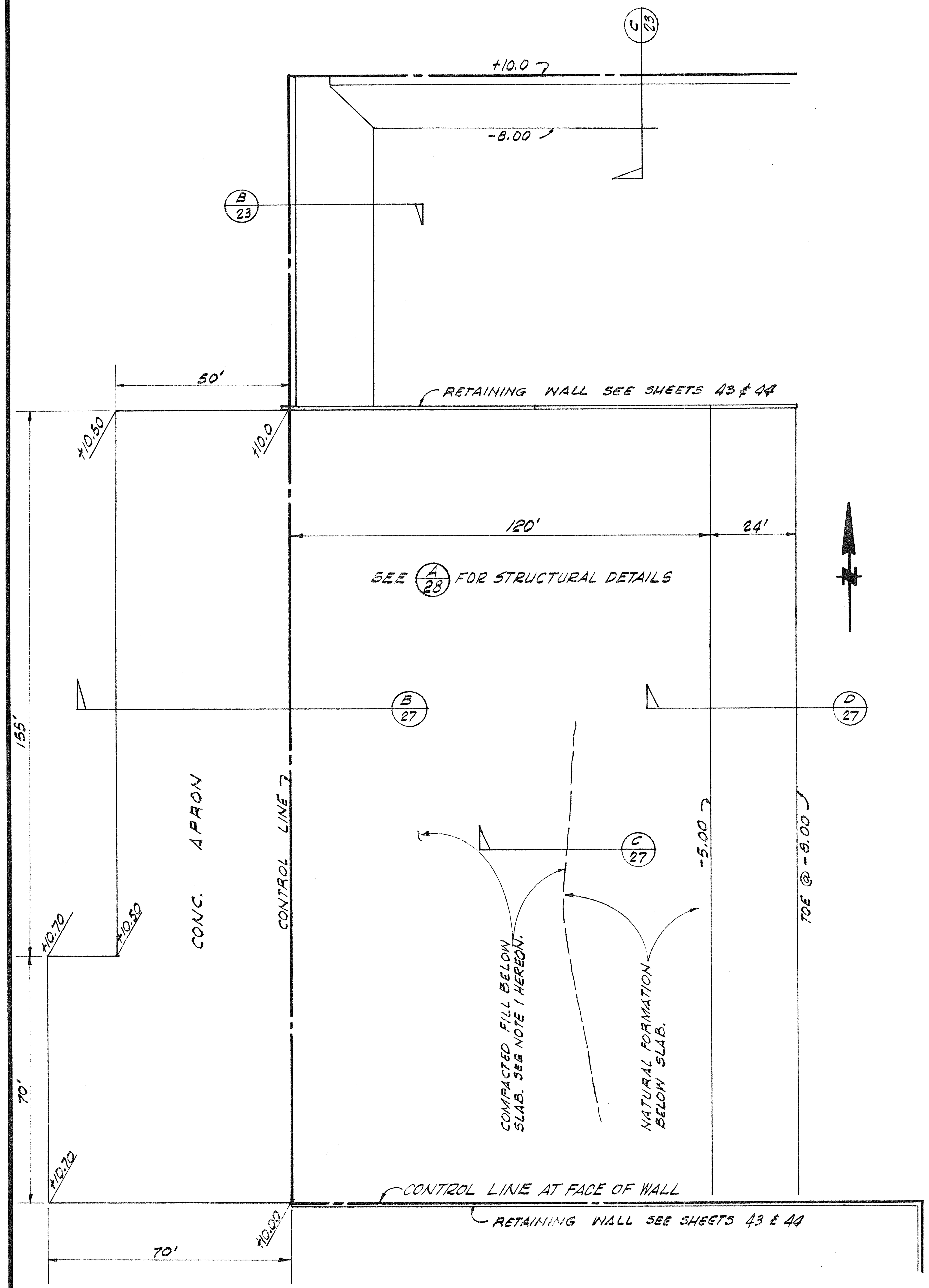


TOE DETAIL BELOW BRIDGE ABUTMENTS

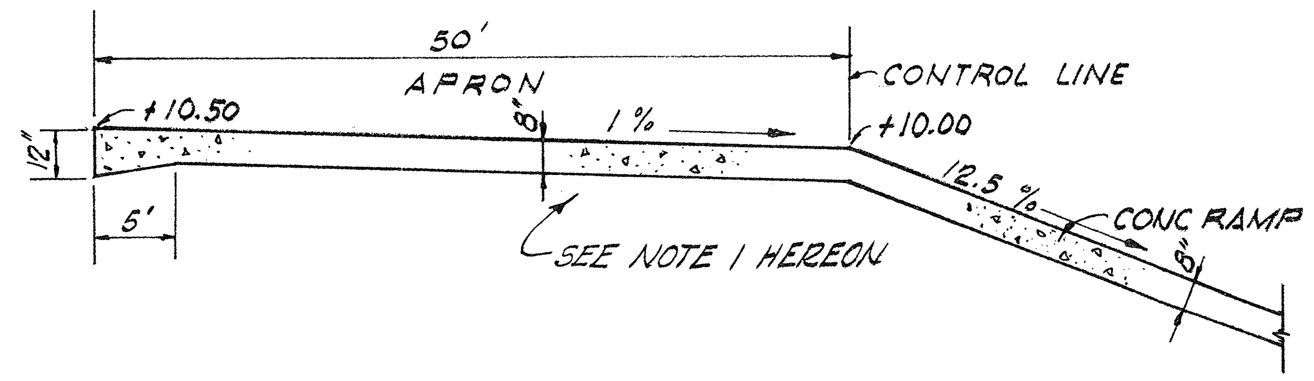
SECTION (E / 26) 13, 14
1" = 1'

ASBUILT SEP 23 1970

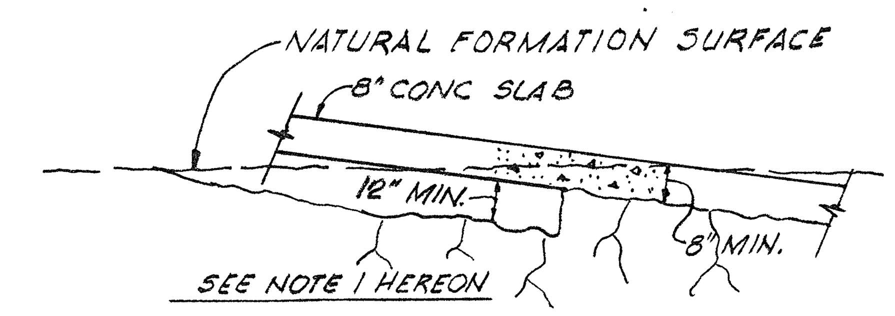
PLANS PREPARED BY KK KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213 / 629-3182	ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800 DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION REVETMENT TRANSITION DETAILS III
JOB NO. 1-417 DATE 9-24-68 APPROVED: [signature]	DATE OCTOBER, 1968 SCALE AS SHOWN SHEET 26 OF 50 D10.5-1



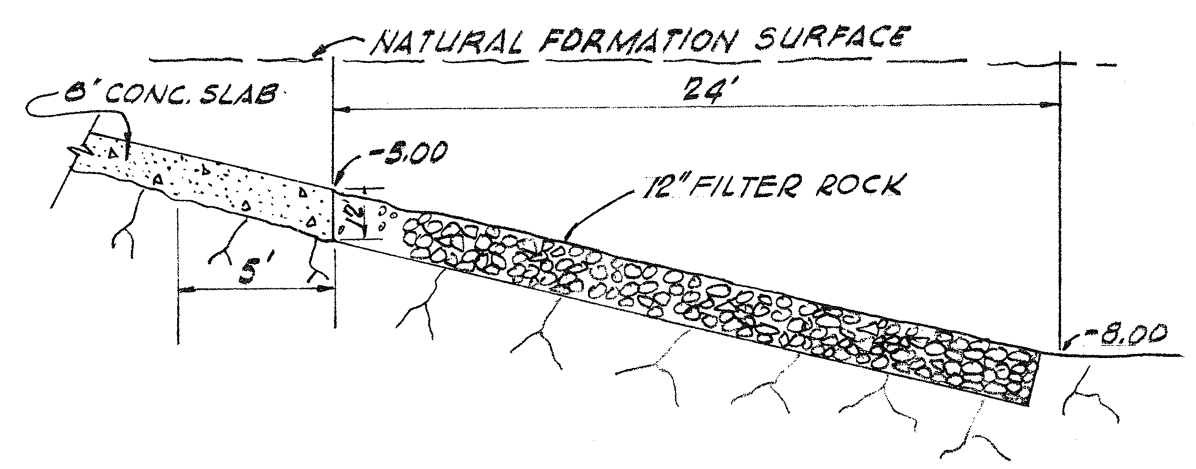
PLAN A/27
1" = 20'



SECTION B/27



SECTION C/27



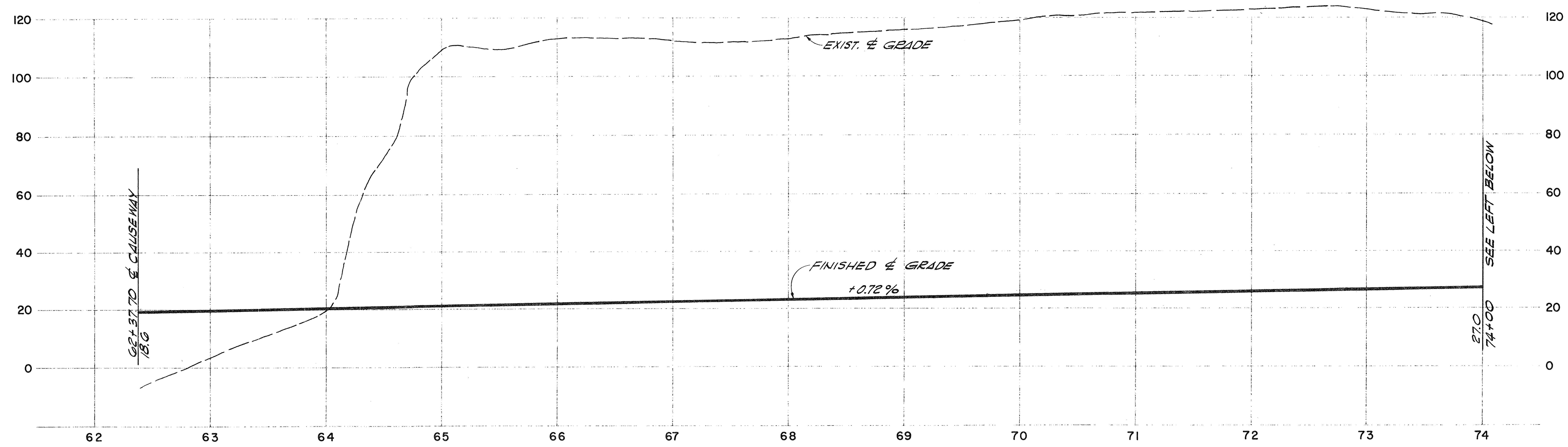
SECTION D/27

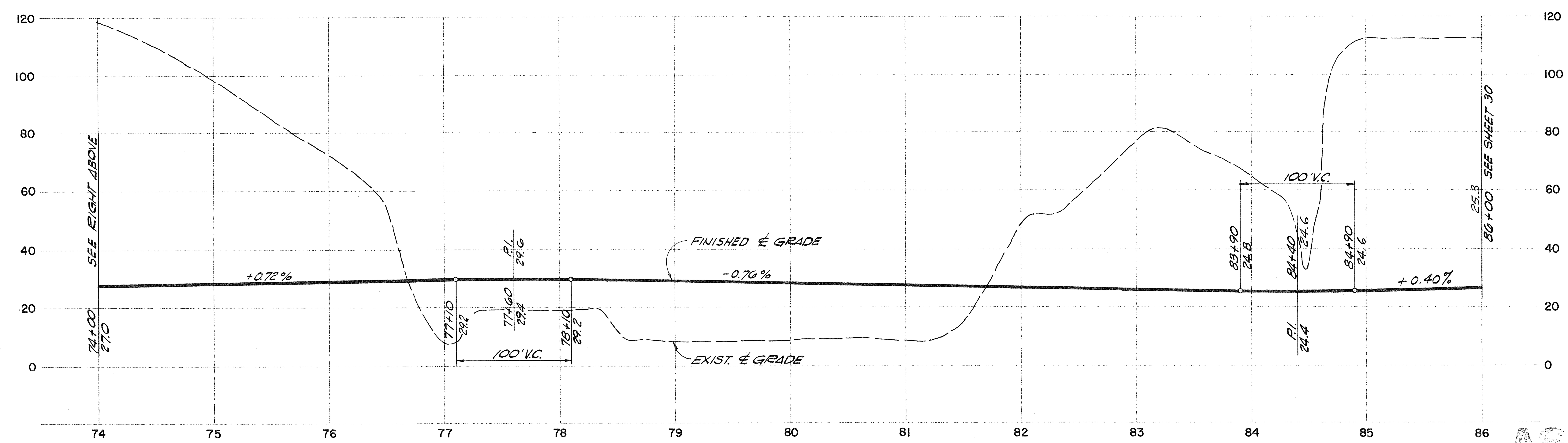
NOTE:
1. PROVIDE A MIN. 12" THICK SUBGRADE LAYER OF GRANULAR FREE DRAINING MATERIAL BETWEEN COMPACTED FILL AND BOTTOM OF 8" CONC. PAVEMENT.

ASBUILT

PLANS PREPARED BY KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213 / 629-3182	ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800 DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION BOAT RAMP - PLAN & SECTIONS
JOB NO. 1-417 DATE 9-24-68 APPROVED:	DATE OCTOBER, 1968 SCALE AS SHOWN SHEET 27 OF 50 D10.5-1


4x4-4/4 W.W.F. (GALV.)
ELASTOMERIC SEALER
PREMOLDED EXPANSION JOINT FILLER
SECTION B 28
FORMED GROOVE
ELASTOMERIC SEALER
4x4-4/4 W.W.F. (GALV.) INTERRUPT AT ALL JOINTS.
TYPICAL TRANSVERSE DUMMY CONTROL JOINT
SECTION C 28
1 1/2" = 1'-0"
¢ JOINT
4x4-4/4 W.W.F. (GALV.) TYP.
ELASTOMERIC SEALER
NOTE: POUR THIS SLAB FIRST AND FACE KEYWAY PROJECTION INTO SLAB POURED FIRST.
TYPICAL LONGITUDINAL CONSTRUCTION JOINT
SECTION D 28
1 1/2" = 1'-0"
¢ 2"Ø HOLE
4x4-4/4 W.W.F.
2"Ø WEEP HOLE DETAIL
SECTION E 28
1 1/2" = 1'-0"
APRON
CONCRETE
RAMP
CONCRETE
END OF RAMP -5.0
TOE OF SLOPE -8.0
CONTROL LINE
50'
20'
70'
70'
40'
40'
40'
24'
PLAN A 28
1" = 20'
TYPICAL OF ENTIRE RAMP SURFACE
15'-0"
TYPICAL LANE WIDTH
PLAN F 28
1" = 5'
TYPICAL SURFACE DETAIL FOR RAMP
(BEFORE FINISHING)
SECTION G 28
1/2" = 1"
ASBUILT
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE
714/834-3800
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
BOAT RAMP - DETAILS
JOB NO. 1-417
DATE 9-24-68
APPROVED:
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 28 OF 50
D 10.5-1





ASBUILT

SCALE HORIZ. 1" = 50'
VERT. 1" = 20'

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

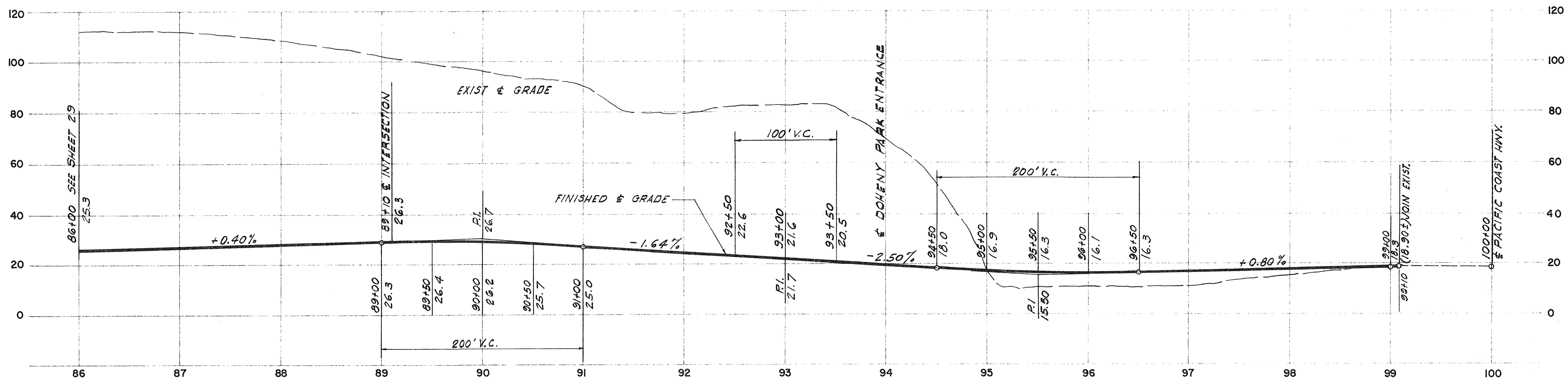
JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

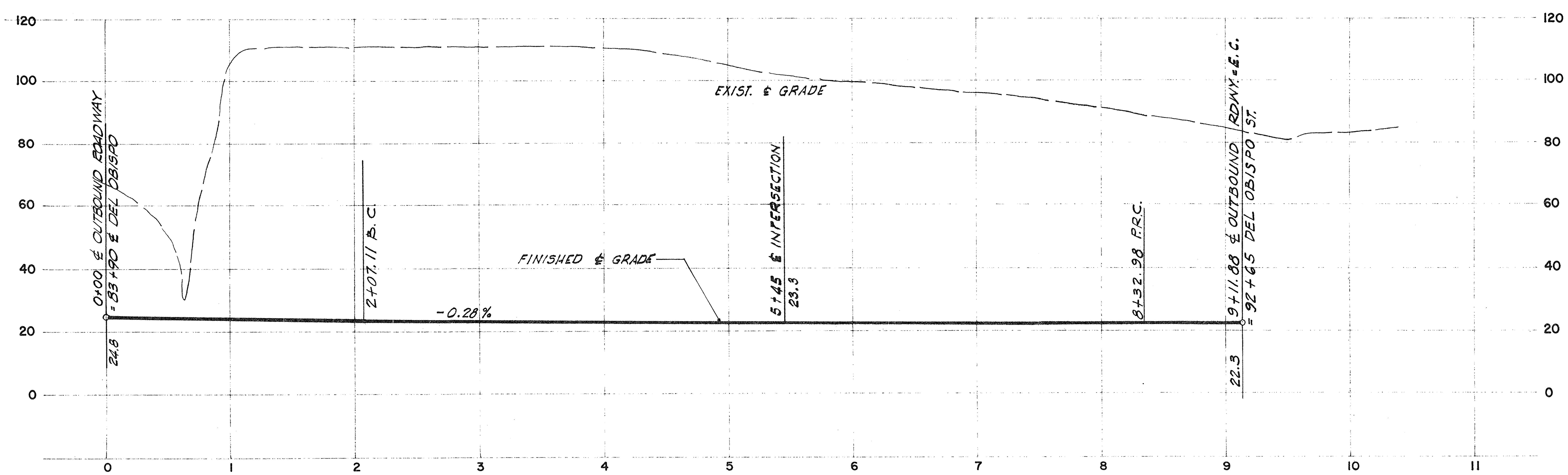
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

DEL OBISPO STREET - PROFILES I

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 1
29 OF 50
D10.5-1



DEL OBISPO STREET



OUTBOUND ROADWAY

SCALE: HORIZ. 1" = 50'
VERT. 1" = 20'

ASBUILT

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 628-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney L. Lundin

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

DEL OBISPO STREET-PROFILES II

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 30 1 OF 50
D10.5-1

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	10,107.81	16	2,000.00	9,140.00
3	2,000.00	9,535.00	17	2,000.00	8,330.00
4	2418.91 ~~2,845.08~~	9381.33 ~~9,382.61~~	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	1,002.00	6,780.00
7	2,000.00	7,980.00	21	1,002.00	7,380.00 ~~7,375.00~~
8	2,204.42	7,980.00	22	1,002.00	7,960.00
9	2,000.00	7,150.00 ~~7,145.00~~	23	1,002.00	8,470.00
10	2,431.46	7,150.00 ~~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	10,845.12	26	1,002.00	9,930.00
13	3,801.88	10,821.40	27	2,388.89 ~~2,266.00~~	9,535.00
14	1,954.44	10,620.00	28	1,762.00	5,806.70
			29	1,400.00	5,908.22 ~~5,906.22~~
			30	1,070.00	5,908.22 ~~5,906.22~~

A

PLAN A 31
1" = 200'

LEGEND

- STORM DRAIN
- M.H.
- ③ COORDINATE POINT

STORM DRAIN GENERAL NOTES

1. STATIONS SHOWN ON THE STORM DRAIN PLANS ARE ALONG THE CENTERLINE OF CONDUIT OR ON A LINE NORMAL TO THE CENTERLINE OF THE CONDUIT.
2. 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.
3. WHERE REINFORCED CONCRETE PIPE HAS A DEFLECTION GREATER THAN 5° USE CONCRETE COLLAR PER DETAIL.

REV.	DESCRIPTION	DATE
A	ADDED FILL WEST END	9-19-69

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 629-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED:

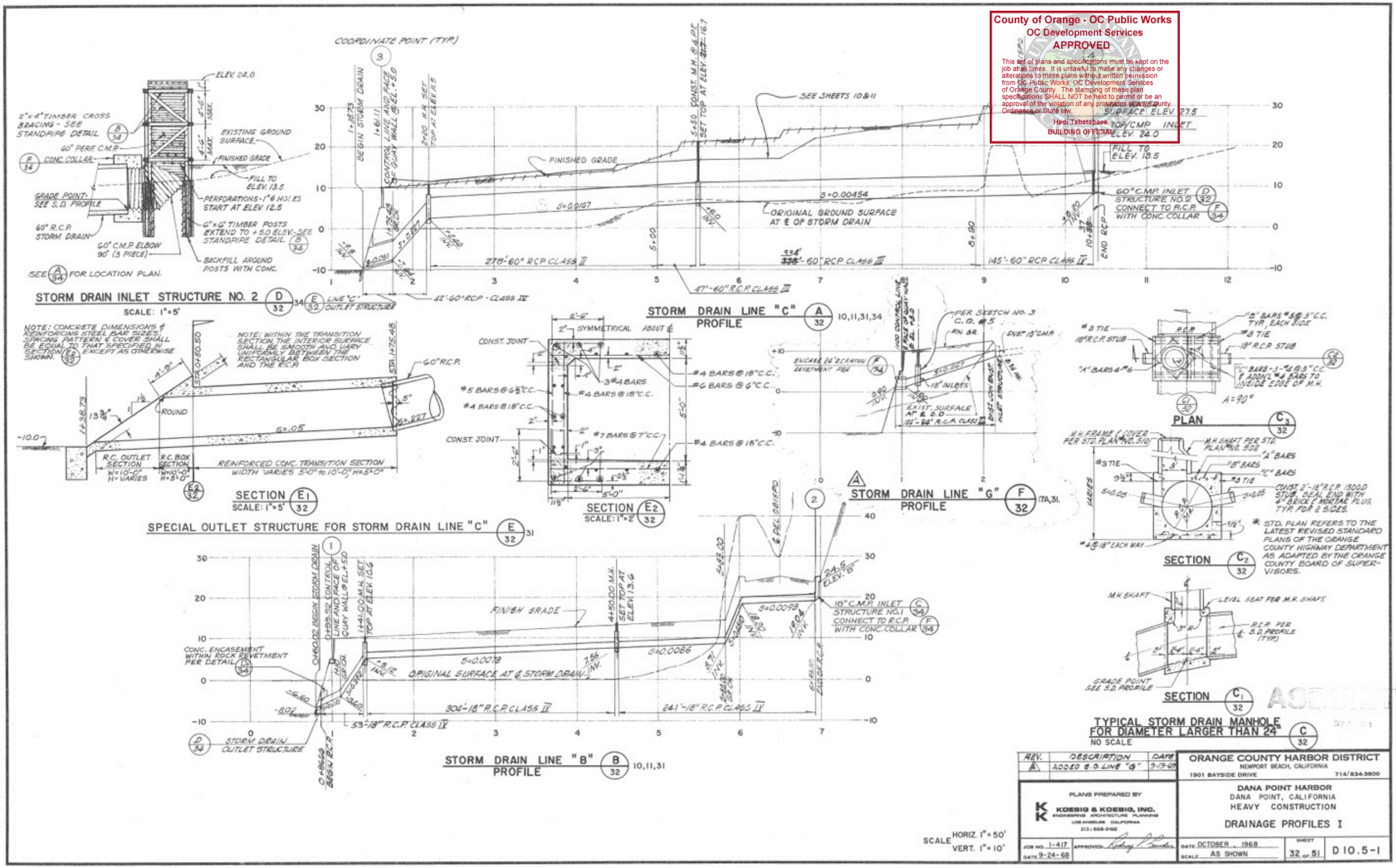
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

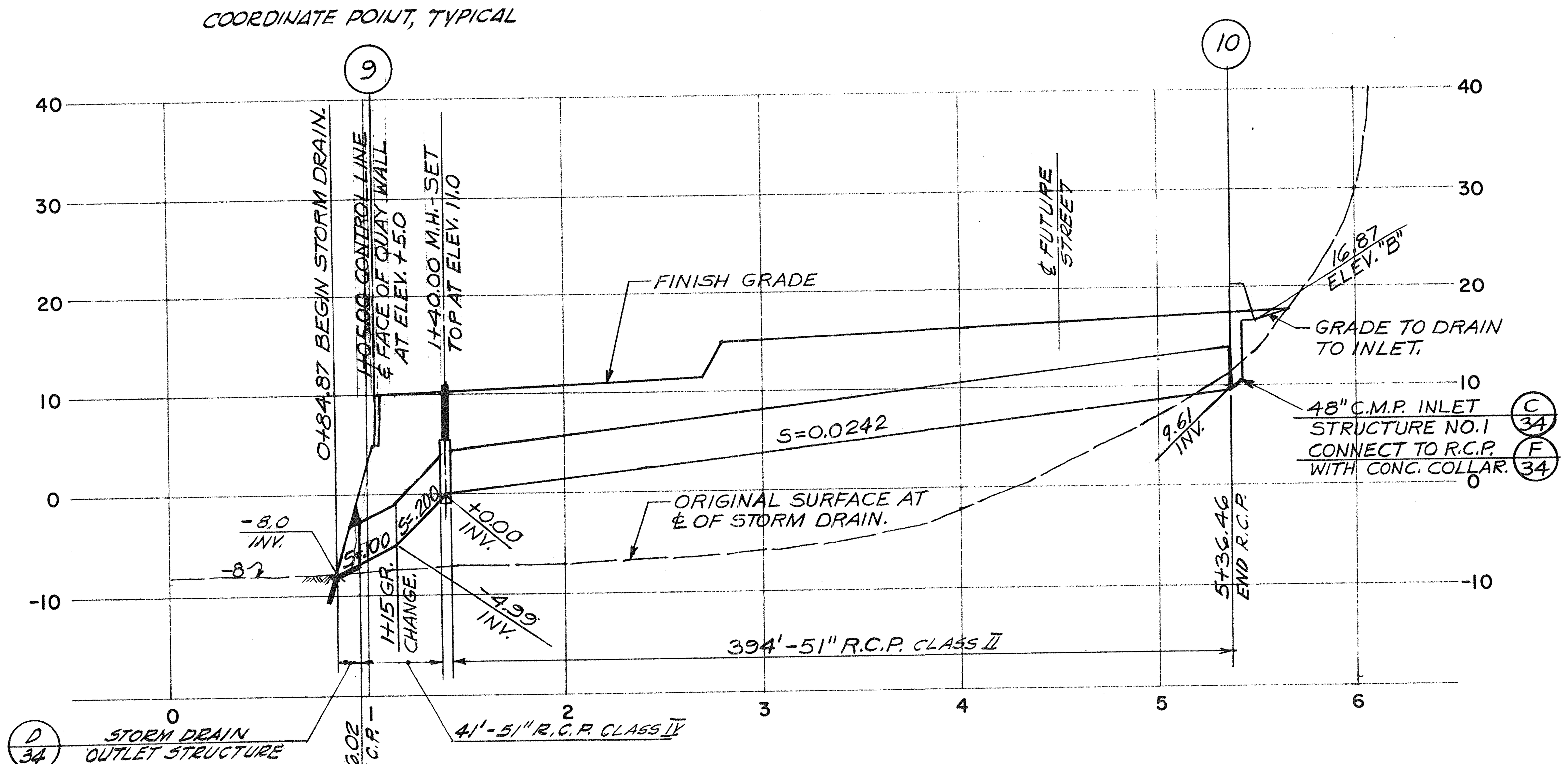
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

DRAINAGE PLAN

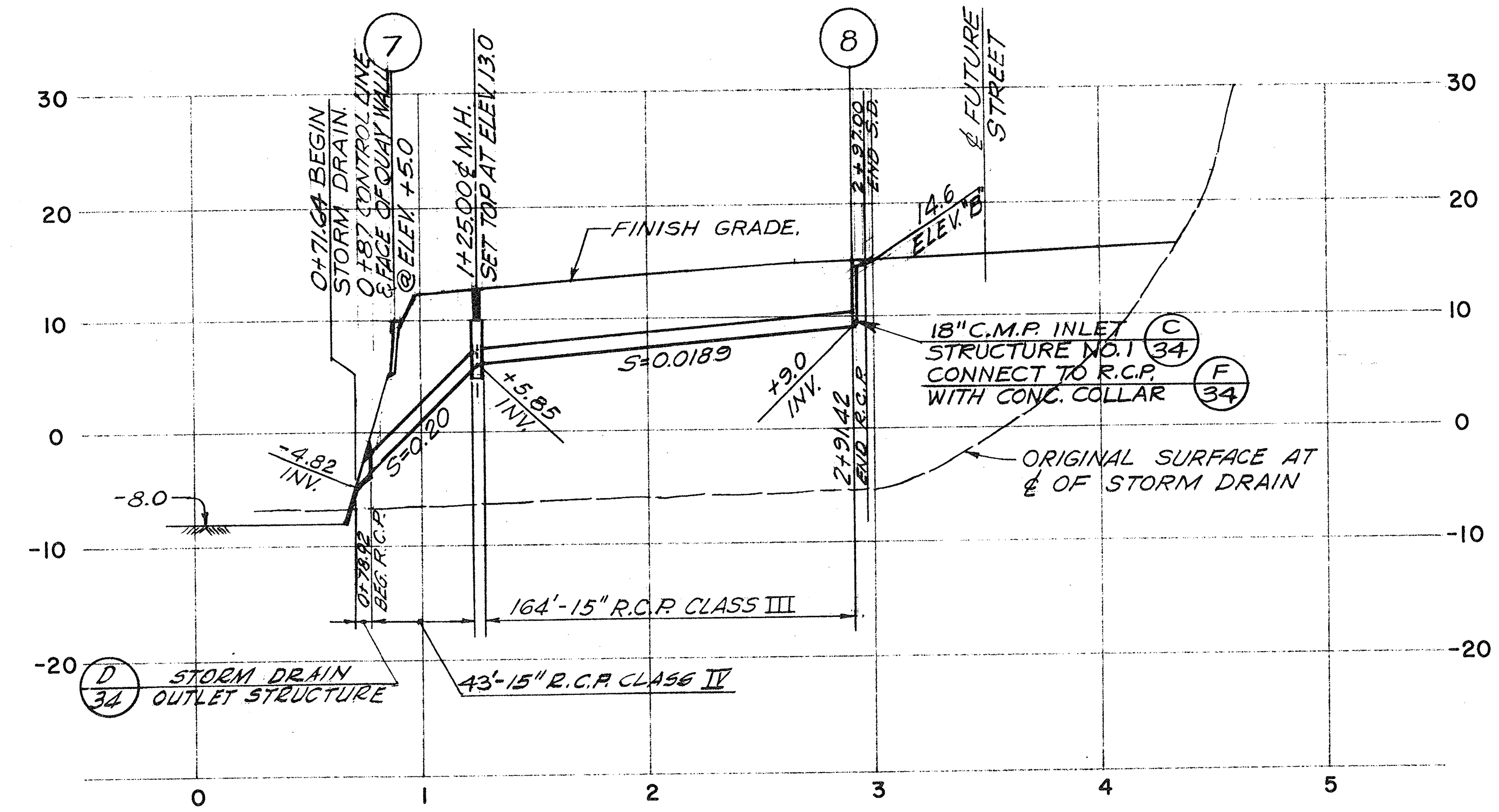
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 31 OF 51
D10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

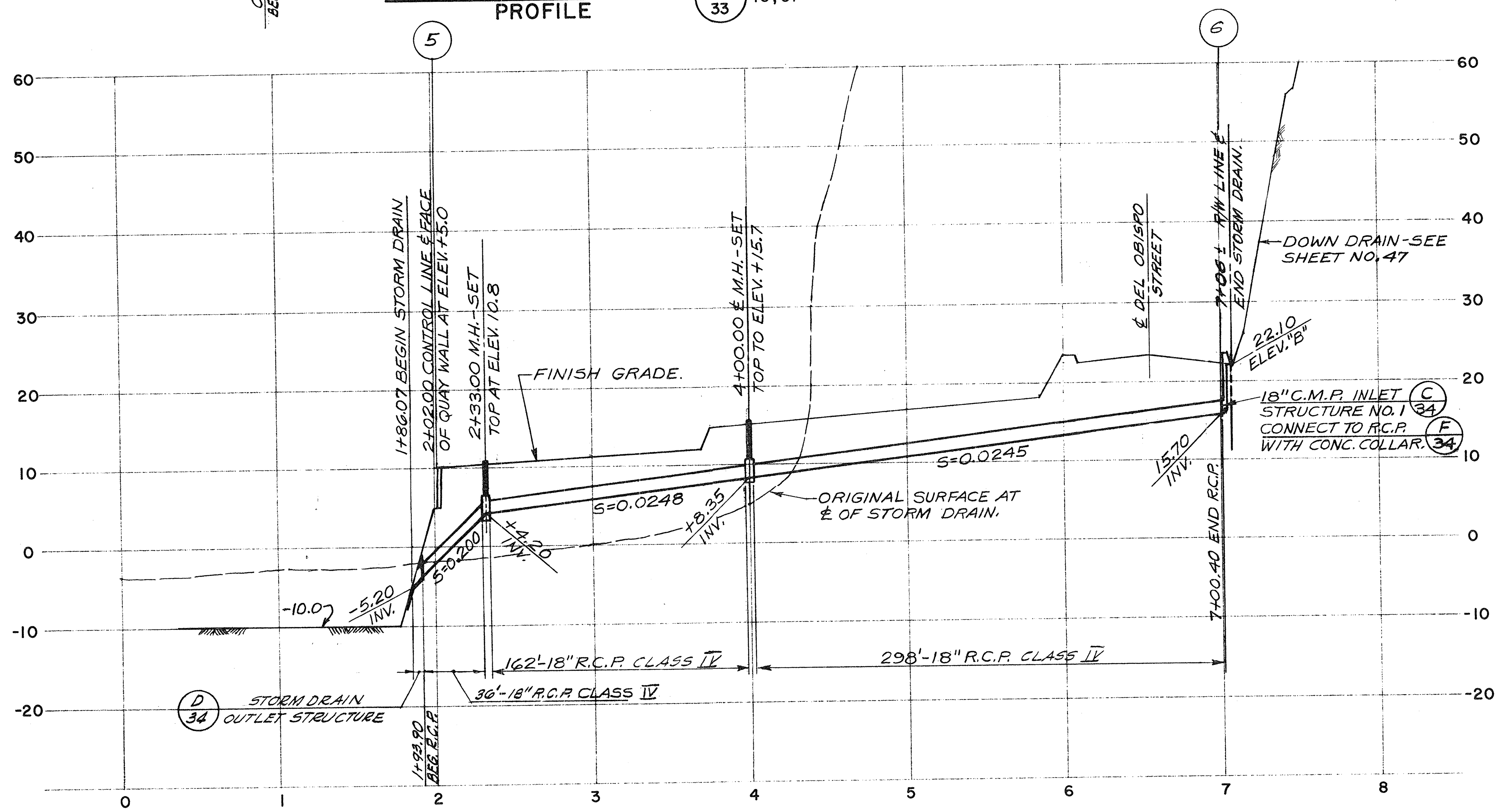




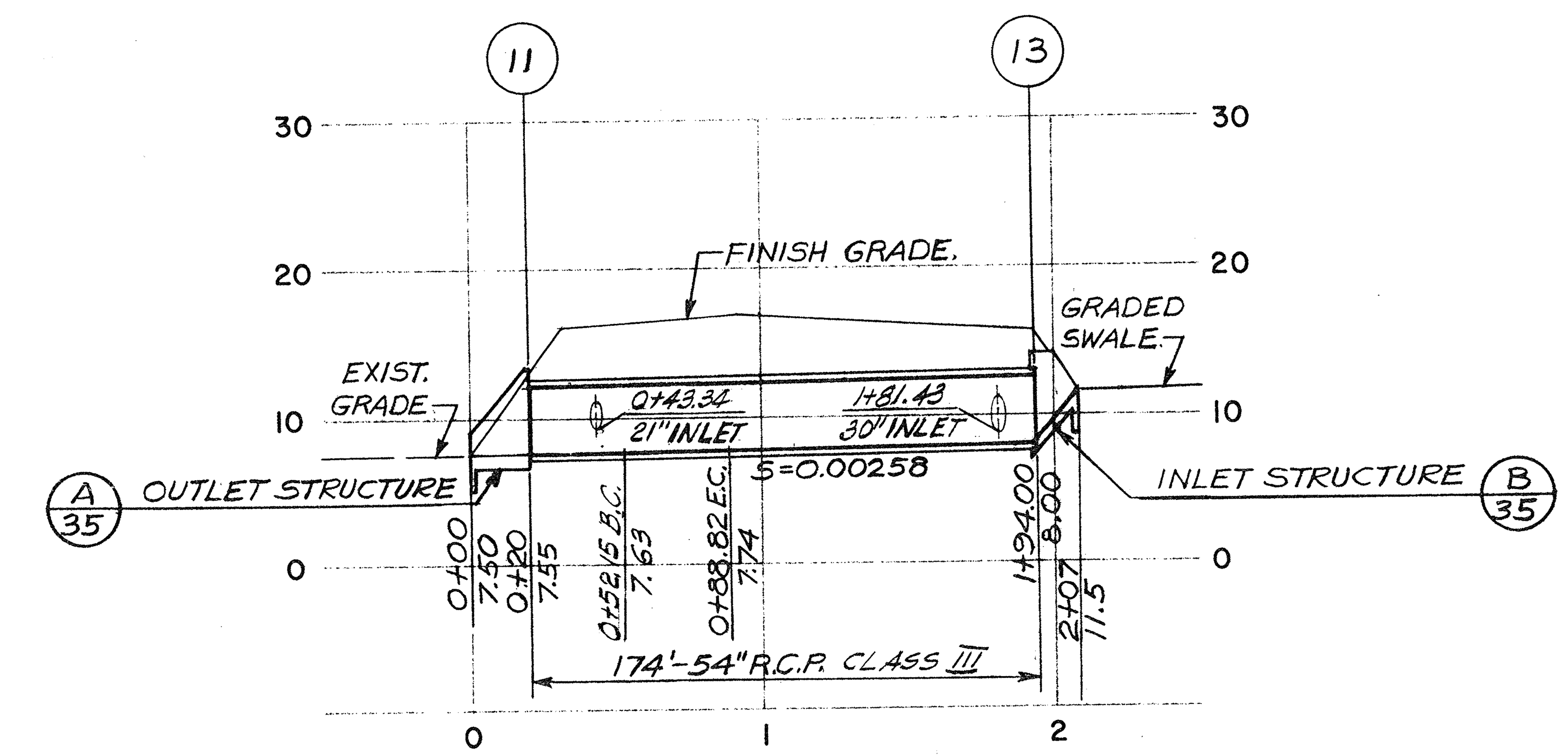
STORM DRAIN LINE "F" PROFILE (A/33) 15,31



STORM DRAIN LINE "E" PROFILE (B/33) 13,31



STORM DRAIN LINE "D" PROFILE (C/33) 9,13,31



STORM DRAIN LINE "A" PROFILE (D/33) 9,31,34

FOR PLAN-SEE (G/34)

SCALE: HORIZ. 1"=50' VERT. 1"=10'

ASBUILT

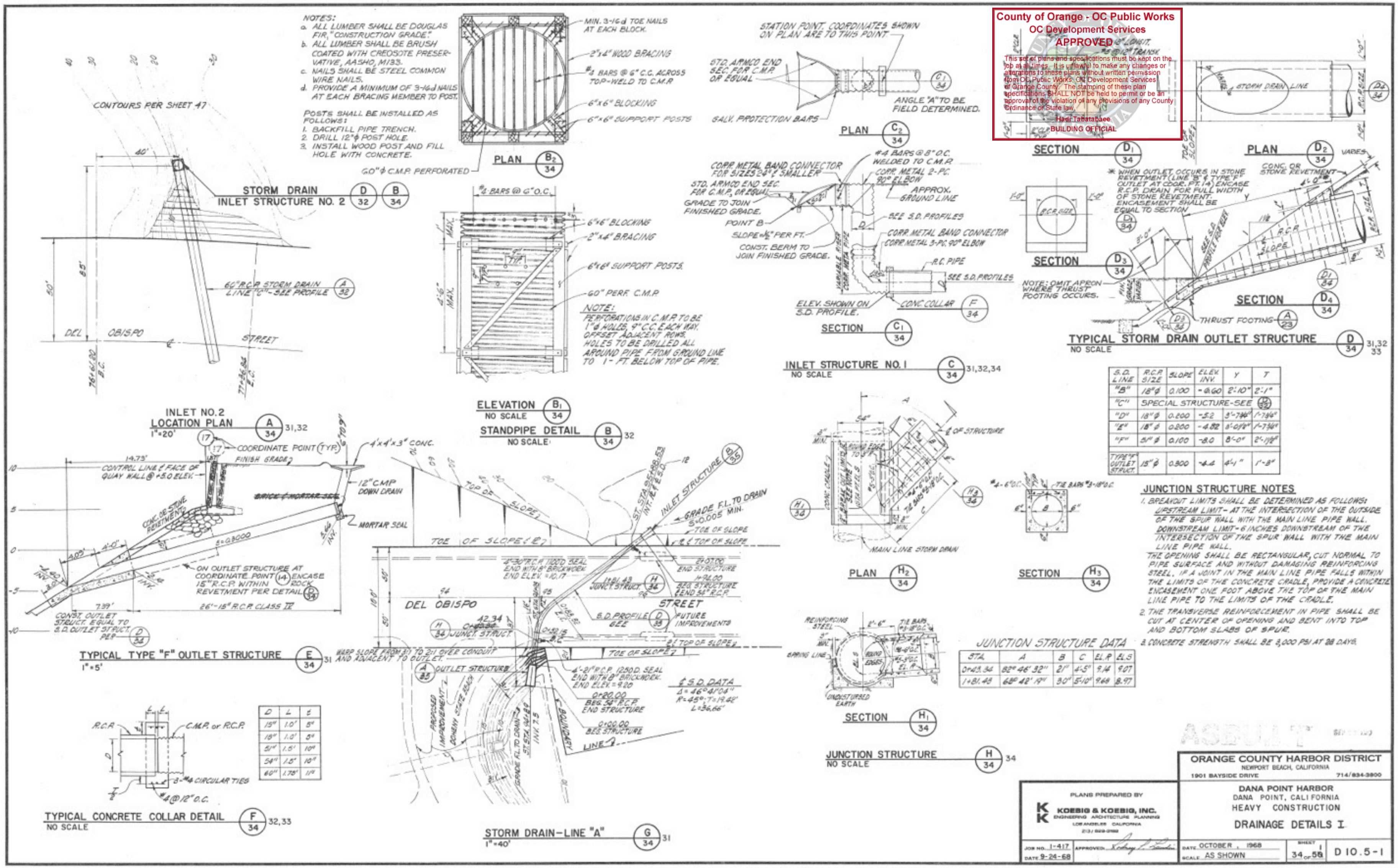
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

JOB NO. 1-417
DATE 9-24-68
APPROVED:

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
DRAINAGE PROFILES II

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 33 OF 50
D10.5-1



NOTES:

a. ALL LUMBER SHALL BE DOUGLAS FIR, "CONSTRUCTION GRADE."
b. ALL LUMBER SHALL BE BRUSH COATED WITH CREOSOTE PRESERVATIVE, AASHO, 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	-6.60	2'-10"	2'-1"
"C"	SPECIAL STRUCTURE-SEE D/32				
"D"	18"ϕ	0.200	-5.2	3'-7¾"	1'-7¾"
"E"	18"ϕ	0.200	-4.82	3'-0⅛"	1'-7¾"
"F"	51"ϕ	0.100	-8.0	8'-0"	2'-11½"
TYPE "F" OUTLET STRUCT.	15"ϕ	0.300	-4.4	4'-1"	1'-8"

JUNCTION STRUCTURE NOTES

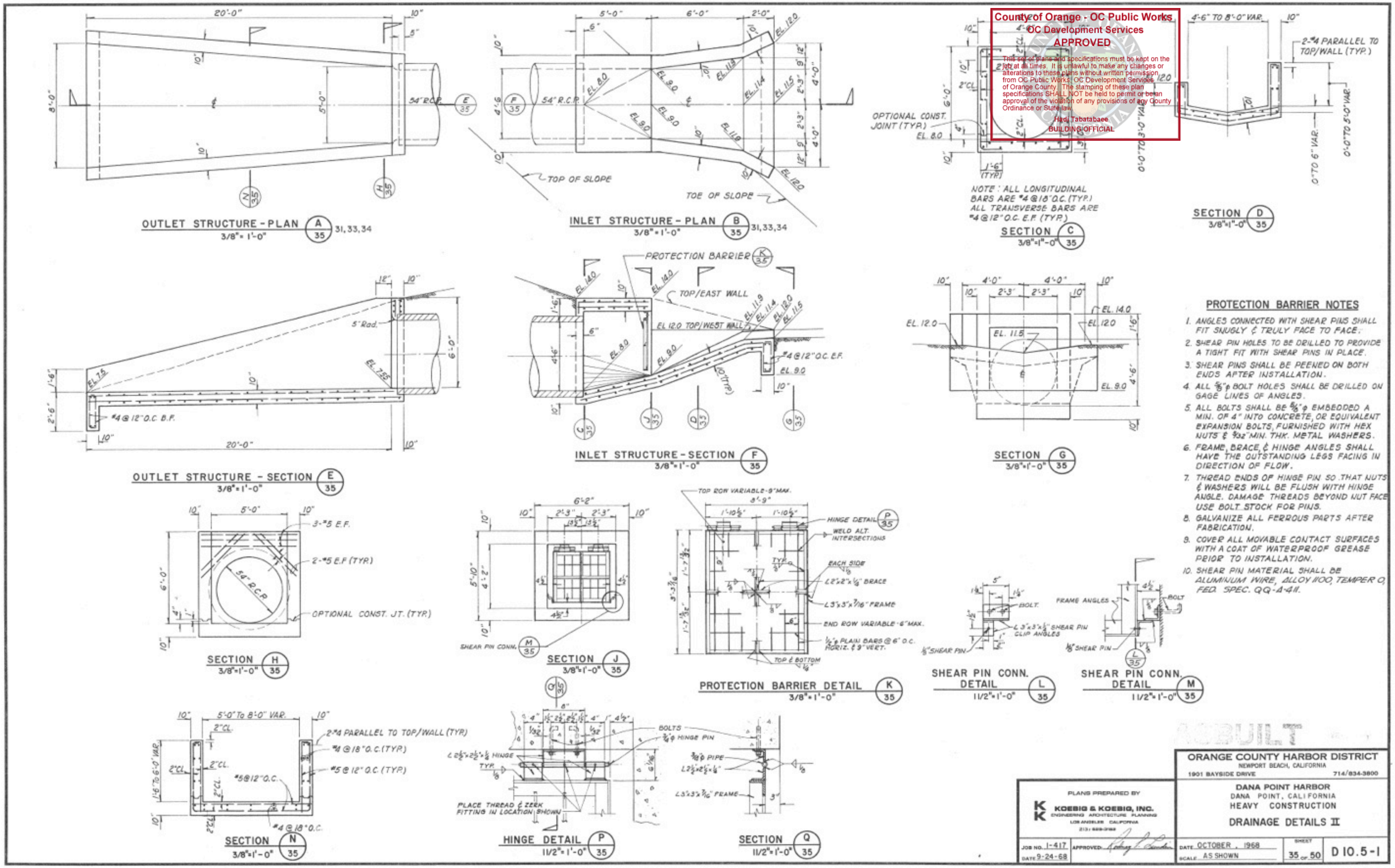
1. BREAKOUT LIMITS SHALL BE DETERMINED AS FOLLOWS:
   UPSTREAM LIMIT - AT THE INTERSECTION OF THE OUTSIDE OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL.
   DOWNSTREAM LIMIT - 6 INCHES DOWNSTREAM OF THE INTERSECTION OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL.
   THE OPENING SHALL BE RECTANGULAR, CUT 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.
2. THE TRANSVERSE REINFORCEMENT IN PIPE SHALL BE CUT AT CENTER OF OPENING AND BENT INTO TOP AND BOTTOM SLABS OF SPUR.
3. CONCRETE STRENGTH SHALL BE 3,000 PSI AT 28 DAYS.

JUNCTION STRUCTURE DATA

STA.	A	B	C	EL. R	EL. S
0+43.34	82° 46' 32"	21"	4'-5"	9.14	9.07
1+81.43	63° 42' 19"	30"	5'-10"	9.68	8.97

D	L	t
15"	1.0'	5"
18"	1.0'	5"
51"	1.5'	10"
54"	1.5'	10"
60"	1.75'	11"

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245



PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/628-3182

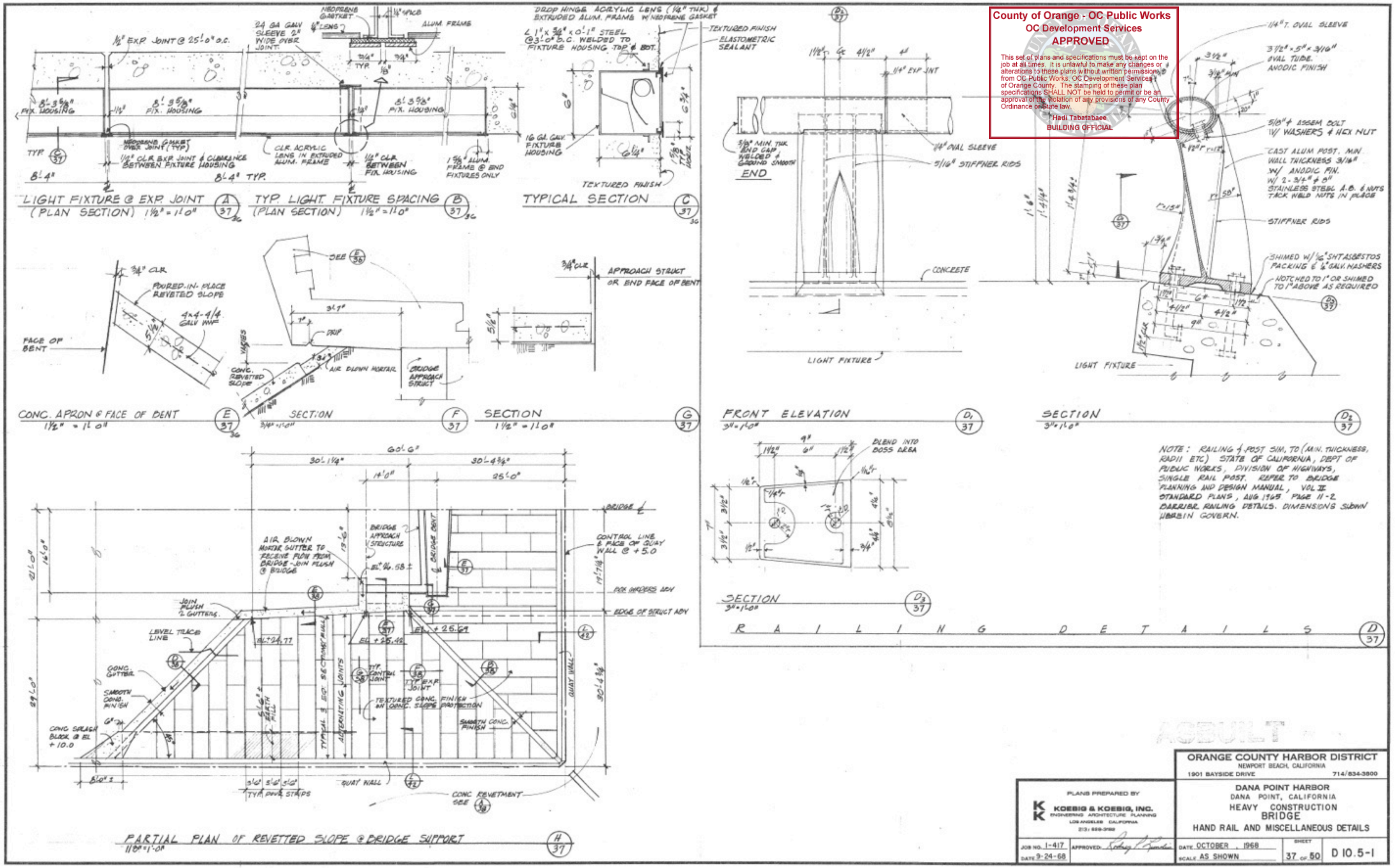
JOB NO. 1-417
DATE 9-24-68
APPROVED: [signature]

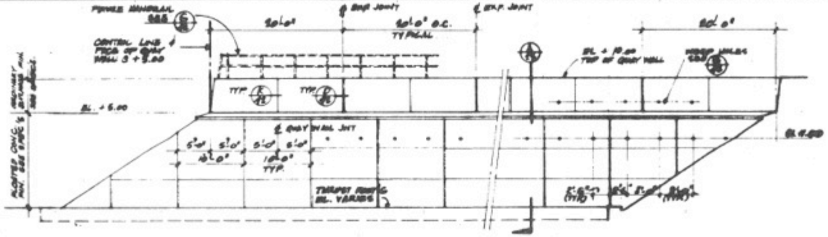
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
BRIDGE
ARCHITECTURAL PLAN, ELEVATION AND MISCELLANEOUS DETAILS

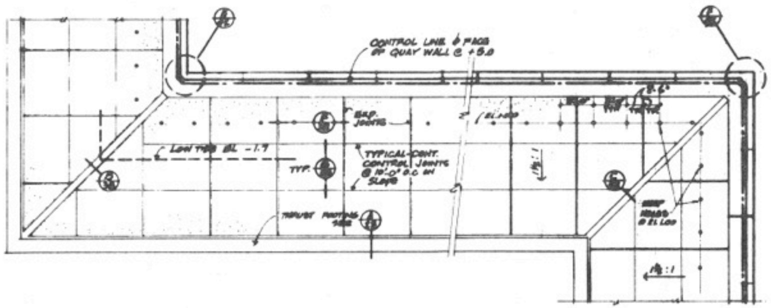
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 36 OF 50
D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

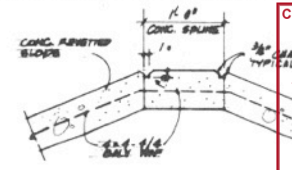




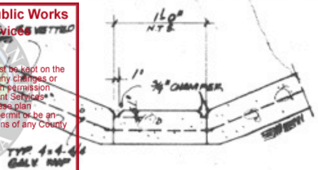
TYP. ELEVATION OF QUAY WALL & CONC. REVETTED SLOPE
1/8" = 1'-0"
A/38



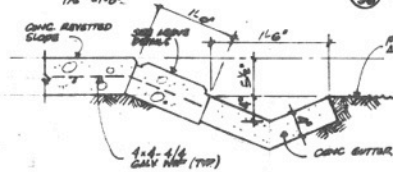
TYP. PLAN OF QUAY WALL & REVETTED SLOPE
1/8" = 1'-0"
B/38



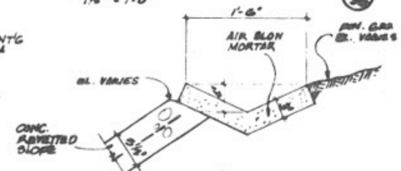
TYPICAL CONCRETE SPLINE OUTSIDE CORNER
1 1/2" = 1'-0"
D/38 37



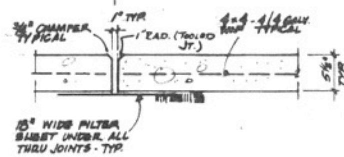
TYPICAL CONCRETE SPLINE INSIDE CORNER
1 1/2" = 1'-0"
C/38



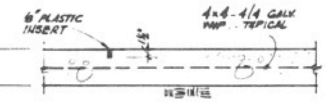
CONC. SPLINE & DRAIN @ BRIDGE
1 1/2" = 1'-0"
10'-0" O.C. TYPICAL
D/38 37



TERM. GUTTER @ BRIDGE & REVETTED SLOPE
1 1/2" = 1'-0"
E/38 37



TYPICAL CONC. REVETTED SLOPE EXPANSION JOINT
1 1/2" = 1'-0"
F/38 37



TYPICAL CONC. REVETTED SLOPE CONTROL JOINT
1 1/2" = 1'-0"
G/38 37

ASBUILT

PLANS PREPARED BY KOEBIG & KOEBIG, INC.	ORANGE COUNTY HARBOR DISTRICT, 1901 BAYSIDE DRIVE, NEWPORT BEACH, CALIFORNIA
JOB NO. 1-417 / DATE 9-24-68 / APPROVED	DANA POINT HARBOR, DANA POINT, CALIFORNIA, HEAVY CONSTRUCTION
	CONCRETE REVETTED SLOPE TYPICAL PLAN ELEVATIONS & DETAILS
	DATE OCTOBER, 1968 / SCALE AS SHOWN / SHEET 38 OF 80 / D 10

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

AS BUILT

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
BRIDGE
STRUCTURAL PLAN AND SECTION

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/628-3182

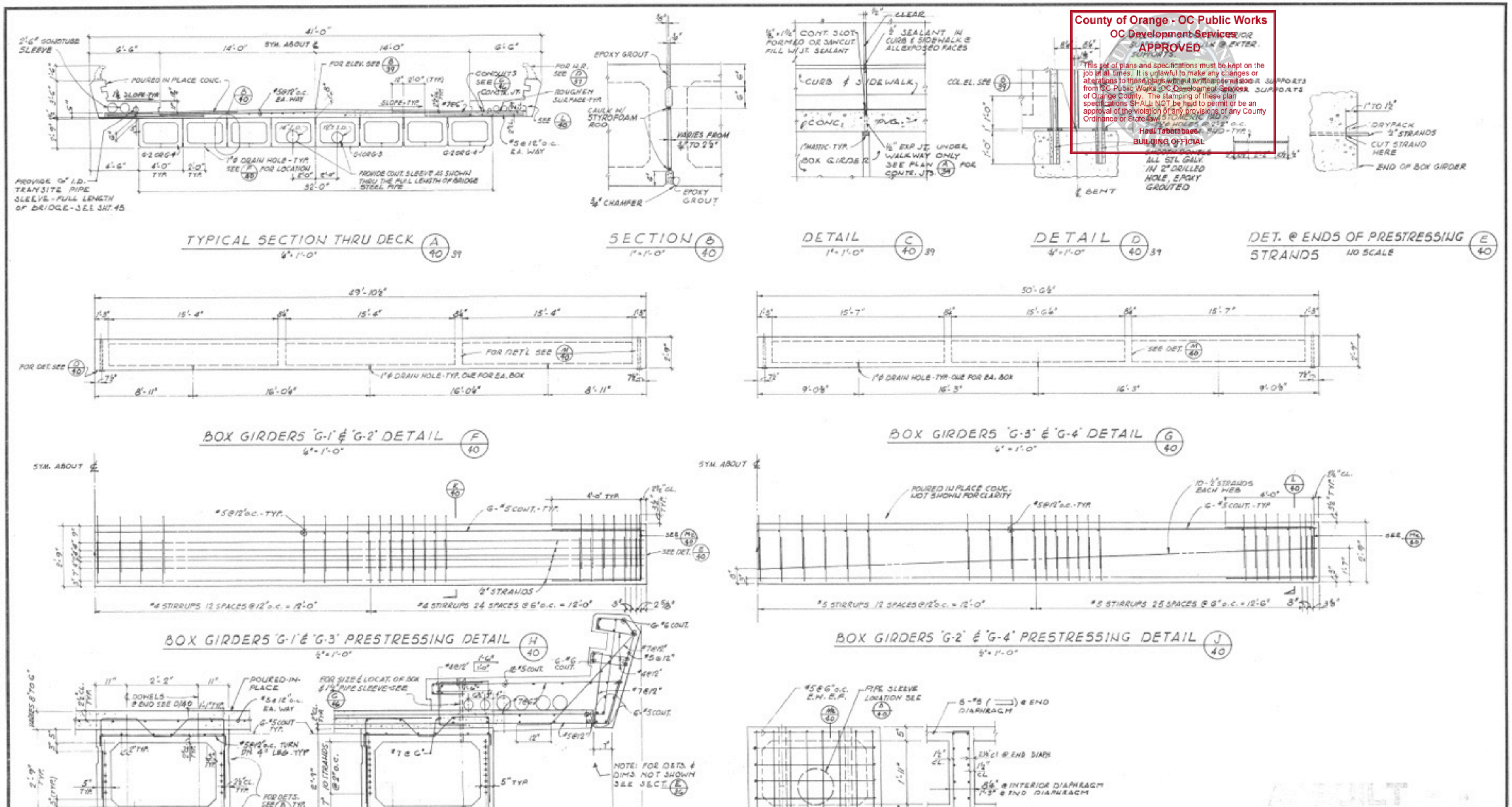
JOB NO. 1-417	APPROVED: Rodney P. Lundin	DATE OCTOBER, 1968	SHEET 39 OF 50
DATE 9-24-68		SCALE AS SHOWN	D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Hadi Tabatabaee
BUILDING OFFICIAL



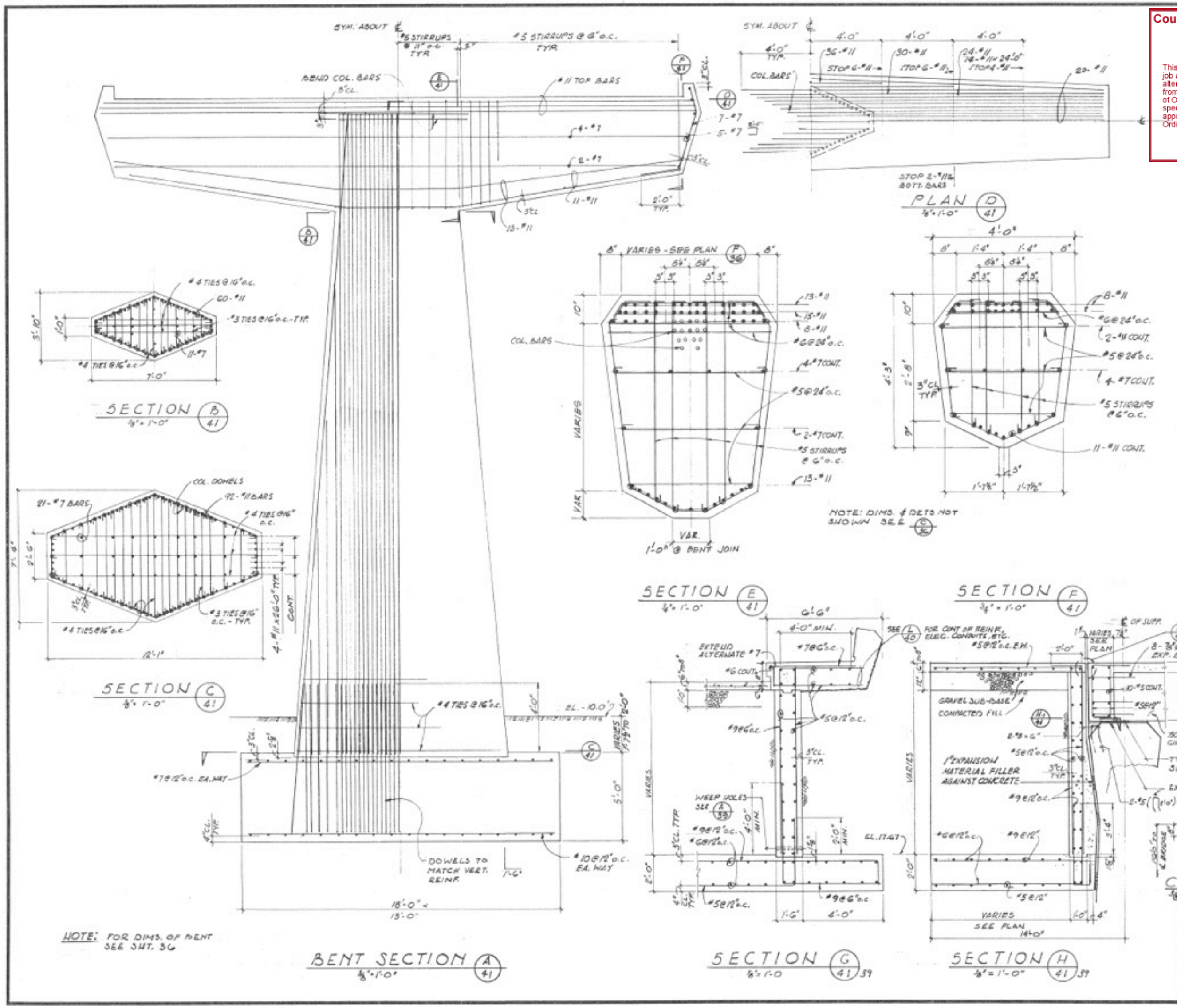
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3162

JOB NO. 1-417
DATE 9-24-68
APPROVED:

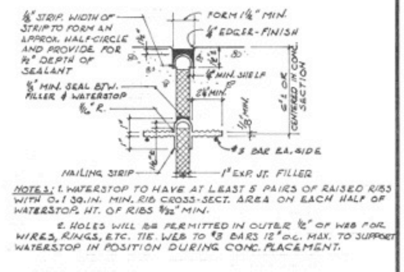
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
BRIDGE
TYPICAL SECTIONS AND BOX GIRDER DETAILS

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 40 OF 50
D 10.5-1



GENERAL NOTES

1. DESIGN CRITERIA FOR THE PRESTRESSED BOX GIRDERS:
   ... DESIGN, MATERIAL AND CONSTRUCTION: A.A.S.H.O. 1965
2. ... CONTAIN TYPE II PORTLAND CEMENT WITH 3/4" MAXIMUM SIZE OF ... SLUMP OF 3" AND SHALL HAVE A MINIMUM STRENGTH AT 28 DAYS AS FOLLOWS:
   a) BOX GIRDERS f'_c = 5000 PSI, WITH NOT LESS THAN 7 1/2 SACKS OF CEMENT PER CUBIC YARD. AT TRANSFER f'_{ci} = 5000 PSI.
   b) SIDEWALKS, PAVEMENTS, BENTS, FOOTINGS AND APPROACH STRUCTURES; f'_c = 4500 PSI, WITH NOT LESS THAN 7 SACKS OF CEMENT PER CUBIC YARD. USE PLASTIMENT OR EQUAL CONCRETE DENSIFIER AS PER MANUFACTURER'S INSTRUCTIONS.
3. PRETENSIONING STEEL SHALL BE SEVEN-WIRE STRESS RELIEVED STRAND, UNCOATED, 270 KSI CONFORMING TO ASTM A-416 - POST TENSIONING WILL NOT BE PERMITTED.
4. REINFORCING STEEL SHALL BE INTERMEDIATE GRADE DEFORMED BARS IN ACCORDANCE WITH ASTM SPECIFICATIONS A-15 AND A-305.
5. ELASTOMERIC BEARING PADS; AS PER A.A.S.H.O. SPECIFICATION, ARTICLE 1.7.51 - 50 DUROMETER HARDNESS.
6. EPOXY GROUT SHALL BE FURANE EPOCAST 530-2 OR EQUAL AND SHALL BE USED AS PER MANUFACTURER'S RECOMMENDATIONS.
7. THE TOP OF BOX GIRDERS AND FOOTINGS SHALL HAVE WOOD FLOAT ROUGH FINISH.
8. CHAMFER OR ROUND TO 3/4" RADIUS ALL EXPOSED CORNERS UNLESS OTHERWISE NOTED.
9. THE BEARING AREA VARIATION FROM PLANE SURFACE SHALL NOT EXCEED 1/16 INCH.
10. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS UNLESS OTHERWISE NOTED.
11. IN HANDLING BOX GIRDERS, THEY MUST BE MAINTAINED IN HORIZONTAL POSITION WITH LIFTING HOOKS UPRIGHT AT ALL TIMES AND MUST BE PICKED UP USING THE LIFTING HOOKS.

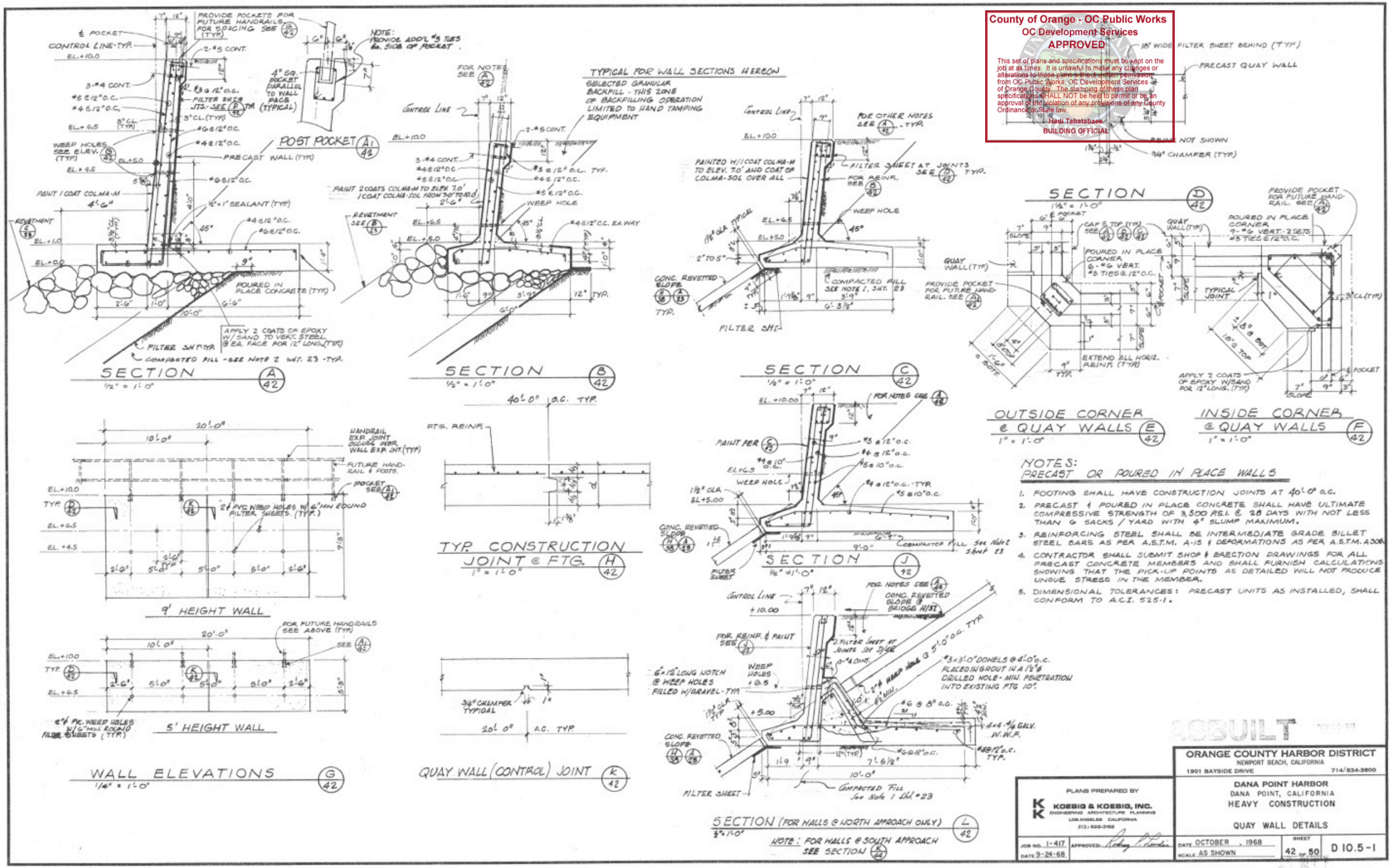


SEALED DECK JOINT DETAIL J/41
NO SCALE

ORANGE COUNTY HARBOR DISTRICT NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800	
PLANS PREPARED BY KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213/629-3162	DANA POINT HARBOR DANA POINT, CALIFORNIA HEAVY CONSTRUCTION BRIDGE TYPICAL BENT AND APPROACH STRUCTURE DETAILS
JOB NO. 1-417 DATE 9-24-68 APPROVED:	DATE OCTOBER, 1968 SCALE AS SHOWN SHEET 41 OF 50 D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plans and specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL



Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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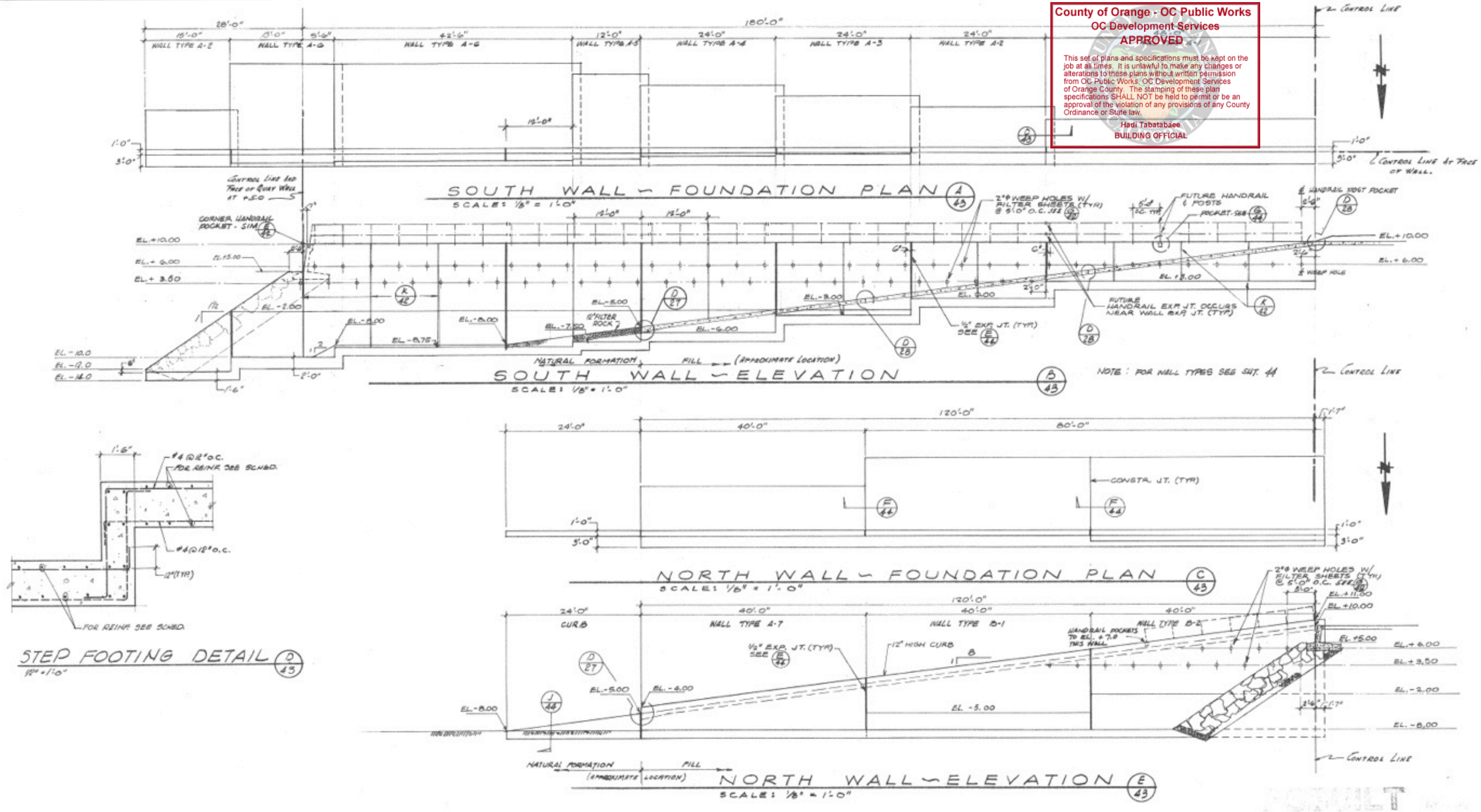
BUILDING OFFICIAL



PLANS PREPARED BY KOEBIG & KOEBIG, INC. ENGINEERING ARCHITECTURE PLANNING LOS ANGELES CALIFORNIA 213/ 666-9166		**ORANGE COUNTY HARBOR DISTRICT** NEWPORT BEACH, CALIFORNIA 1901 BAYSIDE DRIVE 714/834-3800	
JOB NO. 1-417 DATE 9-24-68	APPROVED:	**DANA POINT HARBOR** DANA POINT, CALIFORNIA HEAVY CONSTRUCTION RETAINING WALLS PLANS & ELEVATIONS	
		DATE OCTOBER, 1968 SCALE AS SHOWN	SHEET 43 OF 50 — D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
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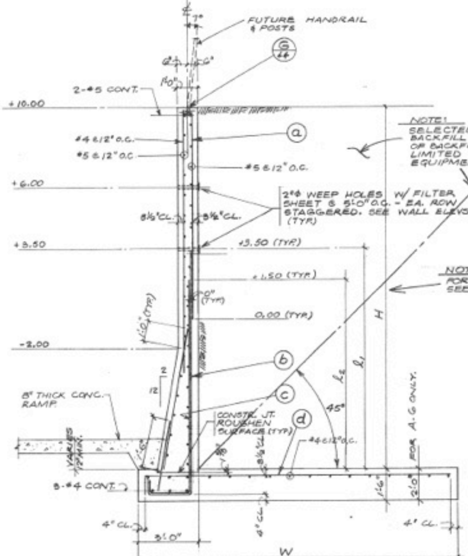
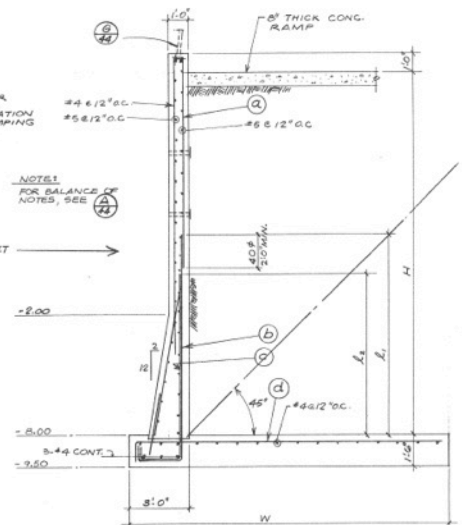
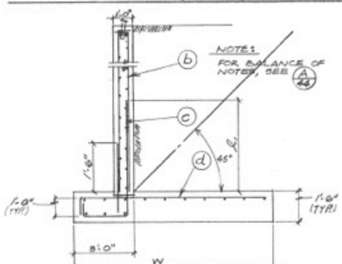
BUILDING OFFICIAL



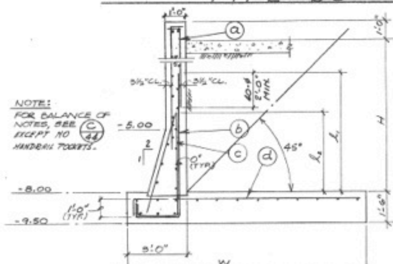
TYPES "A-3", "A-4", "A-5", & "A-6" (A/44)



TYPE "B-2" (C/44)



TYPES "A-1", "A-2" & "A-7" (B/44)

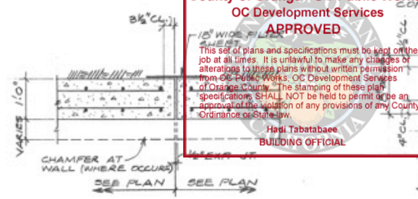


TYPE "B-1" (D/44)

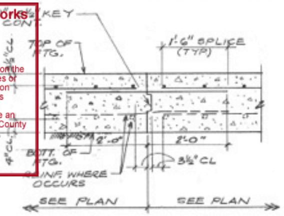
SOUTH WALL (ELEV. @ TOP OF WALL - CONSTANT)									
TYPE	DIMENSIONS		REINFORCING STEEL				LENGTHS		REMARKS
	H	W	(a)	(b)	(c)	(d)	ℓ_1	ℓ_2	
A-1	7'-0"	7'-6"	—	#6@12	#6@12	#5@12	3'-6"	—	—
A-2	10'-0"	10'-0"	—	#7@12	#7@6	#7@12	3'-6"	—	—
A-3	13'-0"	12'-0"	#7@12	#9@12	#7@12	#10@12	6'-6"	4'-6"	ALTERNATE (b) & (c)
A-4	16'-0"	14'-0"	#7@12	#9@12	#9@12	#9@6	9'-6"	7'-6"	" " "
A-5	18'-0"	16'-0"	#7@12	#9@12	#9@12	#10@6	11'-6"	9'-6"	" " "
A-6	20'-0"	18'-0"	#7@12	#9@12	#9@12	#10@6	13'-6"	11'-6"	" " " FTG. THICKNESS = 24"

NORTH WALL (ELEV. @ BOTT. OF FTG. - CONSTANT)									
TYPE	DIMENSIONS		REINFORCING STEEL				LENGTHS		REMARKS
	H	W	(a)	(b)	(c)	(d)	ℓ_1	ℓ_2	
A-7	8'-0"	11'-0"	—	#7@12	#7@12	#6@12	—	—	CONC. RAMP SAME AS TYPE "B" DETAILS.
							VARIES	VARIES	
B-1	15'-0"	16'-0"	#7@12"	#9@12"	#7@12"	#7@6"	5.0 to 7.5	3.0 to 5.5	ALTERNATE (b) & (c) BARS
							VARIES	VARIES	
B-2	18'-0"	16'-0"	#7@12"	#9@12"	#9@12"	#11@6"	7.5 to 10.0	5.5 to 8.0	ALTERNATE (b) & (c) BARS

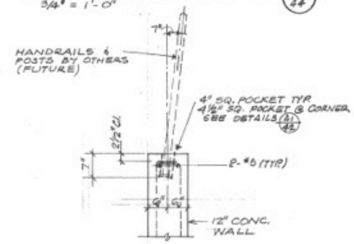
Note: WHERE SPLICES OF DIFFERENT SIZE BARS OCCUR, LAP SHALL BE BASED ON LARGER DIAMETER.



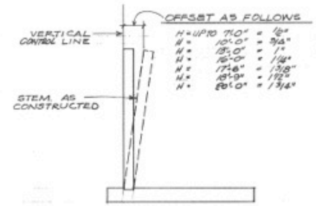
EXP. JT. @ WALL (E/44)
3/4" = 1'-0"



CONSTR. JT. @ FTG. (F/44)
3/4" = 1'-0"

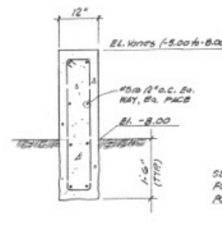


(TYP.) DETAIL (G/44)
3/4" = 1'-0"

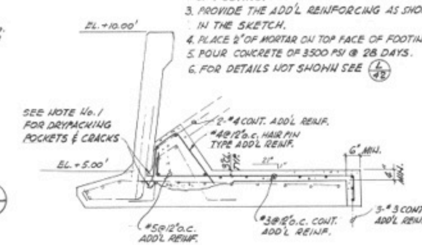


TYP. WALL OFFSET (H/44)
NO SCALE

NOTES:
1. DRYPACK ALL THE POCKETS AND CRACKS AT THE WALL. USE POR-ROK OR EQUAL.
2. THOROUGHLY CLEAN AND/OR SANDBLAST TOP OF FOOTING.
3. PROVIDE THE ADD'L REINFORCING AS SHOWN IN THE SKETCH.
4. PLACE 2" OF MORTAR ON TOP FACE OF FOOTING.
5. POUR CONCRETE OF 3500 PSI @ 28 DAYS.
6. FOR DETAILS NOT SHOWN SEE (L/42)



CURB DETAIL (J/44)
3/4" = 1'-0"



SECTION (FOR WALLS @ SOUTH APPROACH ONLY) (K/44)
½" = 1'-0"

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

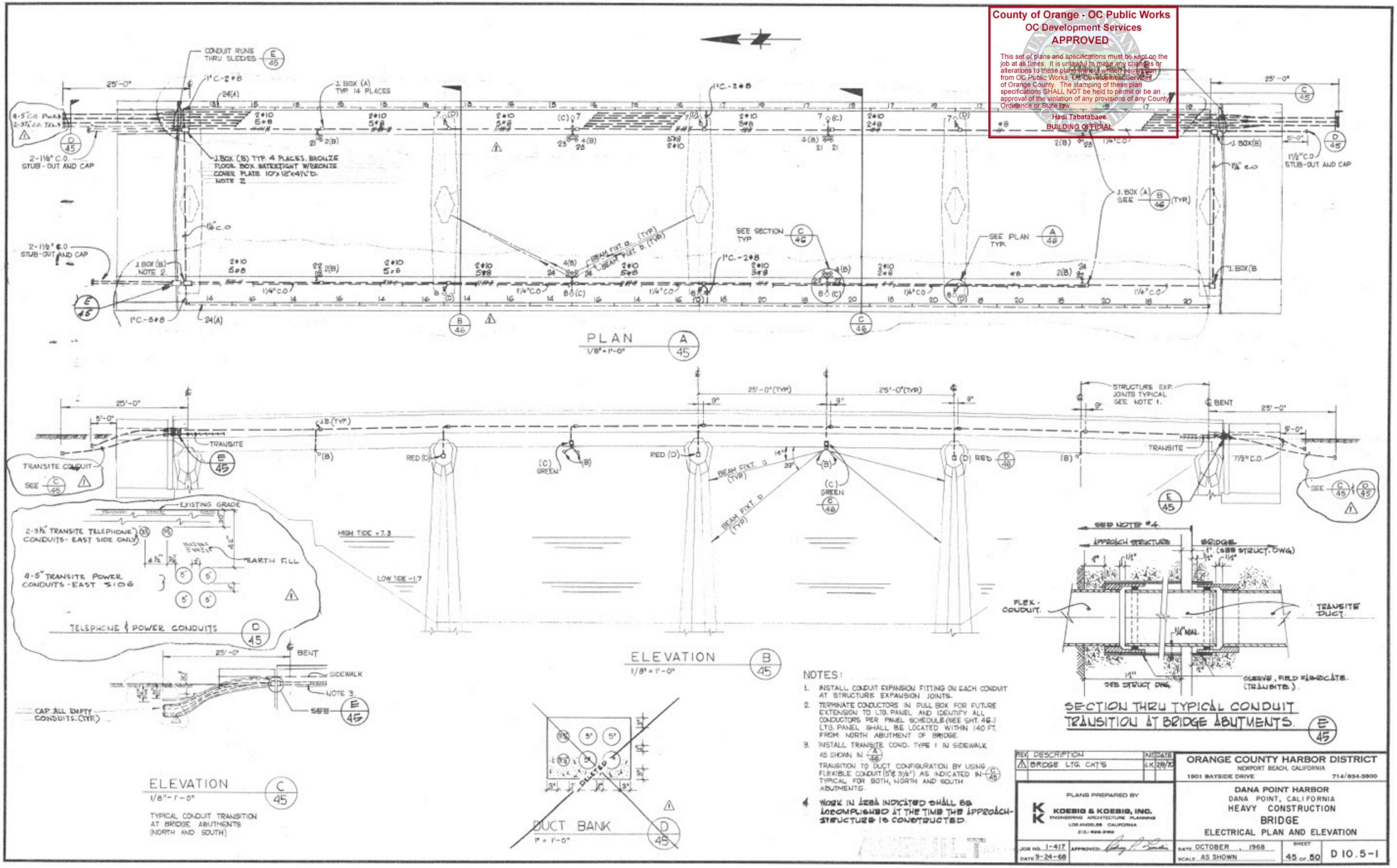
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

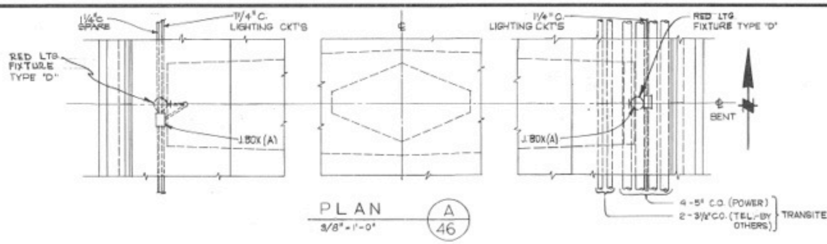
RETAINING WALLS-DETAILS

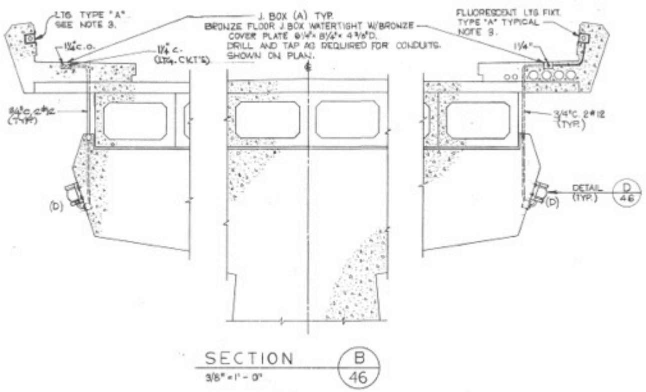
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA

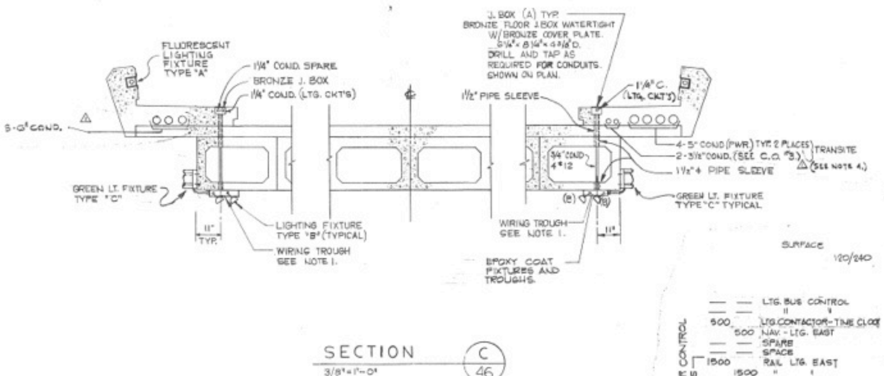
JOB NO. 1-417
DATE 9-24-68
APPROVED:
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 44 OF 50
D 10.5-1

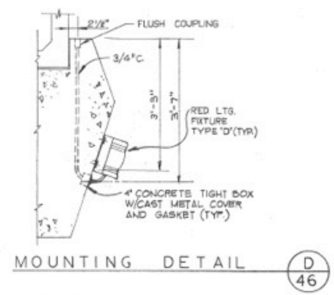
Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245











PANEL SCHEDULE "LA" (SEE NOTE 2.)

120/240 VOLTS, 1φ, 3 WIRE — 125 A. MAIN BREAKER

CONTACTOR CONTROLLED CKT'S (SPLIT BUS): CKT. 1–16

DELETED

CKT. NO.	DESCRIPTION	LTG. FIX.	BREAKER AMPS	BREAKER POLES	WATTS BUS A	WATTS BUS B
1	BRIDGE LTG. EAST	8	20	2	750	750
2	" " WEST	7	20	2	875	875
3	" " EAST	6	20	2	750	750
4	" " WEST	7	20	2	875	875
5	" " EAST	6	20	2	750	750
6	" " WEST	6	20	2	750	750
7	" " EAST	6	20	2	750	750
8	" " WEST	6	20	2	750	750
9	" " EAST	6	20	2	750	750
10	" " WEST	6	20	2	750	750
11	FLOOD LTS. EAST	6	20	1	750	—
12	" " WEST	6	20	1	750	—
13	" " EAST	6	20	1	—	750
14	" " WEST	6	20	1	—	750
15	SPARE	–	20	1	500	—
16	SPARE	–	20	1	500	—
17	RED & GREEN RES. LTS. EAST	5	[illegible]	1	—	500
18	" " " " WEST	5	[illegible]	1	—	500
19	(1) LTG. CONTACTOR & RELAY		20	1	100	—
20	SPARE		20	1	500	
21	SPARE		20	1	—	500
22	SPACE					
				TOTAL	10850	10,750

CONNECTED LOAD = 21.6 KW
AMPS = 91 AMP.
L.C.L. = 91 × 1.25 = 114 AMP.

INSTALL (1) MECHANICALLY HELD LTG. CONTACTOR, 100 A – 2P, TO CONTROL CKT'S #1 THRU #18. LOCATION OF PANEL AND MEANS OF CONTROLLING LTG. CONTACTOR TO BE DETERMINED LATER. SEE NOTE 2.
INSTALL (1) MECHANICALLY HELD RELAY 25 A. 4P (N.O.) TO CONTROL CKT'S 17 & 18. RELAY SHALL BE CONTROLLED BY INDEPENDENT DEVICE; PROVIDE ALSO PUSHBUTTON TO OVERRIDE CONTROLLING DEVICE CONTACTS. (FOR CONTROL OF MECH. HELD RELAY) FOR MANUAL OPERATION AND TESTING.

FIXTURE SCHEDULE

TYPE	DESCRIPTION	MOUNTING	WATTS	LAMP
A	FLUORESCENT RECESSED W/BRONZE CLEAR ACRYLIC PANEL ANODIZED FINISH. (SEE SPECIFICATIONS)	RECESSED	250	F96T12 CW
B	FLOODLIGHT W/NARROW BEAM LAMP & BRONZE ANODIC FINISH	SURFACE	200	PAR 46 120 V.
C	CAST BRONZE WATERTIGHT WITH GREEN FRESNEL LENS, MEDIUM SCREW SOCKET. PERKO 1005.	WALL	100	A/100
D	INCANDESCENT CAST BRONZE WATERTIGHT W/180 RED FRESNEL LENS, MEDIUM SCREW PERKO 1005	WALL	100	A/100

LEGEND

SYMBOL	DESCRIPTION
———	CONDUIT RUN EXPOSED.
— — —	CONDUIT RUN CONCEALED IN CONCRETE, OR BELOW GRADE
-///-	TIC MARKS INDICATE QUANTITY OF WIRES, SIZE # 12 AWG, CONDUIT FILL PER CODE, UNLESS OTHERWISE NOTED.
-///- #8	TIC MARKS INDICATE QUANTITY OF WIRES, SIZE AS NOTED, CONDUIT FILL PER CODE, UNLESS OTHERWISE NOTED.
▭	FLUORESCENT LIGHTING FIXTURE, MOUNTED AS INDICATED IN THE FIXTURE SCHEDULE.
○	INCANDESCENT LIGHTING FIXTURE, MOUNTED AS INDICATED IN THE FIXTURE SCHEDULE.
D	FLOODLIGHT FIXT., MOUNTING AS INDICATED ON PLANS.
□ J.B.	JUNCTION BOX.
C.O.	CONDUIT ONLY.
W.P.	WEATHERPROOF

NOTES:

1. 2"× 2"× 14"L, WEATHERPROOF, CORROSIONPROOF CAST ALUM. WIRING TROUGH W/3/4" MOUNTING HOLE AND 6-½" TAPPED HOLES (1 PLUG) COVER AND GASKET. EPOXY FINISH TO MATCH LTG FIXTURE.
2. "SCHEDULE" FOR PANEL "LA" SHOWN IN THIS DWG. IS FOR REFERENCE ONLY. NO PANEL INSTALLATION WILL BE INCLUDED IN THIS CONTRACT.
3. FLUORESCENT LTG. FIXTURES ON BRIDGE RAILING SHOULD BE INSTALLED IN ACCORDANCE WITH DETAILS SHOWN ON ARCHITECTURAL DWG A/37, B/37, C/37
4. TELEPHONE CONDUITS (2-3½") WILL BE ~~FURNISHED AND INSTALLED BY OTHERS~~ PER CHANGE ORDER #3.

REV	DESCRIPTION	MT.	DATE
1	BRIDGE LTG. CKT'S.	J.K.	2/9/70

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213 / 628-3162
JOB NO. 1-417
DATE 9-24-68
APPROVED:

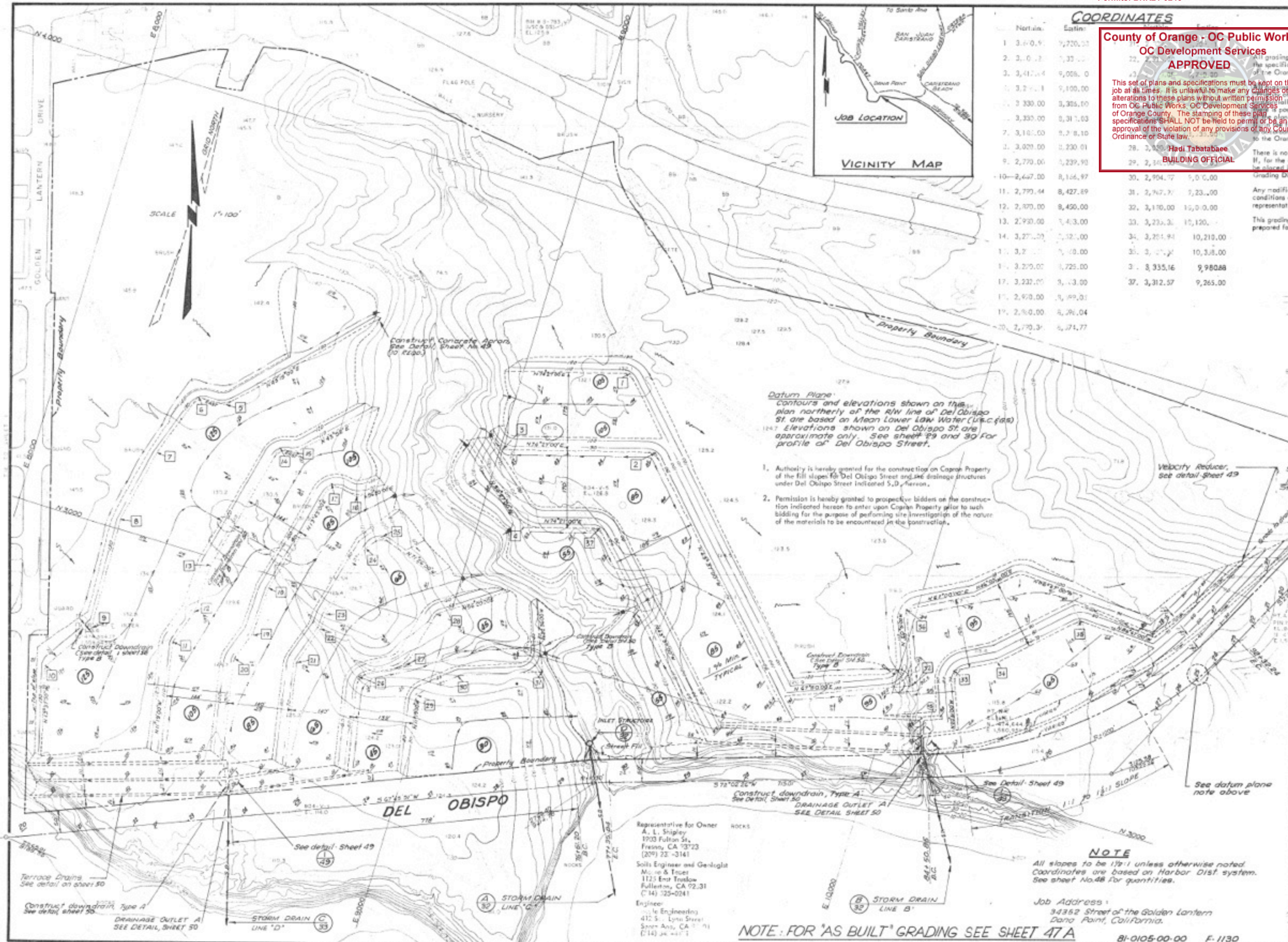
ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
BRIDGE
ELECTRICAL MISCELLANEOUS DETAILS

DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 46 OF 50
D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL



Coordinates

	Northing	Easting		Northing	Easting
1.	3,[illegible]0.9[illegible]	9,720.[illegible]	21.	[illegible]	[illegible]
2.	3,[illegible]	[illegible],33[illegible]	22.	[illegible]	[illegible]
3.	3,41[illegible]	9,006.[illegible]0	23.	[illegible]	[illegible]
4.	3,2[illegible]	9,100.00	24.	[illegible]	[illegible]
5.	3,330.00	3,305.00	25.	[illegible]	[illegible]
6.	3,330.00	8,31[illegible].03	26.	[illegible]	[illegible]
7.	3,10[illegible].00	[illegible]	27.	[illegible]	[illegible]
8.	3,020.00	[illegible],230.01	28.	3,020.[illegible]	[illegible]
9.	2,770.00	[illegible],239.90	29.	2,[illegible]	[illegible]
10.	2,647.00	8,1[illegible].97	30.	2,904.[illegible]	9,0[illegible]0.00
11.	2,770.44	8,427.89	31.	2,[illegible]	[illegible],23[illegible].00
12.	2,870.00	8,450.00	32.	3,1[illegible]0.00	1[illegible],0[illegible]0.00
13.	2,930.00	[illegible],4[illegible]3.00	33.	3,2[illegible]	1[illegible],120.[illegible]
14.	3,27[illegible]	[illegible],32[illegible].00	34.	3,2[illegible].9[illegible]	10,210.00
15.	3,2[illegible]	[illegible],[illegible]0.00	35.	3,[illegible]	10,3[illegible].00
16.	3,2[illegible]0.0[illegible]	[illegible],725.00	36.	3,335.16	9,980.88
17.	3,232.[illegible]	9,[illegible]3.00	37.	3,312.57	9,265.00
18.	2,9[illegible]0.00	[illegible],[illegible].0[illegible]			
19.	2,[illegible]0.00	[illegible],29[illegible].04			
20.	2,770.3[illegible]	[illegible],[illegible]74.77			

General Notes

All grading shall be performed generally in accordance with these plans, the specifications, soils and geological report and the general requirements of the Orange County Grading Division.

All grading shall be performed generally in accordance with the plan labeled "Sequence of Grading." It is intended that each terrace or bench be completed sequentially in accordance with the plan and finished in such a condition that there is positive drainage and minimum erosion in accordance with the intent of the plan and the basic requirements of the Orange County Grading Division. If in the final stage of grading, the last bench or terrace cannot be completed in accordance with the plan, the site shall be left in a condition acceptable to the Orange County Grading Division and the owner.

There is no intent to place any onsite fills for the development of the property. If, for the convenience of Contractor or others, onsite fills are made they shall be placed in accordance with the specifications and requirements of the Grading Division or removed after work has been completed.

Any modification or change in the plan which is necessary because of field conditions or construction procedures shall first be approved by the owner or his representative.

This grading plan was prepared to conform to a concept development plan prepared for the property by Adrian Wilson Associates.

AS BUILT

PERMIT NO. 96322
DATE: 7-20-70

Datum Plane:
Contours and elevations shown on this plan northerly of the R/W line of Del Obispo St. are based on Mean Lower Low Water (U.S.C.&G.S.) Elevations shown on Del Obispo St. are approximate only. See sheet 29 and 30 for profile of Del Obispo Street.

1. Authority is hereby granted for the construction on Capron Property of the fill slopes for Del Obispo Street and the drainage structures under Del Obispo Street indicated S.D. hereon.

2. Permission is hereby granted to prospective bidders on the construction indicated hereon to enter upon Capron Property prior to such bidding for the purpose of performing site investigation of the nature of the materials to be encountered in the construction.

Approvals

Conservator for the Person and Estate of George H. Capron
A. L. Shipley Jr. 20-9-68
A.L. Shipley Jr. Date

Moore & Taber - Geologist & Soils Engineer
R. Moore 5-15-68
Return Moore R.C.E. 8369 Date

Boyle Engineering
A. M. Fickes 5-14-68
A.M. Fickes R.C.E. 8841 Date

Representative for Owner
A. L. Shipley
1903 Fulton St.,
Fresno, CA 93723
(209) 23[illegible]-3141

Soils Engineer and Geologist
Moore & Taber
1125 East Truslow
Fullerton, CA 92631
(714) 525-0241

Engineer
Boyle Engineering
412 So. Lyon Street
Santa Ana, CA [illegible]
(714) [illegible]

Note
All slopes to be 1½:1 unless otherwise noted.
Coordinates are based on Harbor Dist. system.
See sheet No.48 for quantities.

Job Address:
34352 Street of the Golden Lantern
Dana Point, California.

NOTE: FOR "AS BUILT" GRADING SEE SHEET 47A

81-0105-00-00 F-1130

CAPRON PROPERTY
ROUGH GRADING PLAN

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
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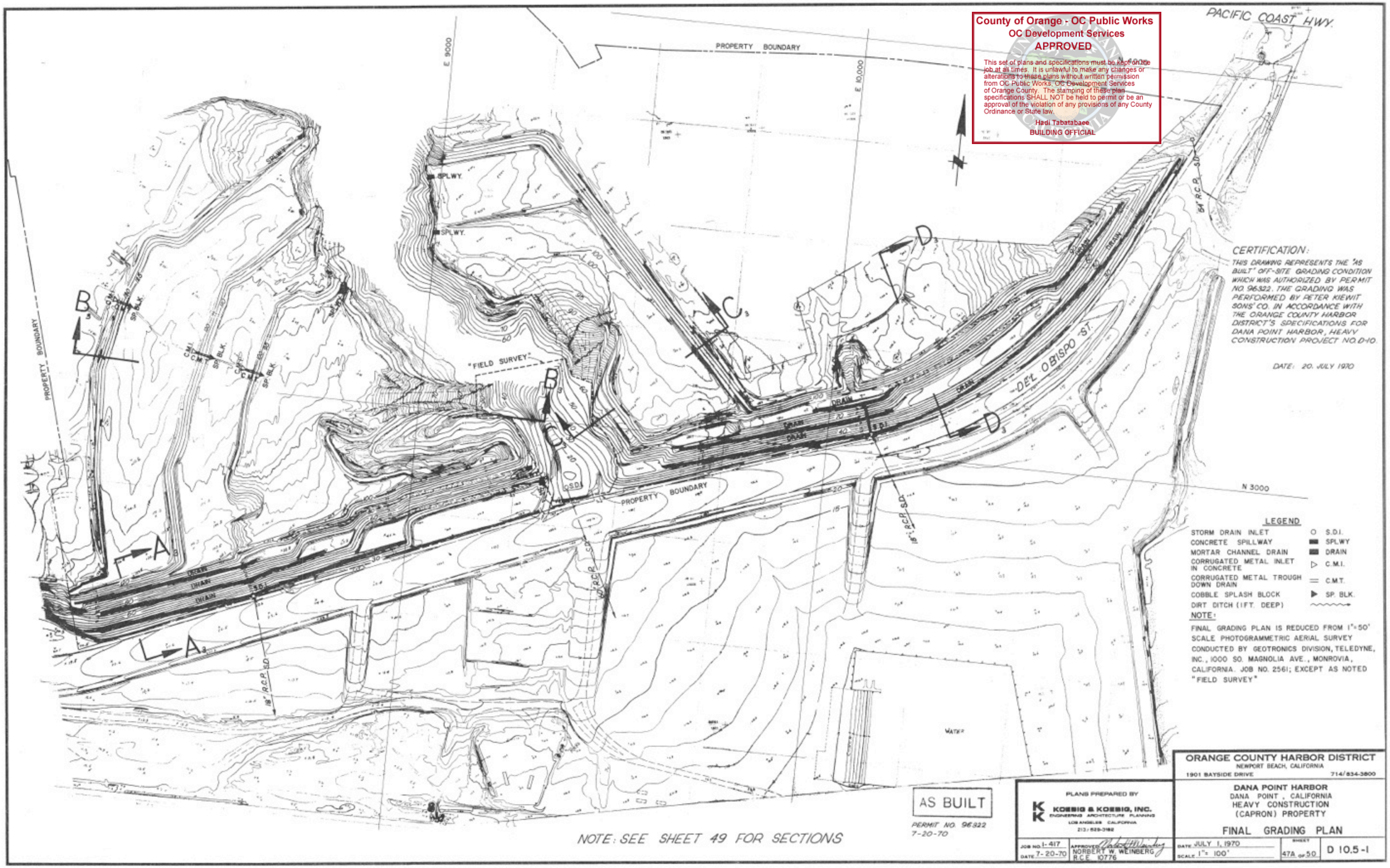
Hadi Tabatabaee
BUILDING OFFICIAL



CERTIFICATION:
THIS DRAWING REPRESENTS THE "AS BUILT" OFF-SITE GRADING CONDITION WHICH WAS AUTHORIZED BY PERMIT NO. 96322. THE GRADING WAS PERFORMED BY PETER KIEWIT SONS' CO. IN ACCORDANCE WITH THE ORANGE COUNTY HARBOR DISTRICT'S SPECIFICATIONS FOR DANA POINT HARBOR, HEAVY CONSTRUCTION PROJECT NO. D-10.

DATE: 20. JULY 1970

LEGEND

STORM DRAIN INLET	○ S.D.I.
CONCRETE SPILLWAY	SPLWY
MORTAR CHANNEL DRAIN	DRAIN
CORRUGATED METAL INLET IN CONCRETE	▷ C.M.I.
CORRUGATED METAL TROUGH DOWN DRAIN	C.M.T.
COBBLE SPLASH BLOCK	▶ SP. BLK.
DIRT DITCH (1 FT. DEEP)	

NOTE:
FINAL GRADING PLAN IS REDUCED FROM 1"=50' SCALE PHOTOGRAMMETRIC AERIAL SURVEY CONDUCTED BY GEOTRONICS DIVISION, TELEDYNE, INC., 1000 SO. MAGNOLIA AVE., MONROVIA, CALIFORNIA. JOB NO. 2561; EXCEPT AS NOTED "FIELD SURVEY"

AS BUILT

PERMIT NO. 96322
7-20-70

NOTE: SEE SHEET 49 FOR SECTIONS

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-3182

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
(CAPRON) PROPERTY

FINAL GRADING PLAN

JOB NO. 1-417
DATE 7-20-70
APPROVED
NORBERT W. WEINBERG
R.C.E. 10776
DATE JULY 1, 1970
SCALE 1" = 100'
SHEET 47A OF 50
D 10.5-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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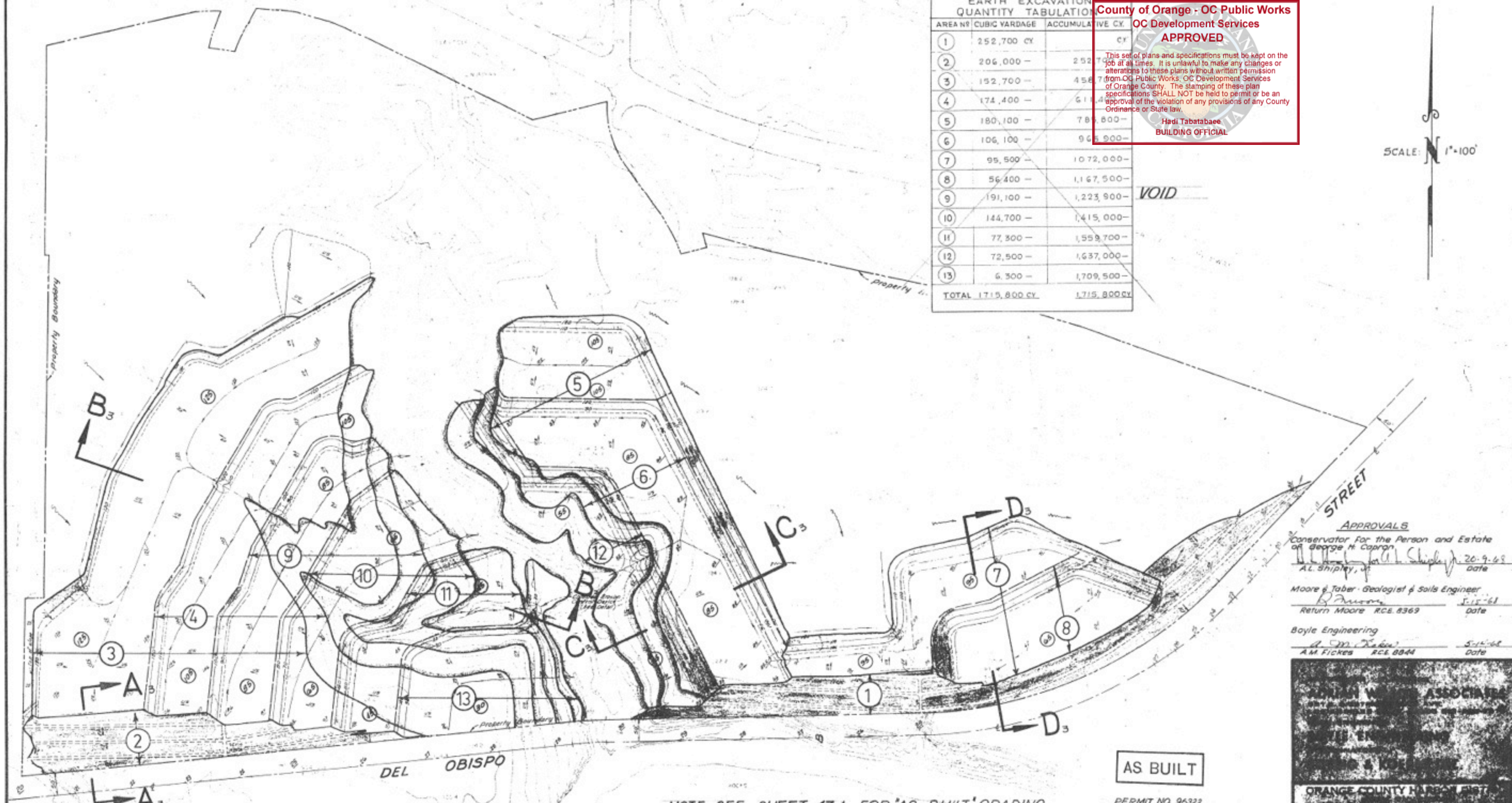
Hadi Tabatabaee
BUILDING OFFICIAL

EARTH EXCAVATION QUANTITY TABULATION

AREA Nº	CUBIC YARDAGE	ACCUMULATIVE C.Y.
1	252,700 CY	CY
2	206,000 –	252,7[illegible]
3	152,700 –	458,7[illegible]
4	174,400 –	611,4[illegible]
5	180,100 –	78[illegible],800 –
6	106,100 –	96[illegible],900 –
7	95,500 –	1072,000 –
8	56,400 –	1,167,500 –
9	191,100 –	1,223,900 –
10	144,700 –	1,415,000 –
11	77,300 –	1,559,700 –
12	72,500 –	1,637,000 –
13	6,300 –	1,709,500 –
TOTAL	1715,800 CY	1,715,800 CY

VOID



APPROVALS

Conservator for the Person and Estate of George H. Capron
A.L. Shipley, Jr. 20-9-68 Date

Moore & Taber · Geologist & Soils Engineer
Return Moore R.C.E. 8369 5-15-68 Date

Boyle Engineering
A.M. Fickes R.C.E. 8844 5-14-68 Date

ASSOCIATES
ORANGE COUNTY

AS BUILT

PERMIT NO. 96322
DATE: 7-20-70

NOTE: SEE SHEET 47 A FOR "AS BUILT" GRADING

NOTE:
SEE SHEET 49 FOR SECTIONS

This plan "Priority of Grading" - Sheet 48 - is intended to show in general concept the priority of the areas to be graded and is not intended to show any details of grading. See Sheet 47 for details.

81-0105-00-00 F-1130

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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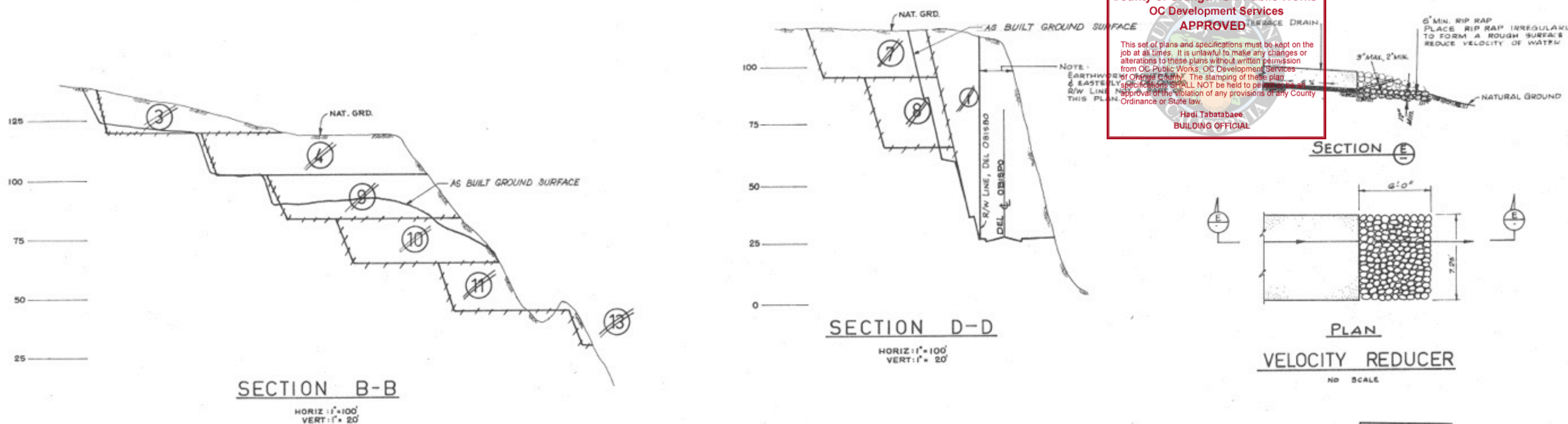
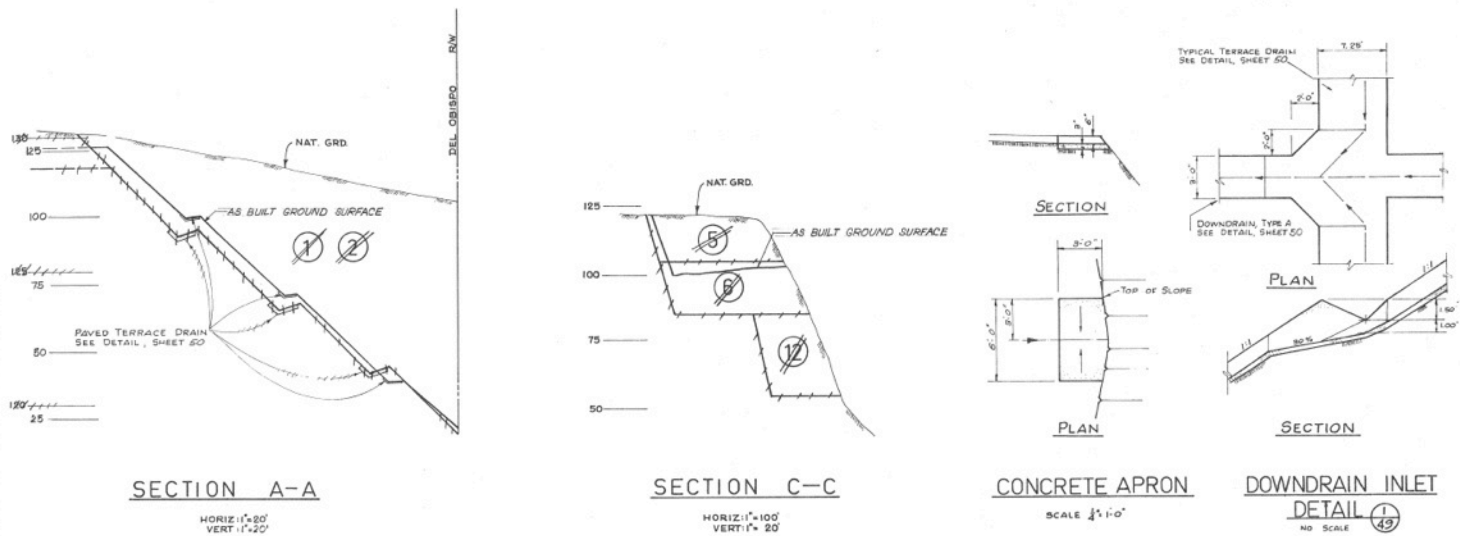
Hadi Tabatabaee
BUILDING OFFICIAL



AS BUILT

PERMIT NO. 96322
DATE: 7-20-70



APPROVALS

Conservator for the Person and Estate of George H. Capron

A.L. Shipley, Jr. — 20-7-68 Date

Moore & Tober - Geologist & Soils Engineer

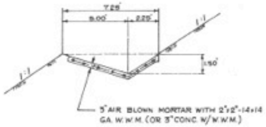
Return Moore R.C.E. 6369 — 5-15-68 Date

Boyle Engineering

A.M. Fickes R.C.E. 6844 — 5-14-68 Date

81-0105-00-00 F-1130

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245



TYPICAL TERRACE DRAIN
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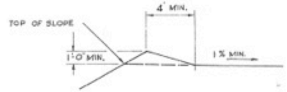
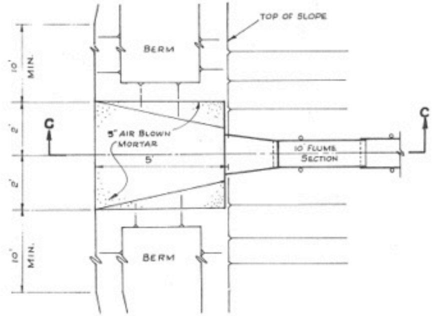
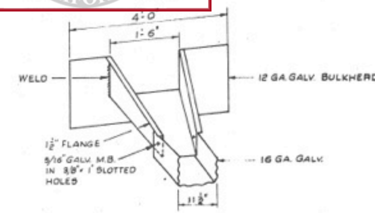


TYPICAL BERM AT TOP OF SLOPE



PLAN
TAPERED INLET AND FLUME DOWNDRAIN
TYPE B



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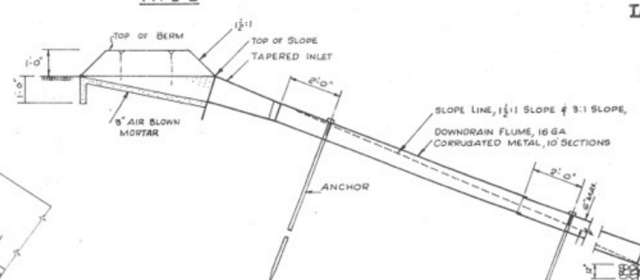
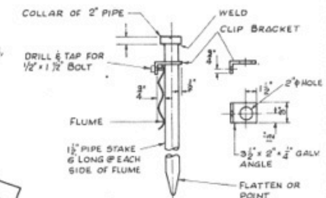
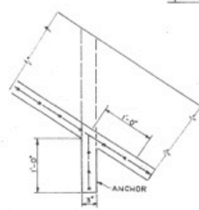


SECTION C-C



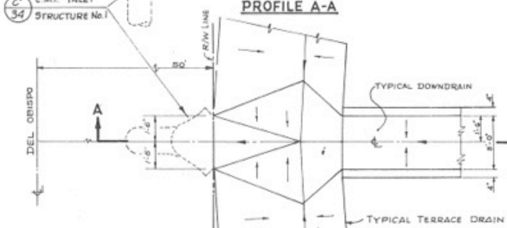
ANCHOR DETAIL

PROFILE A-A

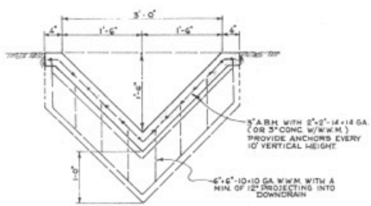


PROFILE
DOWNDRAIN & ANCHOR
SCALE: 1"=1'-0"

C/34 C.M.P. INLET STRUCTURE No. 1

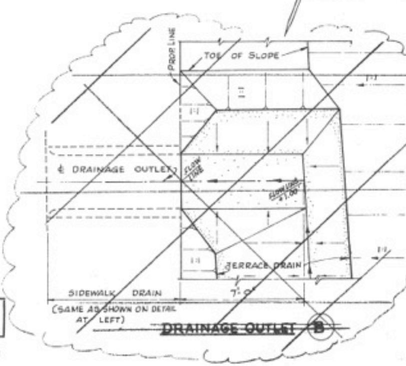


PLAN
DRAINAGE OUTLET (A)
NO SCALE



SECTION
TYPICAL DOWNDRAIN
TYPE A

AS BUILT
PERMIT NO. 96322
DATE: 7-20-70



DRAINAGE OUTLET (B)

Conservator for the Person and Estate of George H. Capron
A.L. Shipley, Jr. 20-9-68 Date

Moore & Taber - Geologist & Soils Engineer
Return Moore R.C.E. 6369 5-15-68 Date

Boyle Engineering
6-15-68

[redacted]

81-0105-00-00 F-1130

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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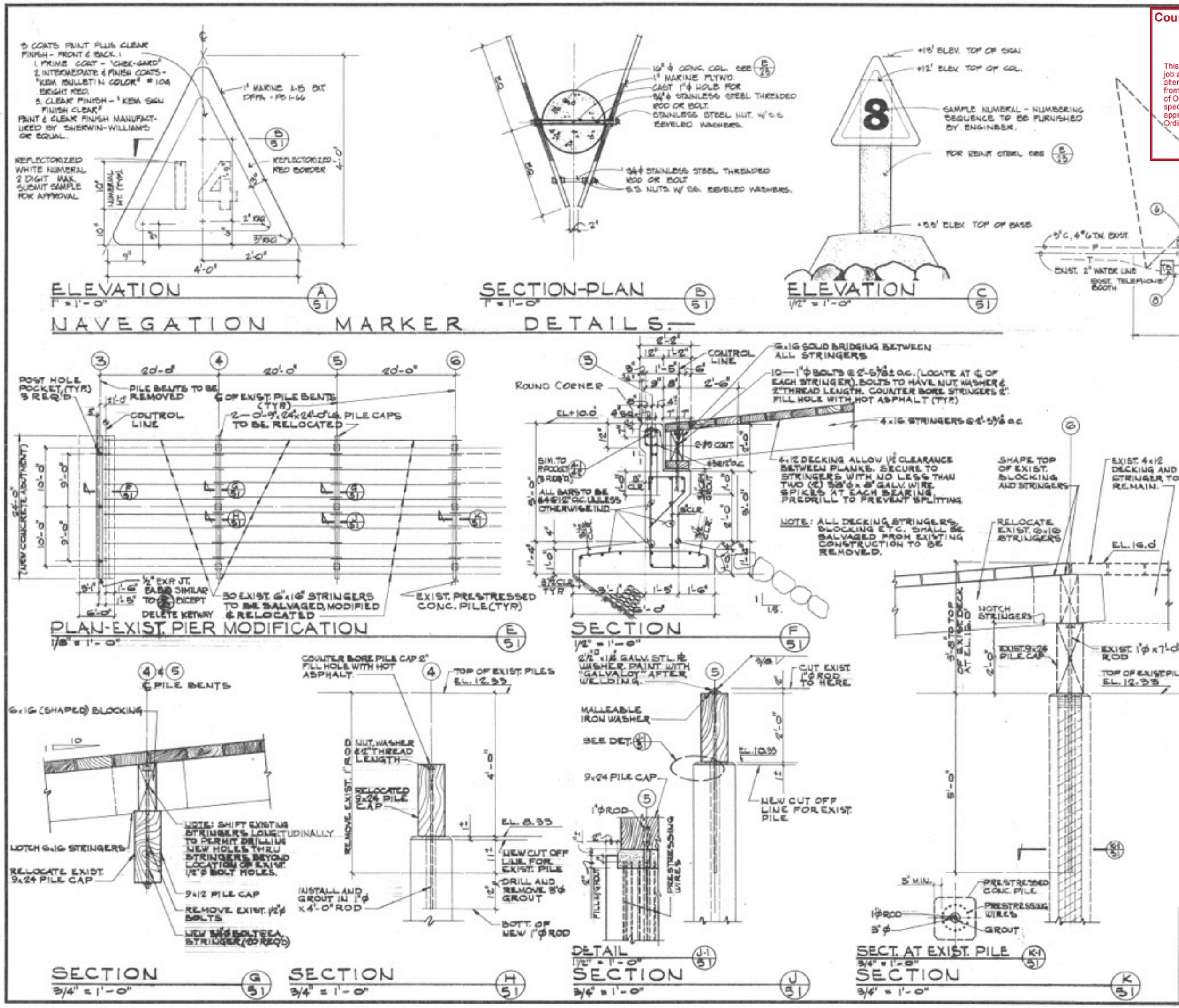

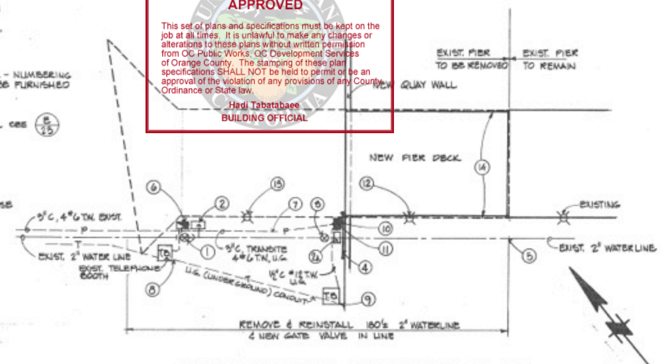

UTILITY RELOCATION PLAN

NO SCALE

CONSTRUCTION NOTES

1. REMOVE EXIST. 2" GATE VALVE.
2. RELOCATE EXIST. FIRE HOSE CABINET TO NEW LOCATION. (2A) MOUNT ON RAILING
3. INSTALL NEW GATE VALVE IN REINSTALLED WATER LINE
4. INSTALL 10' EXIST. RAILING.
5. CONNECT TO EXIST. 2" WATER LINE.
6. RELOCATE PANELBOARD TO NEW LOCATION. (10)
7. EXTEND PRIMARY POWER DUCT & FEEDER TO NEW PANELBOARD LOCATION & CONNECT.
8. REMOVE TELEPHONE CONDUIT STUB-UP AND EXTEND CONDUIT TO TELEPHONE BOOTH NEW LOCATION (9) IN CONFORMANCE WITH THE TELEPHONE COMPANY REQUIREMENTS.
9. TELEPHONE BOOTH - NEW LOCATION.
10. PANELBOARD - NEW LOCATION
11. INSTALL RELOCATED PANELBOARD AND ROUTE CIRCUITS FOR LIGHTING & POWER SIMILAR TO EXISTING.
12. REMOVE LTG. STD. AND REINSTALL AFTER PIER MODIFICATION.
13. REMOVE LTG. STD. AND SALVAGE.
14. REMOVE & REINSTALL HANDRAILING WITHIN LIMITS OF NEW PIER DECK CONSTRUCTION.

GENERAL NOTES

1. WATER LINE INSTALLED WITHIN LAND AREA SHALL HAVE A MIN. COVER OF 36".
2. WATER LINE INSTALLED ON PIER SHALL BE MOUNTED SIMILAR TO EXISTING.
3. LIGHTING POWER & RECEPTACLES SHALL BE RECONNECTED SIMILAR TO EXISTING.
4. ELECTRICAL MODIFICATION WORK SHALL FOLLOW NATIONAL ELECTRICAL CODE AND LOCAL CODES.
5. ALL ELECTRICAL PERMITS SHALL BE OBTAINED BY THE CONTRACTOR.
6. SPLICES SHALL NOT BE MADE IN CONDUIT RUNS.
7. ALL FRESHLY CUT SURFACES OF DECKING, STRINGERS, ETC. SHALL BE THOROUGHLY BRUSHED WITH TWO COATS OF CREOSOTE.

ASBUILT

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA

JOB NO. 1-4173I
DATE 9-19-69
APPROVED

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/834-3800

DANA POINT HARBOR
DANA POINT CALIFORNIA
HEAVY CONSTRUCTION
PIER MODIFICATION
STRUCTURAL & MISCELLANEOUS DETAILS

DATE SEPTEMBER, 1969
SCALE AS SHOWN
SHEET 51 OF 51
D10.5-1

APPENDIX D

Potential Obstruction Mitigation Layout

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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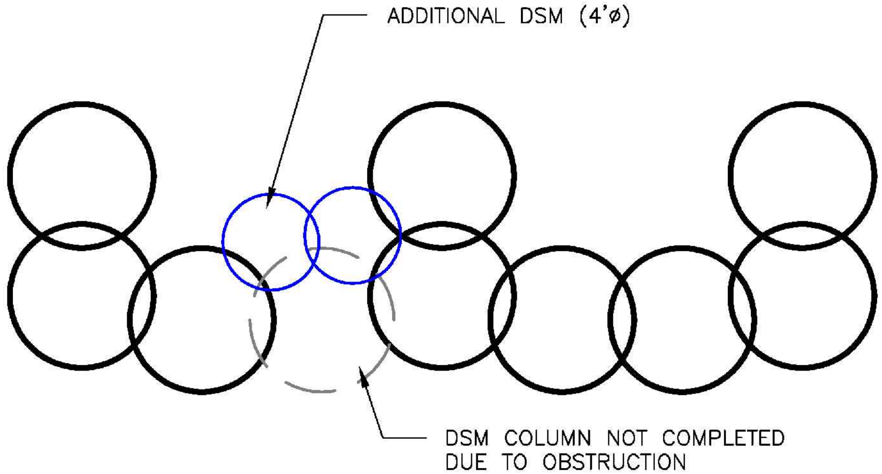
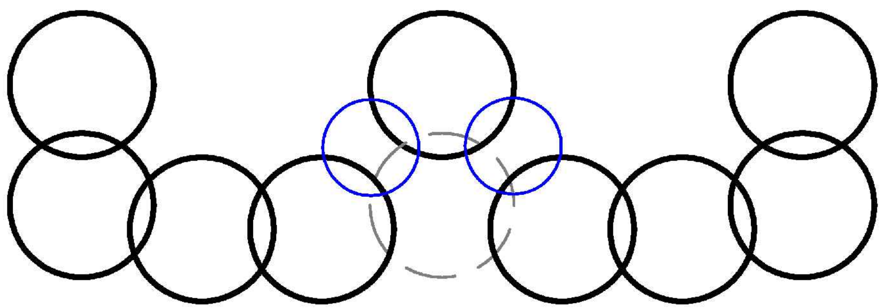
Example layout for mitigation option





DRAWING: q:\2017\17-206-02\dwg\1720602_dph_commcor_example layout for mitigation option - sketch by agi.dwg PLOTTED: 9/20/2021 2:57 PM BY: Jesus Meza

Example Layout for Mitigation Option - Sketch by AGI

GMU

Date:	**SEPTEMBER 20, 2021**
Project No.:	**17-206-02**

APPENDIX E

Revised AGI Design Package

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

AGI
ADVANCED GEOSOLUTIONS INC
Ground Improvement and Specialty Piling Contractors

GROUND IMPROVEMENT BY DEEP SOIL MIXING

DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CALIFORNIA

Submittal No. 01

DESIGN SUBMITTAL

August 23, 2021

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
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Hadi Tabatabaee
BUILDING OFFICIAL

1.0 INTRODUCTION

Advanced Geosolutions, Inc. (AGI) is pleased to present this design submittal package for deep soil mixing (DSM) at the planned redevelopment area located at the harbor in Dana Point, California. We understand the redevelopment involves the construction of new hotels, new commercial buildings and new marine facilities. The submittal herein addresses the design for the commercial area of this redevelopment.

The geotechnical report by GMU identifies medium dense to dense sandy artificial fill at the site down to a depth of approximately 20 feet below grade at the time of geotechnical exploration. They recommended ground improvement to mitigate excessive seismically induced lateral spreading at the project site. Ground improvement is also intended to mitigate uncertainty about the competence of the undocumented artificial fill soils and the potential associated risk with constructing structures overlying those materials. DSM was selected by the design team as the most appropriate ground improvement technique for this project based on the soil conditions, performance goals, efficiency, and site constraints.

Our design meets the performance criteria as described in the following sections. Concepts, calculations, means, and methods in this design are deemed intellectual property of AGI, and shall remain confidential. AGI's design, and any other related information, shall not be made available to another party other than the members of the design team without the express written consent of AGI. We anticipate that a set of construction drawings and specifications will be put out to bid but only the minimal set of documents required to bid the installation work should be distributed to bidders as approved by AGI.

2.0 REFERENCE DOCUMENTS AND INFORMATION

In preparing this design AGI relied on information provided by the design team, including:

- Geotechnical Investigation Report, Volumes 1, 2, and 3, Dana Point Harbor Revitalization: Buildings 1 through 12 – Commercial Component, City of Dana Point, California. Report no. 17-206-02 prepared by GMU and dated 5/27/2021.
- Site plan CAD file provided by GMU
- Foundation plan for building 1 prepared by KPFF dated 10/8/2020
- Foundation plans for buildings 6-9 prepared by KPFF dated 4/9/2021
- Foundation plans for building 10-12 prepared by KPFF dated 4/12/2021

3.0 DESIGN CRITERIA

Per the Geotech report's recommendation and discussion with the design team, the ground improvement shall be designed in consideration of the following performance criteria:

- Design earthquake Magnitude (Mw) = 6.9 and PGA = 0.67g

- Reduce lateral spread movement to 3 inches or less behind the DSM buttress
- Ground improvement will directly support all footings with at least 5,000 psf allowable bearing pressure.
- Limit total static settlement to 1 inch or less.
- Reduce total seismic settlement to 0.5 inch or less.
- Building slab-on-grade areas require improvement or support to mitigate potential poor performance of undocumented fill materials.

4.0 CEMENT DEEP SOIL MIXING (DSM) DESIGN

The proposed DSM layout is presented in Appendix A. The DSM program includes two components: (1) DSM buttress along the waterfront, between the existing seawall and the proposed building, and (2) discrete DSM columns under the proposed buildings to support structural loads with a soil-cement load transfer platform (LTP) to distribute slab loading to the DSM columns.

The buttress is 12 feet wide and consists of overlapping 6-ft diameter DSM with a continuous front row. The columns will embed 4 feet into the Capistrano formation.

The DSM system supporting Buildings 6 through 12 consists of 4-ft diameter columns centered under all footings. In addition, the same 4-ft diameter columns are installed in a 12-ft grid pattern throughout slab-on-grade areas in building interiors. The 4-ft diameter DSM columns for building support will extend to practical refusal to rest on competent bedrock materials.

The DSM design unconfined compressive strength (UCS) is 150 psi at 28 days.

4.1 Lateral Spread

AGI performed a pseudostatic slope stability analysis in order to determine the post-improvement critical horizontal seismic coefficient (also called yield acceleration, k_y), which is a necessary input value to estimate lateral slope deformation. The analysis is presented in Appendix B1. The slope geometry and soils parameters used in the model were provided by GMU.

For section A, the composite shear strength of the DSM buttress was calculated based on the area replacement ratio (ARR), and this calculation is shown in Appendix B2. For sections C and D, the DSM block is modeled as a 5-ft wide (effective width) zone with 100% ARR on the perimeter of Building 1, while the soils inside the block is assigned unimproved strength without liquefaction.

AGI estimated lateral spread deformation using the empirical equations outlined in NCHRP Report 611 (2008), and the calculation is shown in Appendix B3. The results are summarized in Table 1 below.

Table 1. Estimated Post-improvement Slope Deformation

Section	Ky from pseudostatic analysis	Estimated Slope deformation (inch)
Section A	0.26g	1.4
Section C	0.78g	0.0
Section D	0.49g	0.1

AGI performed all applicable internal stability checks of the buttress in accordance with FHWA guidelines. Those checks included bearing capacity, overturning, crushing at the toe, racking, and internal shear failures. The analysis is included in appendix B4.

4.2 Building Support

The structural capacity and geotechnical capacity calculation are included in Appendix C1 and C2, respectively. The analysis results indicate that the allowable load on a 4-ft diameter DSM column bearing on bedrock is 200 kips.

Building loading information was not provided with the structural drawings but we understand the footings were sized for 5,000 psf. Therefore the required number of DSM column supporting each footing was determined by taking the footing area, multiply by 5.0 ksf, and divide by 200 kips.

4.3 Static Settlement

Since the DSM columns will bear directly on formation material, the main source of static settlement is the elastic compression of the soil cement. This was calculated using the software RSPile by Rocscience. The calculation is shown in Appendix C3. The elastic modulus of DSM material was selected based on FHWA's recommended correlation (300 times design compressive strength).

The result indicates static settlement of the DSM column under design load is approximately 0.5 inch.

4.4 Seismic Settlement

The DSM columns transfer building loads to bedrock, but it does not densify the surrounding soils. When the soils liquefy after an earthquake, it would induce downdrag forces on the DSM columns which causes additional compression and settlement.

AGI estimated the magnitude of liquefaction-induced downdrag and column compression using method for piles, as outlined in the AASHTO Bridge Design Manual. This calculation is shown in Appendix D, which shows that downdrag force is approximately 128 kips for a 4-ft diameter column. And the corresponding seismic settlement due to DSM column compression is less than 0.1 inch.

The structural capacity and geotechnical capacity checks of Appendices C1 and C2 also ensure that the DSM column can resist this downdrag load in addition to the building design load.

5.0 DSM INSTALLATION METHOD

Cement Deep Soil Mixing is performed using a specialty, purpose-built drilling tool consisting of a series of mixing blades and/or paddles extending radially from a hollow stem. In general, as the mixing tool is advanced into the soil, the hollow stem is used as a conduit to pump grout slurry (a mixture of cement and water) and injected at the tip of the tool while blending the soils. Pre-augering or trenching operations may be used to facilitate mechanical breakdown and blending of firm or stiff soils, or to remove the upper strata before DSM operations, or to assist with spoil control. The resulting DSM product is an improved soil-cement column with low compressibility, high stiffness, and significant load carrying capacity. Typical DSM equipment and mixing tools are shown below in Figure 1.

Grout will be batched on site using an in-line jet valve or weight control system. We anticipate that cement and water will be the only components for the grout slurry. Water and/or cement component quantities are adjusted to achieve the target specific gravity prior to pumping it to the mixing drill rig. The batch plant and pump are expected to be located in an area to avoid relocating the facility during the entire DSM operation.

Figure 1. DSM mixing tool assembly (left) and track-mounted drilling rig constructing a DSM column (right)

6.0 LOAD TRANSFER PLATFORM (LTP)

As described above the design includes a LTP consisting of cement-treated soils at the ground surface. The LTP will be constructed in three 12-inch-thick lifts for a three-foot-thick section of soil cement to a design strength of 200 psi at 28 days. LTP will be constructed after completion of the DSM scope placing the lifts over the top of the DSM columns throughout the structural footprints of the buildings. The LTP is designed to transfer load from the floor slab to the regularly spaced DSM columns at 12 feet on-center. See Geotechnical Report for other requirements.

We have assumed slab loading (Dead plus live) of 300 psf for this design. The performance of the LTP under load was analyzed using 2D plane strain finite element in PLAXIS, which is presented in Appendix E. The analysis demonstrates that the specified LTP will provide satisfactory performance under 300 psf floor load. The design also conservatively assumes that the artificial soils underlying the LTP may settle and accounts for the potential that a gap may form below the bottom of the LTP and the underlying soil such that no support is provided other than by the DSM columns.

7.0 DEEP SOIL MIXING QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Quality Control / Quality Assurance will be performed in accordance with the DSM specifications as outlined on the approved drawings.

8.0 LOAD TRANSFER PLATFORM QUALITY CONTROL

LTP Quality Control will be performed in accordance with the Geotechnical Report's recommendations.

9.0 CONCLUDING REMARKS

This ground improvement preliminary design is submitted to address the geotechnical concerns of the proposed buildings. The design uses DSM ground improvement technique to meet the project requirements provided to AGI.

The layout of our ground improvement program is presented in AGI's shop drawing (Appendix A). Relevant strength parameters of the design will be verified by the UCS results.

This design was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing under similar conditions and in the same locality. No warranty is made nor implied.

We appreciate the opportunity to provide our services for this project. Please contact the undersigned with any questions regarding this document.

Sincerely,

ADVANCED GEOSOLUTIONS, Inc.

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

Thomas Tran

Justin Martos, P.E., G.E.	**Thomas Tran, P.E.**
Project Manager	**Design Engineer**

---- 0 ----

References

FHWA (2013) “Federal Highway Administration Design Manual: Deep Mixing for Embankment and Foundation Support”. Publication No. FHWA-HRT-13-046. U.S. Department of Transportation, Federal Highway Administration

Kitazume, M. and Terashi, M. "The Deep Mixing Method", CRC Press 2013.

Lunne, T., Robertson, P.K., and Powellm J.J.M. (1997) “Cone Penetration Testing in Geotechnical Practice”

NCHRP (2008) Report 611 “Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankments”. Transportation Research Board

Rayamajhi,D., Nguyen, T., Ashford, S., Boulanger, R., Lu, J., Elgamal, and Shao, L. (2014). ” Numerical Study of Shear Stress Distribution for Discrete Columns in Liquefiable Soils.” J. Geotech. Geoenviron. Eng., 140, 2014.

APPENDIX A

Layout Drawings

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

DANA POINT HARBOR COMMERCIAL COMPONENT DEEP SOIL MIXING

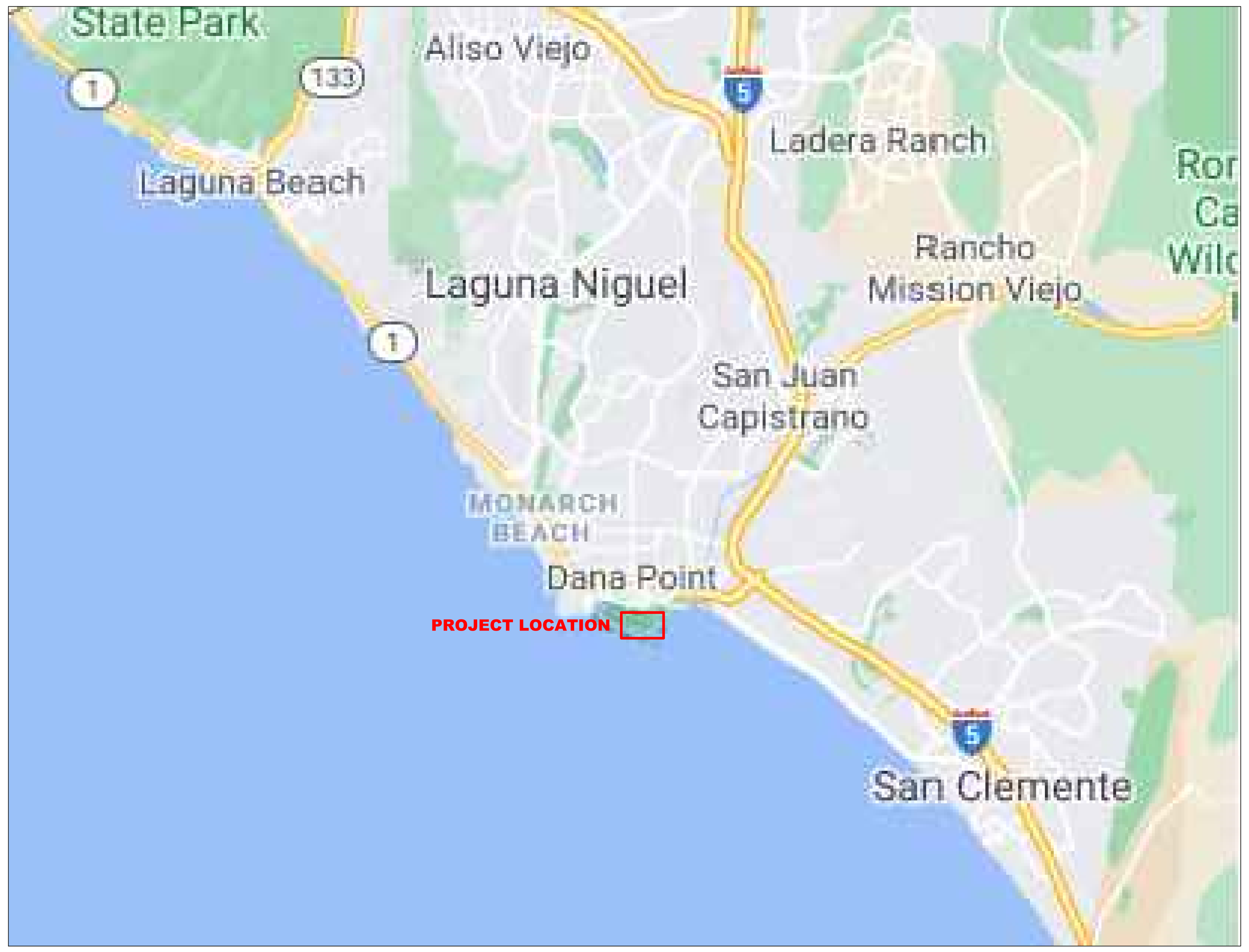
DANA POINT, CALIFORNIA

SHEET INDEX

GI-1	COVER SHEET
GI-2	GENERAL NOTES AND DETAILS
GI-3	DEEP SOIL MIXING PLAN
GI-4.1	DEEP SOIL MIXING LAYOUT – BUILDING 1
GI-4.2	DEEP SOIL MIXING LAYOUT – BUILDING 6
GI-4.3	DEEP SOIL MIXING LAYOUT – BUILDING 7
GI-4.4	DEEP SOIL MIXING LAYOUT – BUILDING 8
GI-4.5	DEEP SOIL MIXING LAYOUT – BUILDING 9
GI-4.6	DEEP SOIL MIXING LAYOUT – BUILDING 10
GI-4.7	DEEP SOIL MIXING LAYOUT – BUILDING 11
GI-4.8	DEEP SOIL MIXING LAYOUT – BUILDING 12
GI-5	GEOTECHNICAL SECTIONS

GROUND IMPROVEMENT DESGINER:	ADVANCED GEOSOLUTIONS, INC.
CIVIL ENGINEER:	TAIT & ASSOCIATES, INC.
STRUCTURAL ENGINEER:	KPFF
GEOTECHNICAL ENGINEER:	GMU GEOTECHNICAL, INC.

VICINITY MAP



MAP DATA: GOOGLE 2020

LOCATION MAP

MAP DATA: GOOGLE 2020

ADVANCED GEOSOLUTIONS Inc.
13 Orchard Rd, Suite 105
Lake Forest, CA 92630
Phone (310) 796-9000 | Fax (310) 796-9001
www.advgeosolutions.com

REVISIONS

NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

COVER SHEET

PROJECT NO. –	SHEET NUMBER:
DATE: 08/23/2021	GI-1
SCALE: AS SHOWN	

S:\Projects\P714290 Dana Point Harbor Design\Drawings\Main Files\AGI_Sheet_DSM.dwg

PART 1 – GENERAL

1.1 SCOPE

A. DEEP SOILS MIXING (DSM) SHALL BE INSTALLED TO MITIGATE POTENTIAL FOR LATERAL SPREADING AND UNCERTAIN PERFORMANCE OF UNDOCUMENTED ARTIFICIAL FILL.

B. A LOAD TRANSFER PLATFORM (LTP) SHALL BE CONSTRUCTED THROUGHOUT ALL BUILDING FOOTPRINTS TO TRANSFER FLOOR SLAB LOADING TO UNDERLYING DSM COLUMNS AND PREVENT ADVERSE SETTLEMENT IN FLOOR SLAB AREAS THAT MAY RESULT FROM NEW LOADING APPLIED TO UNDERLYING UNDOCUMENTED ARTIFICIAL FILL.

C. THE DSM PLAN IS PREPARED IN ACCORDANCE WITH THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT PREPARED BY GMU DATED 5/27/2021.

D. THIS DESIGN IS BASED ON THE GEOTECHNICAL CHARACTERIZATION AND SOIL PARAMETERS PRESENTED IN THE REFERENCED GEOTECHNICAL REPORT, AS WELL AS LOAD REQUIREMENTS INDICATED ON THE STRUCTURAL DRAWINGS. THIS DESIGN WAS CONDUCTED IN A MANNER CONSISTENT WITH THE LEVEL OF CARE AND SKILL ORDINARILY EXERCISED BY MEMBERS OF THE GEOTECHNICAL ENGINEERING PROFESSION CURRENTLY PRACTICING UNDER SIMILAR CONDITIONS AND IN THE SAME LOCALITY. NO WARRANTY IS MADE NOR IMPLIED.

1.2 REFERENCES

A. GEOTECHNICAL INVESTIGATION REPORT, VOLUMES 1, 2, AND 3, DANA POINT HARBOR REVITALIZATION BUILDINGS 1 THROUGH 12, COMMERCIAL COMPONENT – REPORT NO. 17-206-02 PREPARED BY GMU DATED MAY 27, 2021.

B. ASTM C150 – SPECIFICATION FOR PORTLAND CEMENT

C. ASTM D1633 – STANDARD TEST METHODS FOR COMPRESSIVE STRENGTH OF MOLDED SOIL-CEMENT CYLINDERS

D. ASTM D4380 – DENSITY OF BENTONITE SLURRIES

F. FEDERAL HIGHWAY ADMINISTRATION DESIGN MANUAL: DEEP MIXING FOR EMBANKMENT, AND FOUNDATION SUPPORT, PUBLICATION NO. FHWA-HRT-13-046, OCTOBER 2013.

1.3 DEFINITIONS

A. DEEP SOIL MIXING (DSM) – A SOIL IMPROVEMENT TECHNIQUE USED TO CONSTRUCT IN SITU SOIL STRUCTURES OR TREAT SOILS IN PLACE, WITHOUT EXCAVATION OR DEWATERING. SOIL MIXING USES A LARGE, CRANE OR DRILL RIG – MOUNTED TURNTABLE TO INSERT A LARGE-DIAMETER (TYPICALLY 3- TO 8 -FOOT DIAMETER) TOOL INTO THE GROUND WHILE INJECTING AND MIXING A GROUT WITH THE SOIL. STABILIZED SOIL COLUMNS ARE CREATED THAT MAY BE JOINED TOGETHER BY OVERLAPPING TO FORM RETAINING WALLS OR FOUNDATION ELEMENTS, OR TO TREAT A LARGE BLOCK OF SOIL OR SLUDGE.

B. ASTM – ASTM INTERNATIONAL.

C. OWNER – THE OWNER AS REFERRED TO HEREIN IS DANA POINT HARBOR PARTNERS, LLC, C/O BURNHAM-WARD PROPERTIES.

D. ENGINEER – THE ENGINEER IS THE OWNER'S GEOTECHNICAL ENGINEER OF RECORD TO ACT ON ITS BEHALF IN THE EXECUTION OF THESE SPECIFICATIONS.

E. CONTRACTOR – REFERS TO THE GENERAL CONTRACTOR DIRECTLY CONTRACTED WITH THE OWNER AND SUBCONTRACTING THE DSM SCOPE TO THE DSM SUBCONTRACTOR.

F. DEEP SOIL MIXING SUBCONTRACTOR (DSM SUBCONTRACTOR) – AN INDIVIDUAL OR COMPANY WHO HAS HAD PROVEN AND SUCCESSFUL EXPERIENCE IN SOIL MIXING CONSTRUCTION.

G. GROUT – A STABLE COLLOIDAL SUSPENSION OF POWDERED CEMENT, BENTONITE, ADDITIVES AND/OR OTHER SIMILAR MATERIALS IN WATER. THE TERMS "GROUT" AND "SLURRY" ARE USED INTERCHANGEABLY IN THESE SPECIFICATIONS.

H. INJECTION RATIO – A VOLUMETRIC RATIO OF GROUT TO SOILS (E.G., 100 GALLONS/CUBIC YARD) TO BE MIXED IN A DSM COLUMN. THE GROUT INJECTION RATIO IS DETERMINED FOR EACH COLUMN BASED ON THE COLUMN DIMENSIONS, SOIL DENSITY, PATTERN OF TREATMENT, AND DESIRED APPLICATION RATE.

I. DSM COLUMN – ONE COMPLETED INSERTION, INJECTION AND MIXING OF THE SOIL WITH THE MIXING AUGER TO THE DESIGN DEPTH. THIS CREATES A COLUMN OF TREATED SOIL THE SAME DIAMETER AS THE MIXING AUGER. THE COLUMN MAY BE PRIMARY (THROUGH VIRGIN SOILS), SECONDARY (CONNECTING PRIMARY COLUMNS), TERTIARY, ETC.

J. WORKING PLATFORM – THE WORKING PLATFORM IS THE LEVELED AND STABLE SURFACE FROM WHICH THE DSM EQUIPMENT OPERATES.

K. MIXING AUGER/TOOL – THE SPECIAL TOOL THAT ATTACHES TO THE KELLY BAR AND IS INSERTED INTO THE GROUND TO MIX THE SOILS. THE TOOL MAY BE FITTED WITH PORTS FOR INJECTING GROUT, MIXING PADDLES, AUGER BLADES, ETC.

L. BLADE ROTATION NUMBER (BRN) – NUMBER OF BLADES X (RATE OF PENETRATION PLUS RATE OF WITHDRAWAL (IN REVOLUTIONS/METER). FOR EXAMPLE FOR 5 BLADES, RATE OF PENETRATION = 1 REVOLUTION/25 MM (40 REVOLUTIONS/M), AND RATE OF WITHDRAWAL = 1 REVOLUTION/20 MM (50 REVOLUTIONS/M), THE BRN = 5 X (40 + 50) = 450.

M. OBSTRUCTION – OBSTRUCTIONS ARE DEFINED AS MATERIALS CLASSIFIED AS UNDERGROUND UTILITIES, TREES (OR PARTS THEREOF), METAL, MAN-MADE OBJECTS, WOODEN/CONCRETE/STEEL OR ANY OTHER TYPE OF PILE OR DEEP FOUNDATION, OR NATURAL GROUND MATERIALS LARGER THAN A MAXIMUM COBBLE SIZE (8 INCHES MAXIMUM DIMENSION).

N. MIXING BLADE – A SINGLE MIXING BLADE SHALL CONSTITUTE A PAIR OF MIXING PADDLES ATTACHED TO THE SHAFT OF THE MIXING TOOL AT THE SAME ELEVATION. THE CUTTING PADDLES MAY ALSO BE CONSIDERED AS A MIXING BLADE.

O. DOSAGE – EXPRESSED AS THE MASS OF BINDER INTRODUCED PER VOLUME OF MIXED IN-SITU SOIL (E.G. KG/M^3).

1.4 SUBMITTALS

A. DSM WORK PLAN INCLUDING:

I. ASSIGNED NUMBER OF EACH COLUMN AS ID FOR INSTALLATION RECORD

II. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE INSTALLATION PER PLANS AND SPECIFICATIONS, INCLUDING SPECIFICATIONS OF THE GROUT BATCHING AND VERTICAL DRILL EQUIPMENT INTENDED FOR USE ON THE PROJECT.

III. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE QUALITY CONTROL REQUIREMENTS PER PLANS AND SPECIFICATIONS.

IV. PRELIMINARY SOIL MIX DESIGN INDICATING TYPE OF BINDER MATERIAL AND VOLUMETRIC PROPORTIONS FOR INITIAL TRIALS ON-SITE TO BE ADJUSTED BASED ON FIELD OBSERVATIONS AND EARLY STRENGTH RESULTS (SEE PART 3.2 TEST SECTION).

B. ACCURATE DAILY RECORDS OF THE WORK TO BE SUBMITTED BY CLOSE OF BUSINESS THE FOLLOWING DAY, INCLUDING:

I. COLUMN ID

II. DIAMETER

III. WORKING PAD ELEVATION

IV. MIXING DEPTH

V. START TIME

VI. TIME AT TIP ELEVATION

VII. FINISH TIME

VIII. MIXING DURATION

IX. GROUT MIX DETAILS (PERCENT WATER AND REAGENT BINDER)

X. GROUT INJECTION WITH DEPTH

XI. TOTAL INJECTED GROUT

XII. BLADE ROTATION NUMBER (BRN) WITH DEPTH

D. ANY PROPOSED CHANGE IN THE WORK PROCEDURES PLAN MADE NECESSARY BY CONDITIONS ENCOUNTERED DURING CONSTRUCTION FOR REVIEW AND APPROVAL BY THE ENGINEER.

E. MATERIAL CERTIFICATIONS FOR CEMENT BINDER TO BE USED IN THE PROJECT.

F. WEIGHTS: CERTIFICATES OF BATCH WEIGHTS FOR EACH TRUCK LOAD DELIVERED IF ON-SITE BATCH PLANT IS NOT USED.

G. ADMIXTURES/POZZOLANS/ADDITIVES SUBJECT TO THE APPROVAL OF THE ENGINEER, IF USED.

H. QC TEST RESULTS: SUBMIT ALL QC TEST RESULTS WITHIN 48 HOURS OF TESTING.

I. REPORT SUMMARIZING TEST SECTION RESULTS AND CALIBRATION OF DRILLING EFFORT CRITERIA FOR COLUMN DEPTH TERMINATION APPROVED BY THE ENGINEER.

J. AS-BUILT REPORT DOCUMENTING THE CONSTRUCTED LOCATIONS AND DIMENSIONS OF ALL DSM COLUMNS, COMPILATION OF ALL QUALITY CONTROL AND QUALITY ASSURANCE DATA COLLECTED FOR THE PROJECT, AND EXPLANATION OF ANY DEVIATION FROM THE PLANS AND SPECIFICATIONS PREVIOUSLY REVIEWED APPROVED TO THE SATISFACTION OF THE ENGINEER.

K. THE CONTRACTOR WILL SUBMIT A WORK PLAN DETAILING THE CONSTRUCTION AND QA/QC OF THE LTP, MEETING THE DESIGN REQUIREMENTS HEREIN AND IN THE GEOTECHNICAL REPORT.

1.5 ACCEPTANCE

A. ACCEPTANCE OF THE DSM WORK WILL BE BASED ON COMPLIANCE WITH THE STRENGTH AND GEOMETRY REQUIREMENTS OF THE PLANS AND SPECIFICATIONS AS VERIFIED BY THE ENGINEER'S QA TESTING. THE MATERIAL FORMED BY MIXING THE GROUT WITH THE IN SITU SOIL SHALL MEET A MINIMUM REQUIRED UNCONFINED COMPRESSIVE STRENGTH OF 150 POUNDS PER SQUARE INCH (PSI) AT 28 DAYS. TESTS WILL BE CONSIDERED PASSING IF THEY ARE AT LEAST 90% OF THE 150 PSI STRENGTH REQUIREMENT PROVIDED THAT NO MORE THAN 10% OF ALL TESTS FALL BELOW THE REQUIREMENT AND THE OVERALL AVERAGE STRENGTH EXCEEDS THE REQUIREMENT. IF THE UNCONFINED COMPRESSIVE STRENGTH RESULTS DO NOT MEET THAT CRITERIA, THE DSM SUBCONTRACTOR SHALL SUBMIT A MITIGATION PLAN FOR REVIEW AND APPROVAL BY THE ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS

A. FRESH OR RECLAIMED WATER, FREE OF ANY DELETERIOUS SUBSTANCE THAT COULD ADVERSELY AFFECT THE GROUT PROPERTIES SHALL BE USED.

B. BINDER AGENT USED FOR THE PROJECT SHALL CONSIST OF PORTLAND CEMENT TYPE II/V CONFORMING TO ASTM DESIGNATION C150. THE CEMENT SHALL BE ADEQUATELY PROTECTED FROM MOISTURE AND CONTAMINATION WHILE IN TRANSIT AND STORAGE AT THE JOB SITE. RECLAIMED CEMENT OR CEMENT CONTAINING LUMPS OR DELETERIOUS MATTER SHALL NOT BE USED.

C. THE WATER AND CEMENT SHALL BE PREMIXED TO FORM A GROUT FOR INJECTION AND MIXING WITH THE IN-SITU SOIL. MATERIALS SHALL BE COMBINED IN PREDETERMINED WEIGHED PROPORTIONS WITH ITS QUALITY EVALUATED BY SPECIFIC GRAVITY MONITORED AT LEAST ONCE PER INSTALLATION BY MUD BALANCE.

D. THE DESIGN UNCONFINED COMPRESSIVE STRENGTH OF THE SOIL-CEMENT MATERIAL COMPRISING THE DSM COLUMNS IS 150 PSI AT 28 DAYS.

PART 3 – EXECUTION

3.1 EQUIPMENT

A. A PURPOSE BUILT HOLLOW STEM AND MIXING PADDLE TOOL ATTACHED TO A HIGH TORQUE ROTARY DRILL ON TRACKS SHALL BE USED TO ACCOMPLISH THE DSM. MIXING TOOLS OF 4- AND 6-FOOT-DIAMETER WILL BE IMPLEMENTED FOR THIS PROJECT. MIXING TOOLS SHALL CONSIST OF A MINIMUM OF FOUR (4) MIXING BLADES (4 PAIRS OF MIXING PADDLES).

B. CEMENT WILL BE STORED IN PURPOSE BUILT SILOS.

C. WATER SHALL BE MIXED WITH CEMENT IN A PURPOSE-BUILT WEIGH-BATCH MIXER TO PRODUCE SLURRY WITH A CONSISTENT SPECIFIC GRAVITY OR WATER:CEMENT RATIO FOR PROPER MIXING. JET VALVE MIXING OR OTHER CONTINUOUS MIXING METHODS WILL NOT BE ALLOWED.

D. GROUT SHALL BE DELIVERED TO THE MIXING RIG BY APPROPRIATELY SIZED POSITIVE DISPLACEMENT PUMPS. PROGRESSIVE CAVITY PUMPS SHALL NOT BE ALLOWED.

3.2 TEST SECTION

A. LOCATIONS: PRIOR TO INITIATING PRODUCTION WORK, DSM SUBCONTRACTOR SHALL INSTALL A MINIMUM OF TWO DSM COLUMNS WITH VARYING MIX DESIGN DOSAGE AT EACH OF THE SIX TEST SECTION LOCATIONS INDICATED ON THE PLANS.

B. EVALUATION GOALS: THE PURPOSE OF THE TEST SECTION IS TO EVALUATE THE FOLLOWING ITEMS PRIOR TO INITIATING PRODUCTION WORK. THE DSM SUBCONTRACTOR MAY PROCEED IMMEDIATELY TO PRODUCTION WHILE TEST SECTION EVALUATION RESULTS ARE PENDING BUT DOES SO AT ITS OWN RISK.

I. COLUMN DEPTH: COLUMN INSTALLATION DEPTHS FOR THE PROJECT ARE CONTROLLED BY THE DEPTH TO THE CAPISTRANO FORMATION CONTACT AS DESCRIBED IN SECTION 3.3.G. DURING TEST SECTION INSTALLATION ADJACENT TO EXISTING EXPLORATION DATA, DSM SUBCONTRACTOR SHALL MONITOR AND RECORD INDICATORS OF DRILLING EFFORT (E.G. ROTARY TORQUE APPLIED AND CROWD PRESSURE). DSM SUBCONTRACTOR SHALL PROPOSE A READILY IDENTIFIABLE METRIC SUBJECT TO THE ENGINEER'S APPROVAL FOR THE DRILL OPERATOR TO OBSERVE DURING INSTALLATION AS EVIDENCE OF ENCOUNTERING THE CAPISTRANO FORMATION.

II. MIX CONSISTENCY: DURING TEST SECTION MIXING THE DSM SUBCONTRACTOR AND ENGINEER SHALL OBSERVE

III. STRENGTH: A MINIMUM OF TWO WET-GRAB SAMPLES SHALL BE COLLECTED FROM EACH TEST SECTION COLUMN INSTALLED AT DEPTHS OF 1/3 AND 2/3 THE TOTAL INSTALLATION DEPTH. EACH SAMPLE COLLECTED SHALL BE CAST INTO CYLINDERS FOR UNCONFINED COMPRESSION STRENGTH TESTING AND EVALUATION AS DESCRIBED IN SECTION 3.4.B.

IV. LOAD TEST: DSM SUBCONTRACTOR SHALL CONDUCT A MINIMUM OF FOUR LOAD TESTS PER THE REQUIREMENTS OF THIS SPECIFICATION TO ASSESS THE 4-FOOT-DIAMETER DSM COLUMN GEOTECHNICAL CAPACITY ADJACENT TO EXPLORATORY TEST DATA. SEE PROPOSED LOAD TEST LOCATIONS ON SHEET GI-3.

3.3 CONSTRUCTION

A. INSTALL DSM COLUMNS AT THE LOCATIONS AND TO THE DEPTH INDICATED ON THE DSM PLAN.

B. HORIZONTAL ALIGNMENT: THE DSM COLUMNS SHALL BE CAREFULLY SURVEYED AND STAKED OUT PRIOR TO INSTALLATION. THE COLUMNS SHALL BE CONSTRUCTED WITHIN 4 INCHES OF THE LOCATIONS SHOWN ON THE DRAWINGS.

C. VERTICAL ALIGNMENT: VERTICAL ALIGNMENT OF THE AUGER STROKE WILL BE CONTROLLED BY THE EQUIPMENT OPERATOR. THE COLUMN VERTICALITY SHALL HAVE A TOLERANCE OF 1:50 MAXIMUM DEVIATION.

D. MIXING SHAFT SPEED: THE MIXING SHAFT SPEED (RPMS) SHALL BE ADJUSTED TO ACCOMMODATE AN ADEQUATE RATE OF MIXING SHAFT PENETRATION BASED ON THE DEGREE OF DRILLING DIFFICULTY. THE MIXING SHAFT SPEED CAN BE ADJUSTED ACCORDING TO DRILLING DIFFICULTY.

E. BOTTOM MIXING: THE BOTTOM OF THE COLUMNS SHALL BE DOUBLE MIXED BY RAISING THE MIXING SHAFTS FIVE FEET OFF THE BOTTOM AND THEN REINSERTING THEM FOR REMIXING.

F. GROUT TAKE: THE GROUT TAKE (OR INJECTION RATE) PER VERTICAL FOOT OF COLUMN WILL BE ADJUSTED TO THE REQUIREMENTS OF THE DESIGN MIX. APPROPRIATE DELIVERY PUMPS SHALL BE USED TO TRANSFER THE GROUT FROM THE MIX PLANT TO THE DSM RIG. A FLOW MONITORING DEVICE WILL BE INSTALLED IN THE GROUT LINE TO DETECT LINE BLOCKAGE AND ELECTRONICALLY RECORD INJECTION RATES AND VOLUMES VERSUS DEPTH AND TIME FOR QUALITY CONTROL MONITORING.

I. THE RATE OF APPLICATION MAY BE CONTROLLED AND MONITORED BY ADJUSTING THE PUMP OUTPUT TO THE PENETRATION RATE SO THAT A PRESET GROUT TAKE CAN BE ACHIEVED. TYPICALLY, THE APPLICATION RATE CAN BE SUCCESSFULLY CONTROLLED BY EXPERIENCED OPERATORS ONCE THE PATTERN OF OPERATION IS ESTABLISHED.

II. SOME VARIATIONS OF THE GROUT TAKE WILL OCCUR DUE TO FIELD CONDITIONS. HOWEVER, THE OVERALL APPLICATION RATE TO EACH STROKE CAN BE MONITORED, CALCULATED AND CONTROLLED. ADDITIONAL MIXING IS TO BE USED WHEN NECESSARY TO DISTRIBUTE THE GROUT THROUGH THE ENTIRE COLUMN. THE INJECTION OF GROUT TO EACH STROKE WILL BE MONITORED, CHECKED BY CALCULATION AND RECORDED.

G. COLUMN DEPTH:

I. BUTTRESS COLUMNS: COLUMNS INSTALLED FOR THE LATERAL SPREAD BUTTRESS SHALL BE INSTALLED TO A MINIMUM OF 4 FEET BEYOND THE CAPISTRANO FORMATION CONTACT AS IDENTIFIED BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER. PRACTICAL REFUSAL (AS DEFINED IN SECTION 3.3.H) ENCOUNTERED PRIOR TO ACHIEVING THE REQUIRED 4-FOOT EMBEDMENT INTO CAPISTRANO FORMATION MAY BE APPROVED BY THE ENGINEER ON A CASE-BY-CASE BASIS BUT THE DSM SUBCONTRACTOR SHALL BE PREPARED TO INITIATE PREDRILLING IF NEEDED TO ACHIEVE THE REQUIRED EMBEDMENT AT NO ADDITIONAL COST TO THE OWNER.

II. BUILDING SUPPORT COLUMNS: DSM COLUMNS INTENDED FOR SUPPORT OF THE RETAIL BUILDINGS SHALL BE INSTALLED TO A MINIMUM OF 1 FOOT BEYOND THE CAPISTRANO FORMATION CONTACT OR TO PRACTICAL REFUSAL. MEANS OF IDENTIFYING THE CAPISTRANO FORMATION CONTACT WILL BE BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

H. OBSTRUCTION/MIXING SHAFT PRACTICAL REFUSAL: IF OBSTRUCTIONS ARE ENCOUNTERED WHICH REDUCE THE RATE OF PENETRATION TO ONE FOOT PER MINUTE FOR TWO MINUTES UNDER FULL POWER, THE STROKE SHALL BE COMPLETED IN ACCORDANCE WITH THE SPECIFICATIONS AND REMEDIAL MEASURES WILL BE TAKEN. SUBCONTRACTOR SHALL NOTIFY CONTRACTOR TO INVESTIGATE, CONFIRM, AND REMOVE SAID OBSTRUCTIONS FROM THE SOIL MIXING AREA. ONCE CONTRACTOR REMOVES OBSTRUCTIONS AND BACKFILLS AND COMPACTS (IN LIFTS NOT TO EXCEED 3 FEET IN UNCOMPACTED THICKNESS) THE REMOVAL AREA WITH GRANULAR SAND OR SANDY GRAVEL MATERIAL, THE DSM SUBCONTRACTOR SHALL RETURN TO MIXING THE BACKFILLED AREAS AND REMAINING DSM COLUMNS PER PLANS AND SPECS. IF REMOVAL OF OBSTRUCTIONS BY CONTRACTOR DAMAGES A PREVIOUSLY INSTALLED DSM COLUMN, ASSOCIATED RE-INSTALLATION WORK SHALL BE COMPENSATED BY AS EXTRA AT THE CONTRACT UNIT PRICES. IF IT IS INFEASIBLE OR IMPRACTICAL TO CLEAR AN OBSTRUCTION FROM A DESIGN INSTALLATION LOCATION, CONTRACTOR MAY PROPOSE A MODIFICATION TO THE DESIGN PROVIDED THE ORIGINAL PERFORMANCE IS MAINTAINED SUBJECT TO THE REVIEW AND APPROVAL OF THE ENGINEER.

I. MIXING ENERGY: THE DSM SUBCONTRACTOR SHALL MIX EACH COLUMN WITH SUFFICIENT MIXING ENERGY THROUGHOUT TO PROPERLY PROCESS THE SOIL CEMENT PRODUCT. THE MIXING ENERGY SHALL BE DEMONSTRATED BY MEASURED AND RECORDED BRN REPORTED FOR EACH INSTALLATION AND THE MIXING ENERGY APPLIED SHALL MINIMALLY ACHIEVE THAT REQUIRED TO PRODUCE SATISFACTORY RESULTS DURING THE TEST SECTION.

J. NO EXCAVATION OR HEAVY GRADING BY CONTRACTOR SHALL PROCEED PRIOR TO 3 DAYS AFTER DSM COLUMN CONSTRUCTION UNLESS APPROVED BY THE DSM DESIGN ENGINEER.

K. UTILITY TRENCH: EXCAVATE THE COMPLETED DSM COLUMNS AS NECESSARY FOR UNDERGROUND UTILITIES. TRENCH BACKFILL WILL BE AS FOLLOW:

I. FOR TRENCHES CUT INTO BUTTRESS DSM AND ABOVE GWT: BACKFILL WILL NATIVE SOILS OR AS APPROVED BY THE ENGINEER.

II. FOR TRENCHES CUT INTO BUTTRESS DSM AND EXTEND BELOW GWT: BACKFILL WITH CEMENT SLURRY WITH COMPRESSIVE STRENGTH OF AT LEAST 300 PSI.

III. UTILITIES TRENCHES WILL AVOID CUTTING INTO THE DISCRETE 4' DIAMETER DSM COLUMNS SUPPORTING BUILDINGS AND SLABS.

L. MANAGEMENT OF SPOIL TO BE COORDINATED BETWEEN CONTRACTOR AND DSM SUBCONTRACTOR.

3.4 QUALITY CONTROL AND QUALITY ASSURANCE

A. PRIOR TO CONSTRUCTION, A PRELIMINARY MIX DESIGN SHALL BE GENERATED BY THE SUBCONTRACTOR. THE MIX DESIGN MAY BE OBTAINED BASED ON SITE SOILS AND LABORATORY TESTING, OR ALTERNATIVELY, BASED ON THE SUBCONTRACTORS DATABASE IN SIMILAR SOIL CONDITIONS AND STRENGTH REQUIREMENTS.

B. WET SAMPLING: THE DSM SUBCONTRACTOR SHALL OBTAIN WET BULK SAMPLES OF THE SOIL CEMENT MIX AND CAST IT IN CYLINDERS FOR SUBSEQUENT QUALITY CONTROL TESTING BY THE DSM SUBCONTRACTOR, AND QUALITY ASSURANCE TESTING AND ACCEPTANCE BY THE ENGINEER.

I. ONE SAMPLE WILL BE RETRIEVED PER WORK DAY PER RIG.

II. THE VOLUME OF SAMPLE RECOVERED DURING EACH SAMPLING SHALL BE SUFFICIENT TO CAST 6 SAMPLE CYLINDERS EACH MEASURING 3" DIAMETER BY 6" HIGH. A ½" SIEVE WILL BE USED TO SCREEN THE MATERIAL IN ORDER TO FACILITATE APPROPRIATE SCALING OF INCLUSIONS AND PROPER MODELING OF THE 3 INCH CYLINDERS.

III. OF THE 6 CYLINDERS CAST, 3 WILL BE PROVIDED TO THE ENGINEER FOR QUALITY ASSURANCE TESTING AND 3 WILL BE RETAINED BY THE DSM SUBCONTRACTOR FOR QUALITY CONTROL TESTING.

IV. TO AVOID DISTURBANCE, THE CYLINDERS ARE TO BE CURED ON SITE IN A COOLER WITH A SMALL AMOUNT OF WATER TO MAINTAIN A STABLE, COOL AND MOIST CURING ENVIRONMENT FOR 2 DAYS.

V. AFTER QUALITY ASSURANCE SAMPLES ARE RETRIEVED BY THE ENGINEER, ALL WET GRAB SAMPLES SHALL BE STORED IN A MOIST ROOM (NOT SUBMERGED) IN ACCORDANCE WITH ASTM C 192 UNTIL THE TEST DATE.

VI. THE QUALITY CONTROL SAMPLES WILL BE TESTED (BY THE DSM SUBCONTRACTOR) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 3-DAY, 7-DAY, AND 14-DAY AFTER CASTING. THE RESULTS WILL BE USED TO EXTRAPOLATE THE EXPECTED STRENGTH AT 28-DAYS.

VII. THE QUALITY ASSURANCE SAMPLES WILL BE TESTED (BY THE ENGINEER) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 7-DAY, 14-DAY, AND 28-DAY AFTER CASTING.

VII. WHEN TIME OR SCHEDULE DOES NOT PERMIT A 28-DAY CURING STRENGTH EVALUATION, THE FOLLOWING UCS AGING CORRELATION WILL BE TENTATIVELY APPLIED TO THIS JOB:

28 : 7 DAY, 1.57

VIII. THE ABOVE CORRELATION MAY BE ADJUSTED FOR SITE-SPECIFIC FINDINGS AS THE PROJECT DEVELOPS.

IX. THE DESIGN STRENGTH FOR THIS PROJECT AT 28-DAYS IS 150 PSI. SUBJECT TO THE APPROVAL OF THE ENGINEER, 7-DAY TEST RESULTS MAY BE ACCEPTED BASED ON THE CORRELATION ABOVE OR A REVISED CURING FACTOR BASED ON PROJECT-SPECIFIC STATISTICAL ANALYSIS OF AVAILABLE DATA.

C. LOAD TEST:

I. DSM SUBCONTRACTOR SHALL PERFORM A MINIMUM OF FOUR COMPRESSION LOAD TEST ON 4-FOOT-DIAMETER COLUMNS AT THE TEST SECTION LOCATION SPECIFIED FOR THE BUILDINGS ON THE DRAWINGS.

II. COMPRESSION LOAD TEST SHALL BE IN GENERAL ACCORDANCE WITH ASTM D1143. THE TEST COLUMN SHALL BE CONDUCTED TO AT LEAST 150% OF THE STATIC DESIGN LOAD.

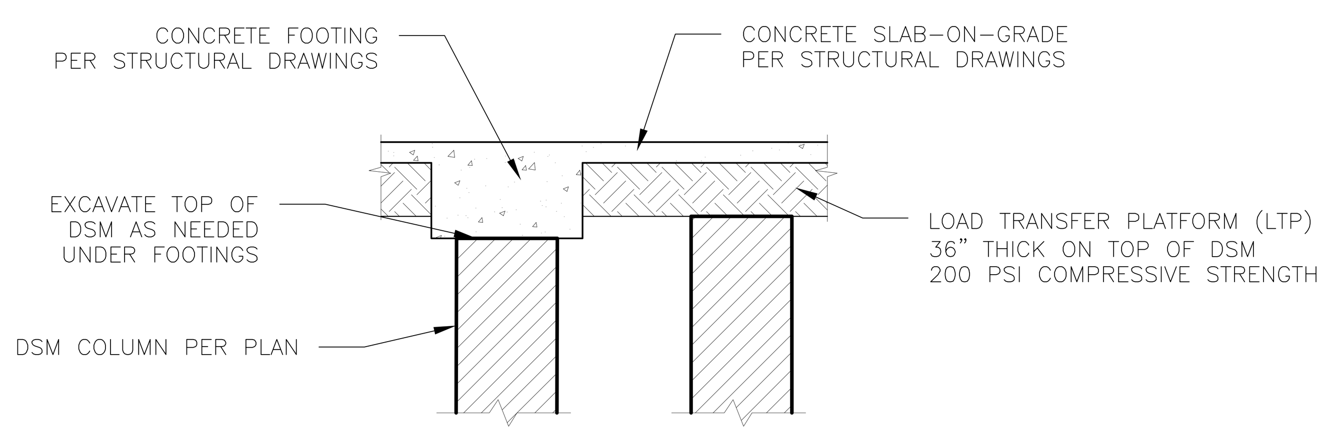
III. LOAD TEST WILL NOT BE PERFORMED BEFORE THE COLUMN HAS ACHIEVED SUFFICIENT UNCONFINED COMPRESSIVE STRENGTH AS DEMONSTRATED BY LABORATORY TESTING ON WET GRAB SAMPLES.

D. OBSERVATION: A REPRESENTATIVE OF THE ENGINEER SHALL BE PRESENT FULL-TIME DURING ALL INSTALLATION WORK TO OBSERVE THE CONSTRUCTION OF THE DSM COLUMNS, SAMPLING, AND TESTING TO VERIFY THE DSM SUBCONTRACTOR PERFORMS THE WORK IN SUBSTANTIAL CONFORMANCE WITH THESE SPECIFICATIONS. THE ENGINEER SHALL MAINTAIN PARALLEL HAND RECORDS OF PERTINENT INSTALLATION DATA FOR COMPARISON WITH REPORTED INSTALLATION LOGS AND OBTAIN TEST SPECIMENS OF THE WET-SAMPLES COLLECTED FOR QUALITY ASSURANCE TESTING.

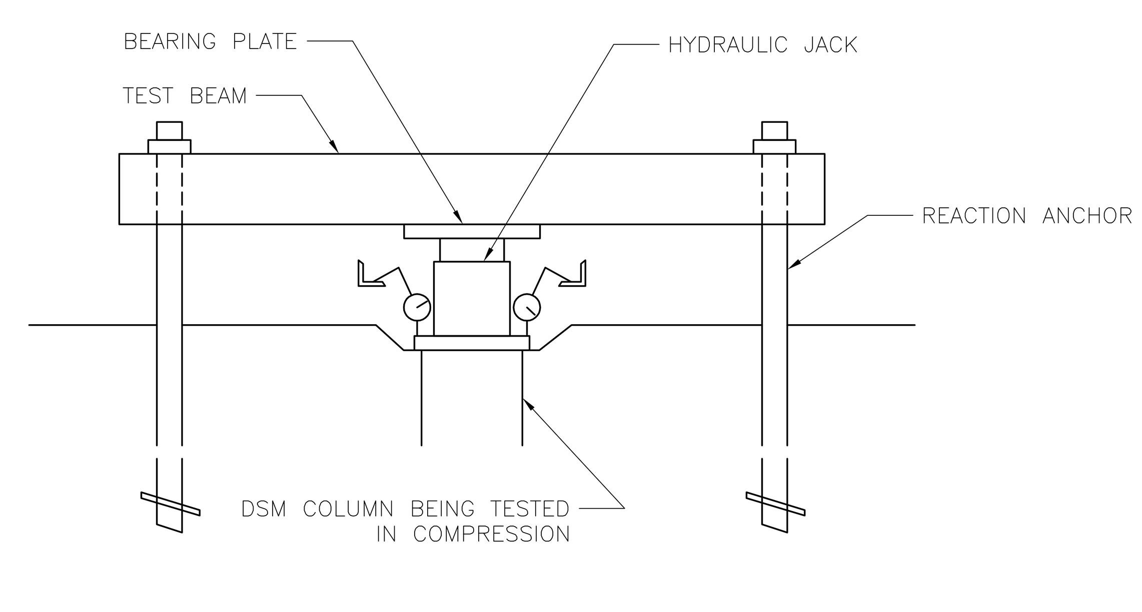
E. UPON COMPLETION OF SITE GRADING AND DSM/LTP INSTALLATION, WRITTEN CONFIRMATION FROM THE PROJECT GEOTECHNICAL CONSULTANT OF RECORD WILL BE PROVIDED TO CONFIRM PRELIMINARY RECOMMENDATIONS FOR PROPOSED STRUCTURE(S) ALLOWABLE BEARING VALUE REMAINS VALID. ADDITIONAL RECOMMENDATIONS SHALL BE PROVIDED AS NECESSARY.

END OF SECTION

COMPRESSION TEST LOADING SCHEDULE		
DESIGN LOAD =	200	KIPS
PERCENT OF DL (%)	LOAD VALUE (KIP)	HOLD DURATION (MIN)
5%	10	4
10%	20	4
15%	30	4
20%	40	4
25%	50	4
30%	60	4
35%	70	4
40%	80	4
45%	90	4
50%	100	4
55%	110	4
60%	120	4
65%	130	4
70%	140	4
75%	150	4
80%	160	4
85%	170	4
90%	180	4
95%	190	4
100%	200	4
105%	210	4
110%	220	4
115%	230	4
120%	240	4
125%	250	4
130%	260	4
135%	270	4
140%	280	4
145%	290	4
150%	300	4
125%	250	4
100%	200	4
75%	150	4
50%	100	4
25%	50	4
5%	10	4
0%	0	-



TYPICAL BUILDING SUPPORT DETAIL
SCALE: NTS



LOAD TEST SETUP
SCALE: NTS

AGI
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Phone (310) 796-9000 | Fax (310) 796-9001
www.advgeosolutions.com

REVISIONS		
NO.	DATE	DESCRIPTION
–	–	–

C 91763 THOMAS ... REGISTERED PROFESSIONAL ENGINEER CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

GENERAL NOTES AND DETAILS

PROJECT NO. –

DATE: 08/23/2021

SCALE: AS SHOWN

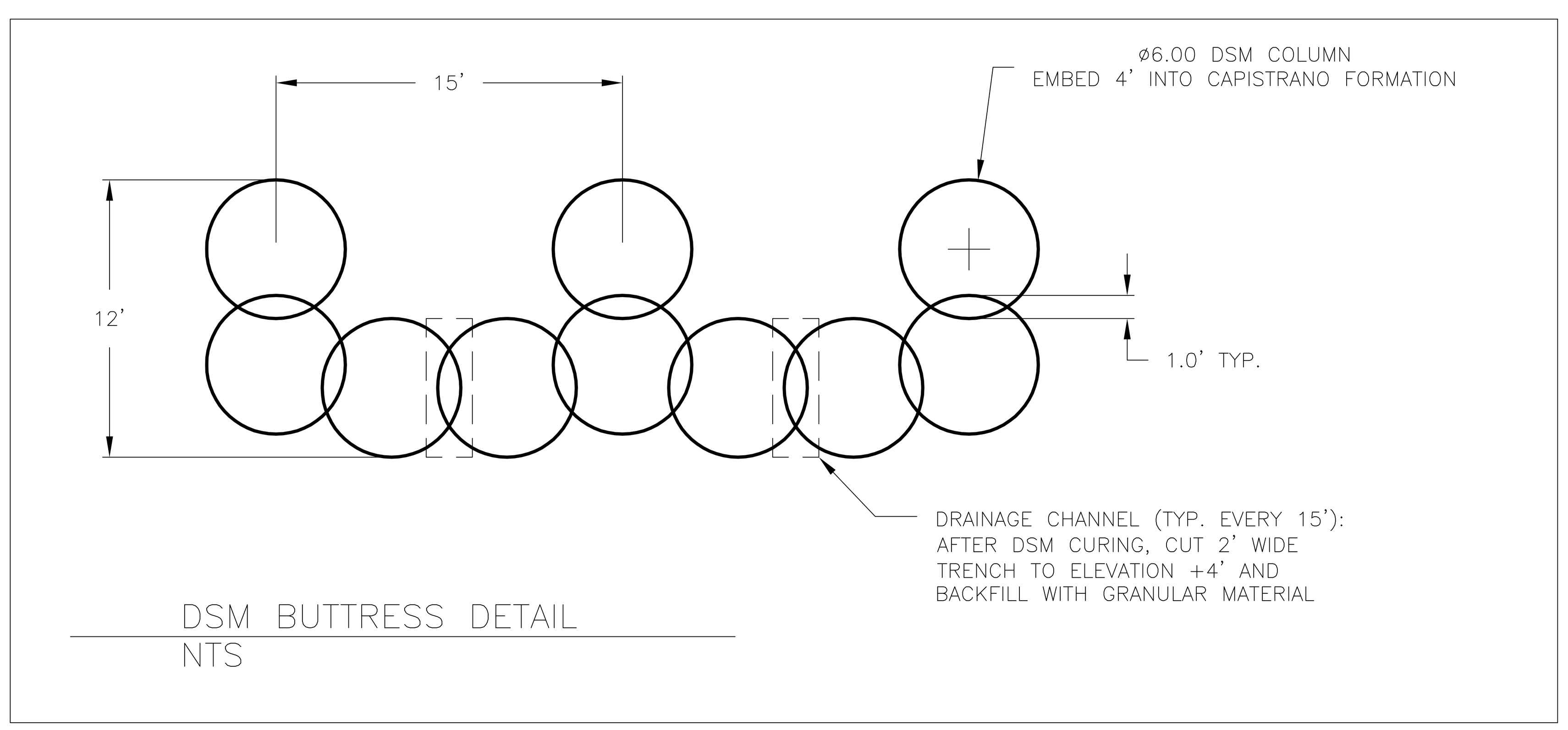
SHEET NUMBER: GI-2

LEGEND:

CPT-4 (11-161-00) Tc @ 16'	APPROXIMATE LOCATION OF CPT APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)
DH-17 (11-161-00) Tc @ 19'	APPROXIMATE LOCATION OF BORE HOLE APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)
D — D'	GEOTECHNICAL CROSS-SECTION

NOTES:

1. SITE PLAN BACKGROUND BY TAIT DATED 5/27/2021 AND SHOWN FOR REFERENCE ONLY.
2. SEE REFERENCE GEOTECHNICAL REPORT FOR LOGS OF BORINGS AND CPTS.



DSM BUTTRESS DETAIL
NTS

DSM PLAN
SCALE: 1" = 40'

0' 40' 80'
SCALE: 1"=40'

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REVISIONS		
NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING PLAN

PROJECT NO. –
DATE: 08/23/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-3

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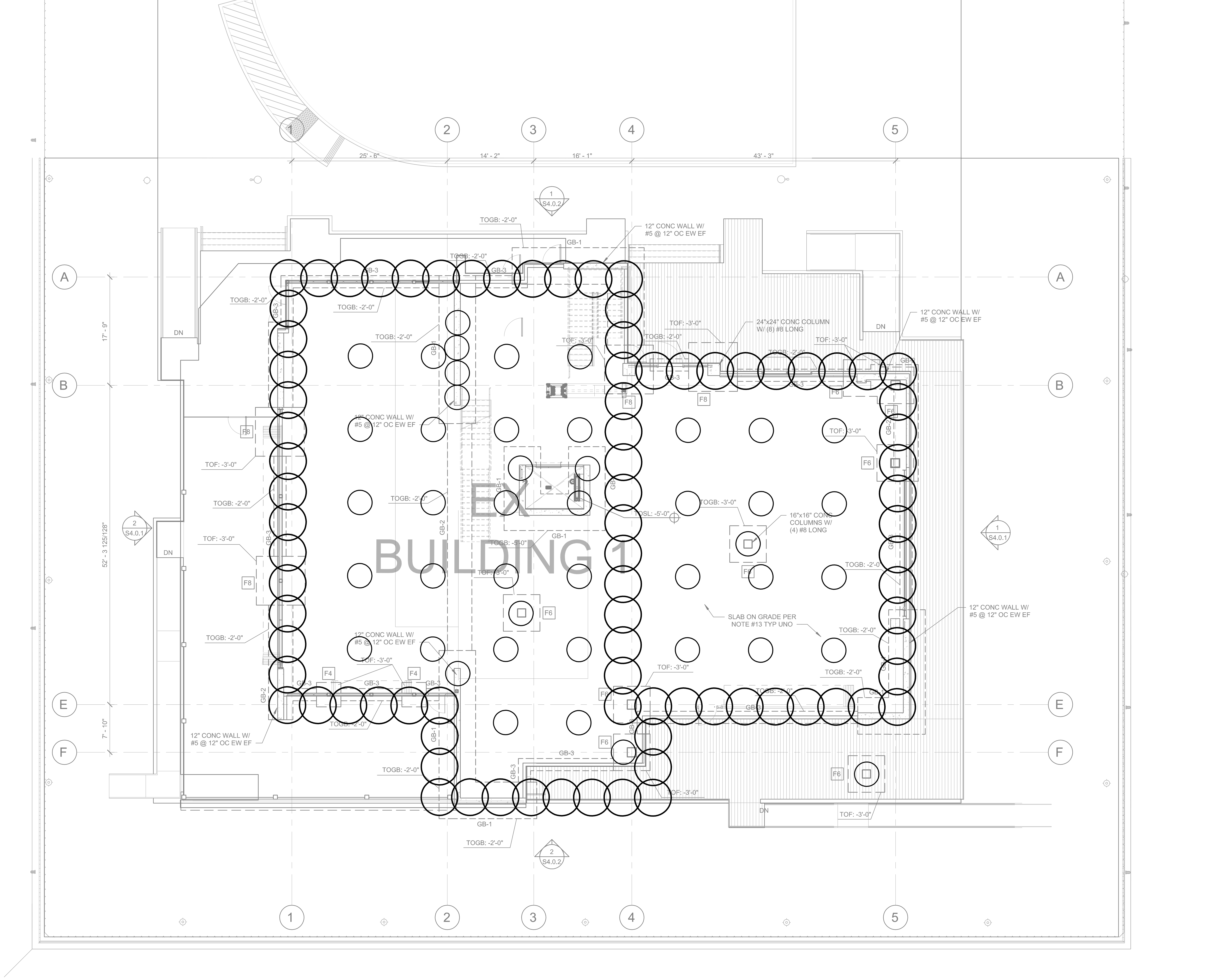

DSM COLUMN LAYOUT – BUILDING 1
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

- DSM COLUMN 6' ø BEARING ON CAPISTRANO FORMATION
- DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 10/8/2020 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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REVISIONS

NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 1

PROJECT NO. –
DATE: 08/23/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.1

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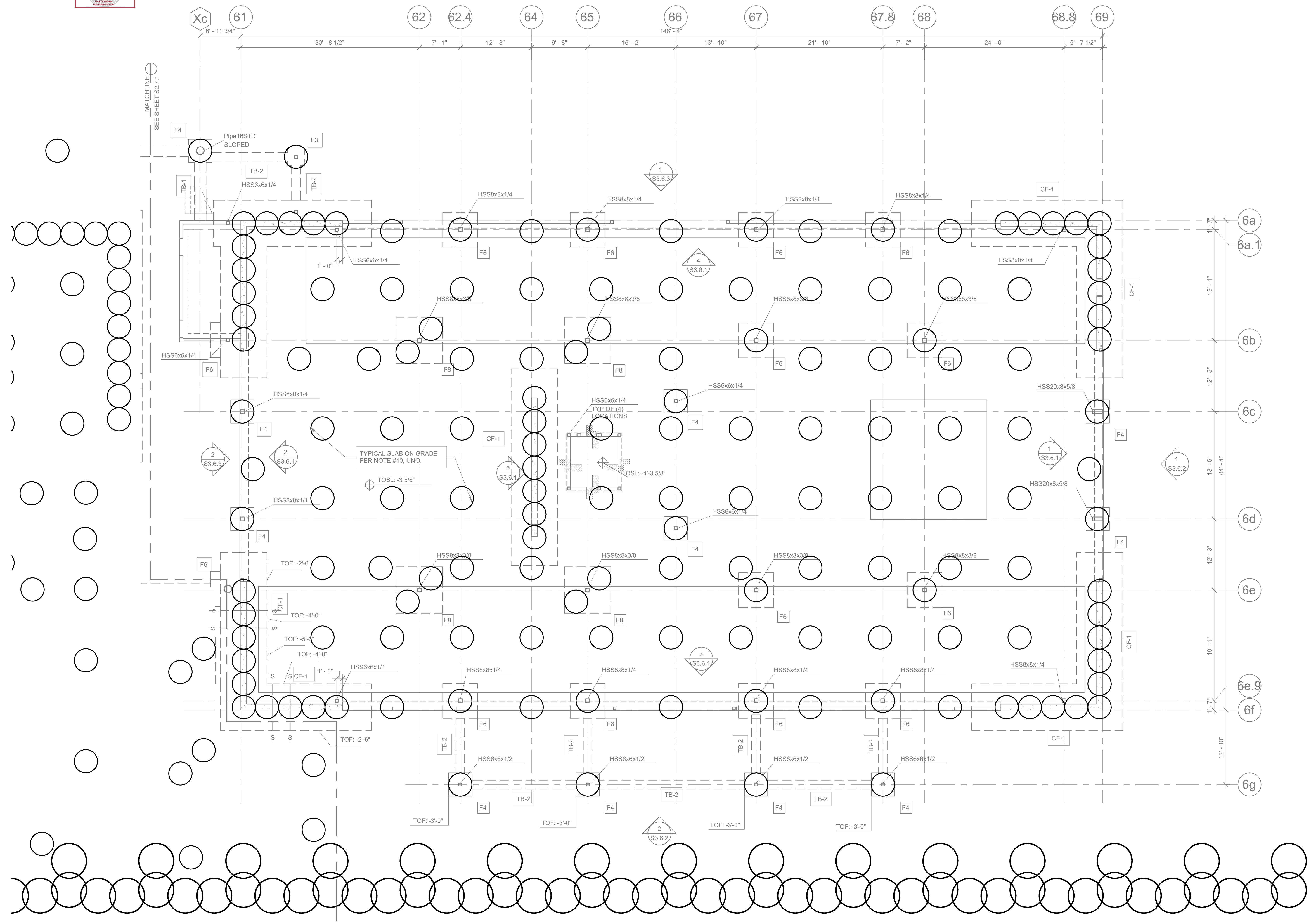

DSM COLUMN LAYOUT – BUILDING 6
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 4/9/2021 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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REVISIONS

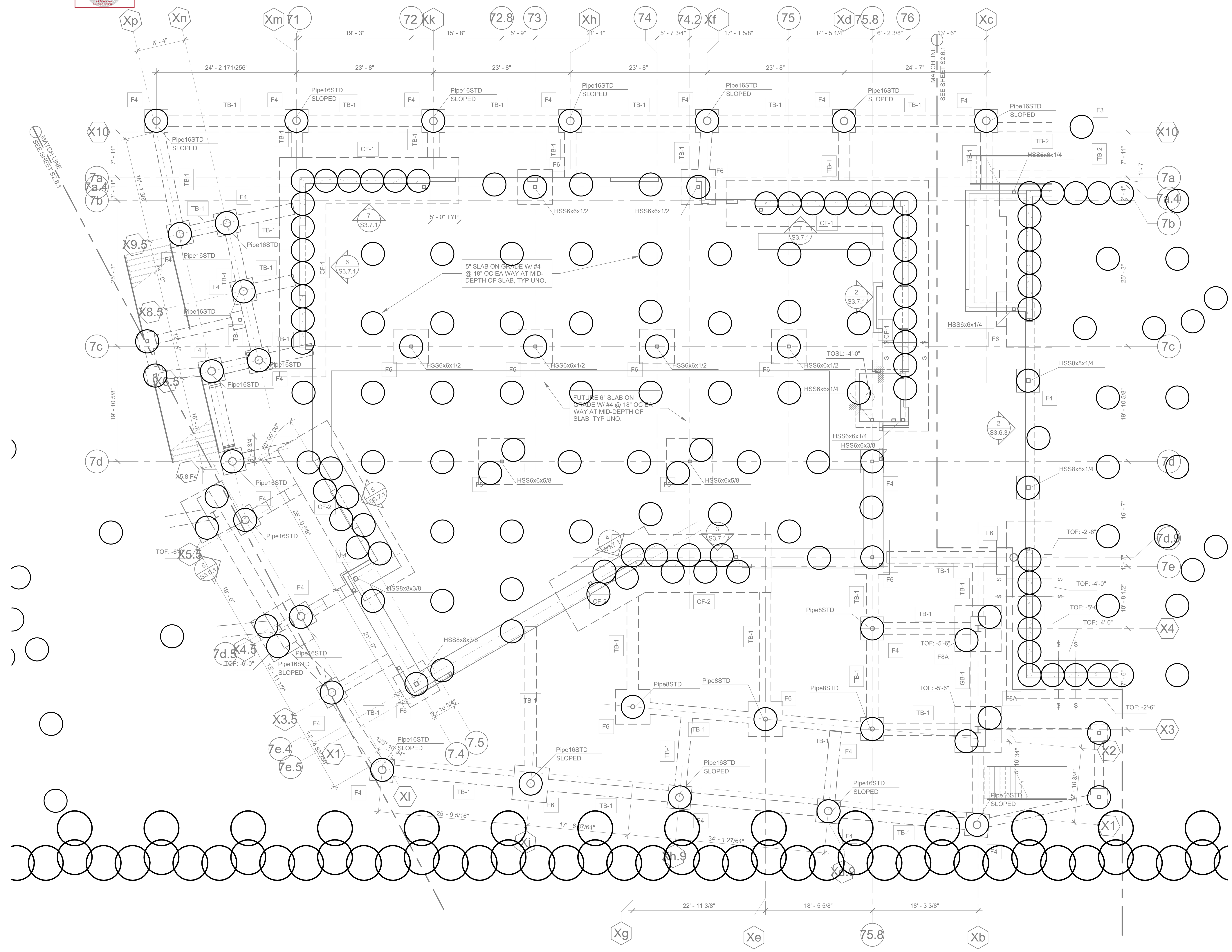
NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 6

PROJECT NO.	SHEET NUMBER:
–	GI-4.2
DATE: 08/23/2021	
SCALE: AS SHOWN	



DSM COLUMN LAYOUT – BUILDING 7
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 7

PROJECT NO. –
DATE: 08/23/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.3

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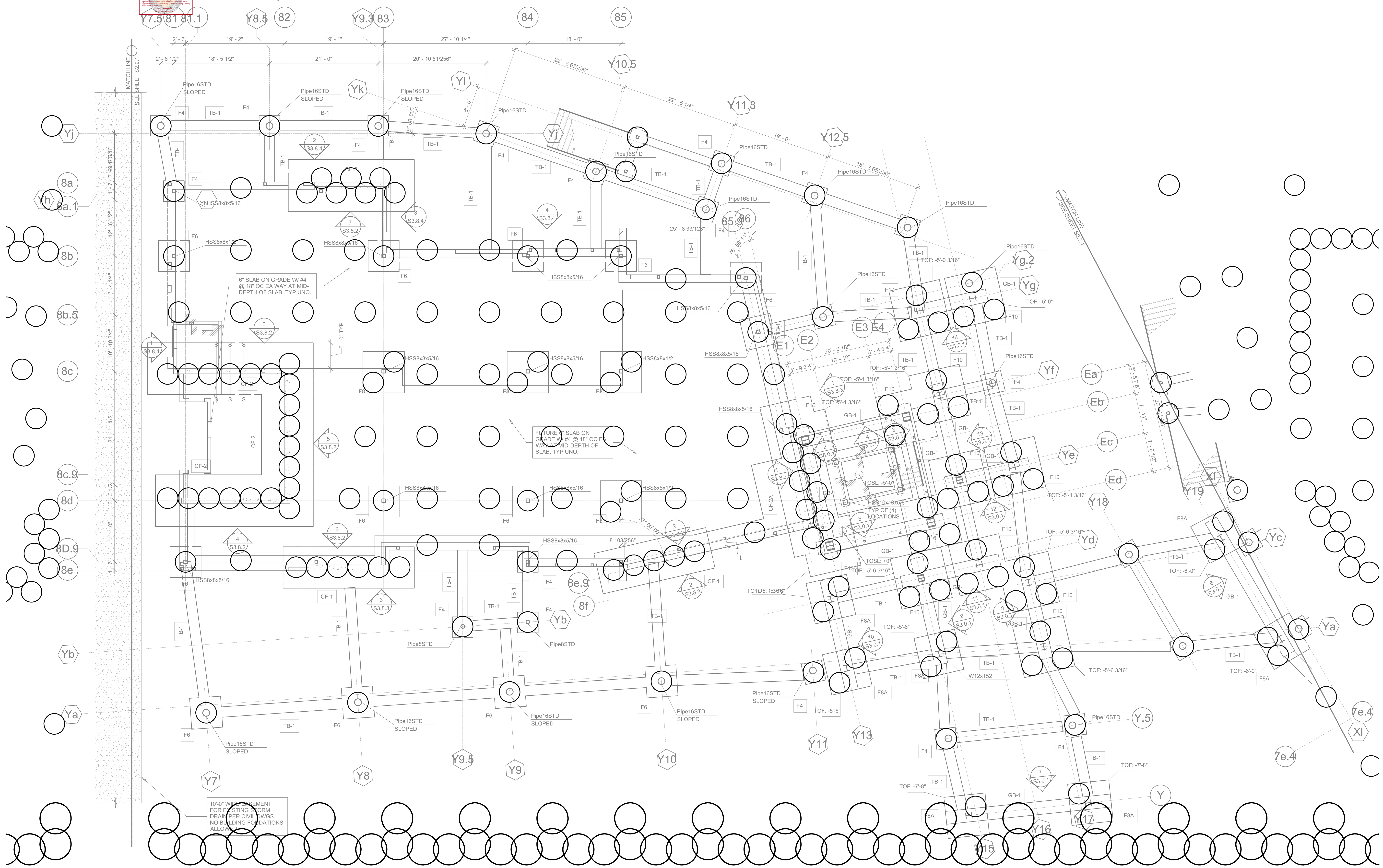

DSM COLUMN LAYOUT – BUILDING 8
SCALE: 1/8" = 1'

LEGEND:

- DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION
- DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

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PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 8

PROJECT NO. –

DATE: 08/23/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.4

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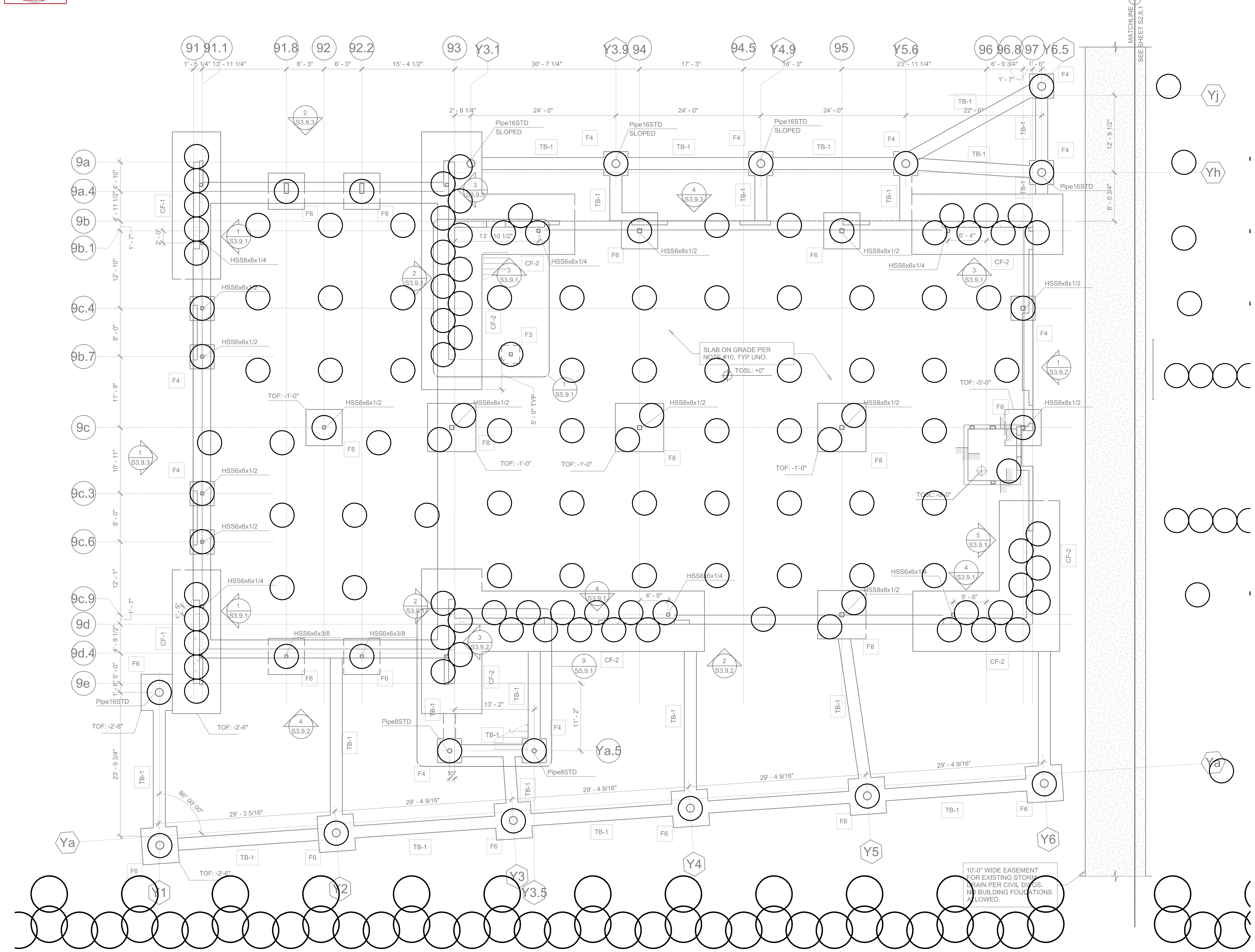

DSM COLUMN LAYOUT – BUILDING 9
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 9

PROJECT NO.	SHEET NUMBER:
–	GI-4.5
DATE: 08/23/2021	
SCALE: AS SHOWN	

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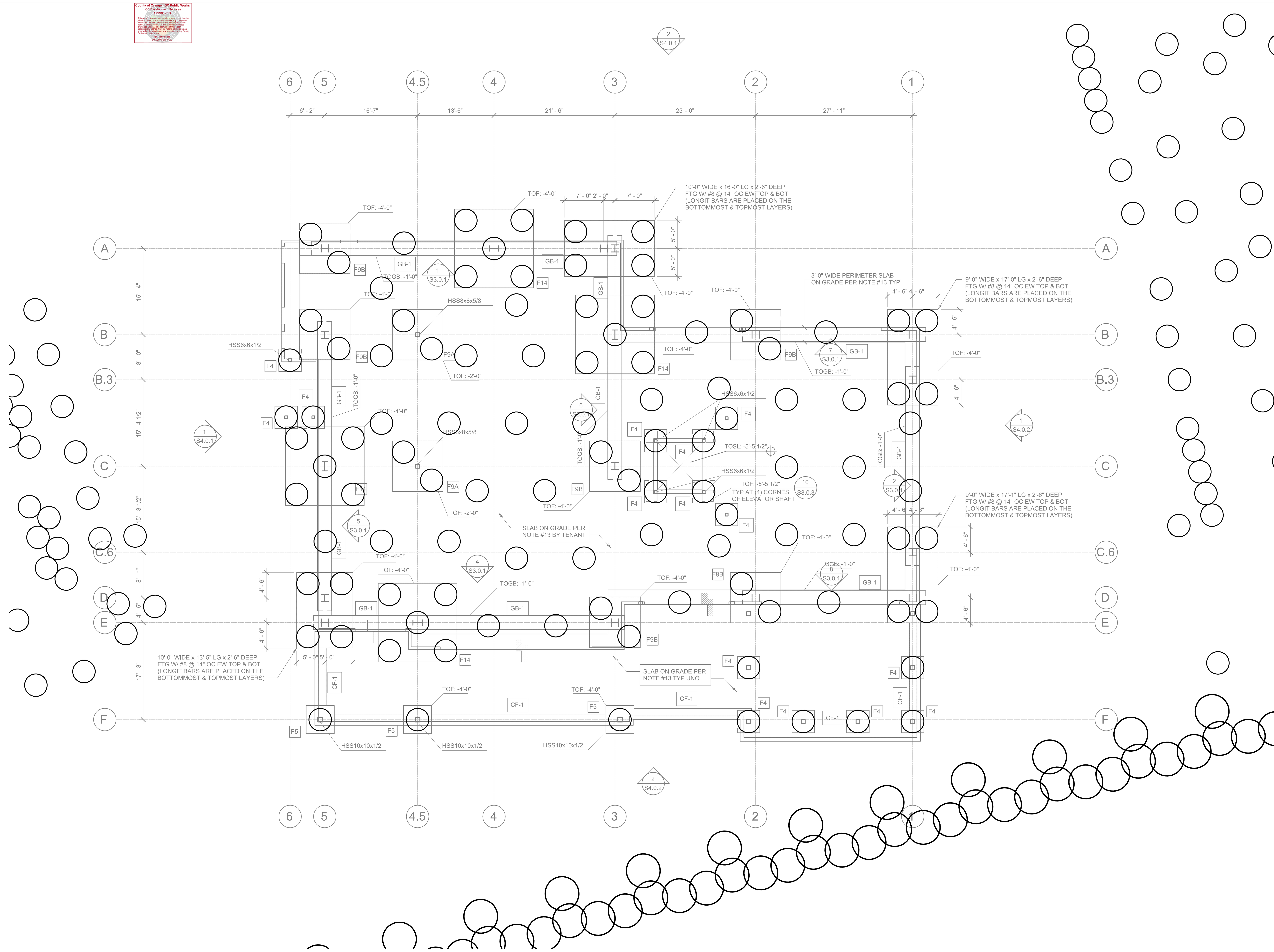

DSM COLUMN LAYOUT – BUILDING 10

SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

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PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 10

PROJECT NO. –

DATE: 08/23/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.6

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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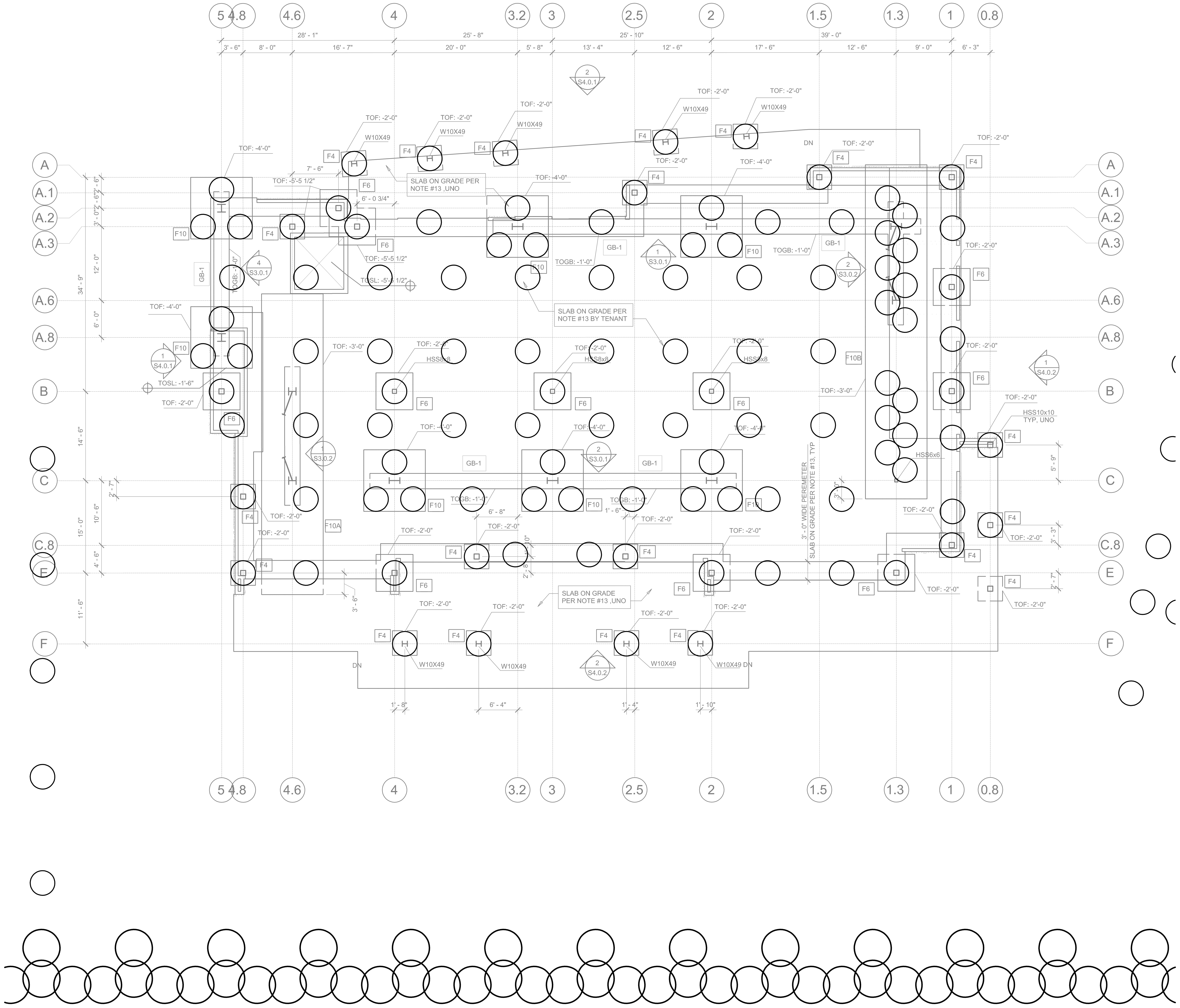

DSM COLUMN LAYOUT – BUILDING 11
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

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SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 11

PROJECT NO. –

DATE: 08/23/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.7

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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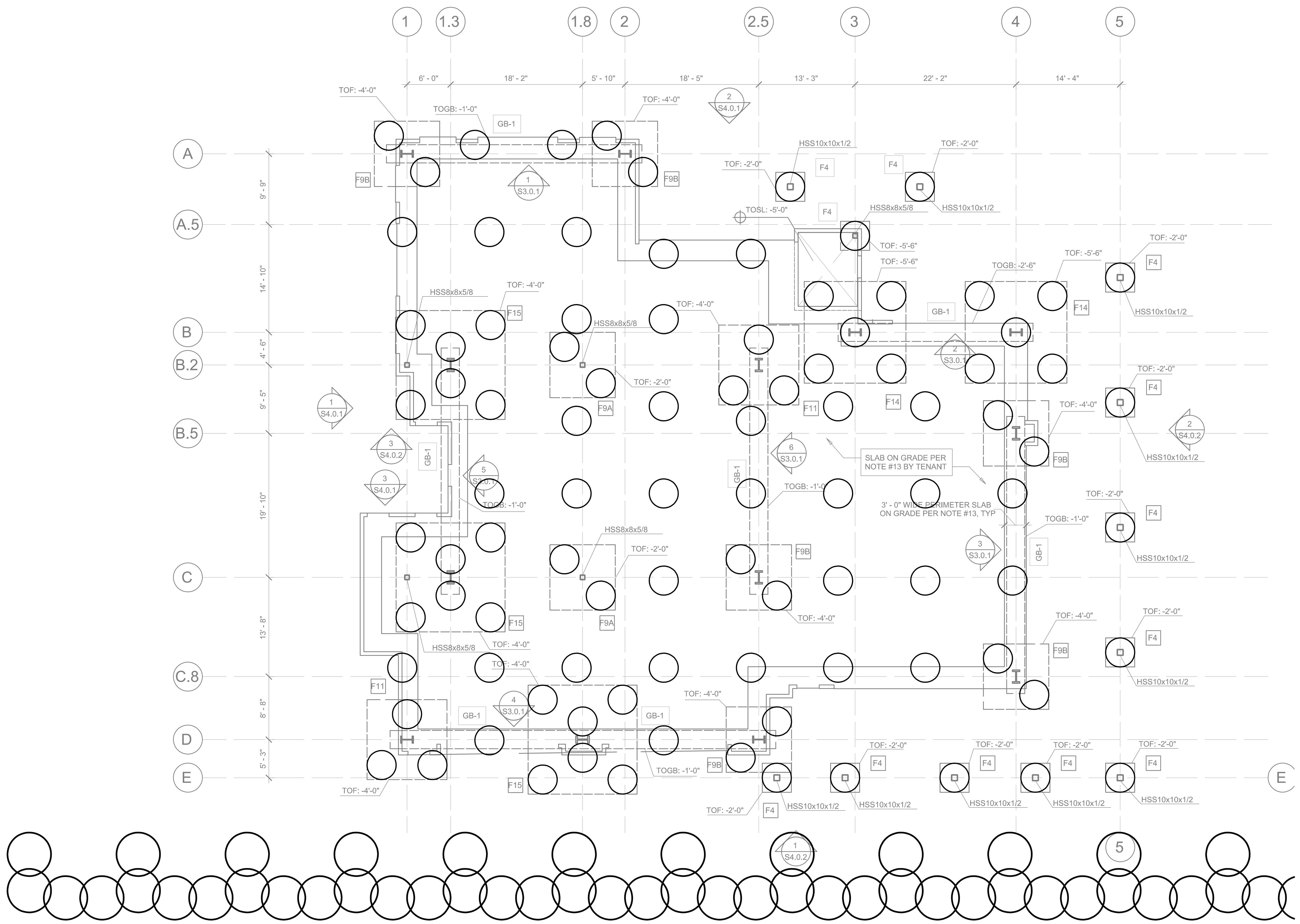

DSM COLUMN LAYOUT – BUILDING 12
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 4/12/2021 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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C 91763
CIVIL
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PROJECT:
GROUND IMPROVEMENT FOR
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SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 12

PROJECT NO. –
DATE: 08/23/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.8

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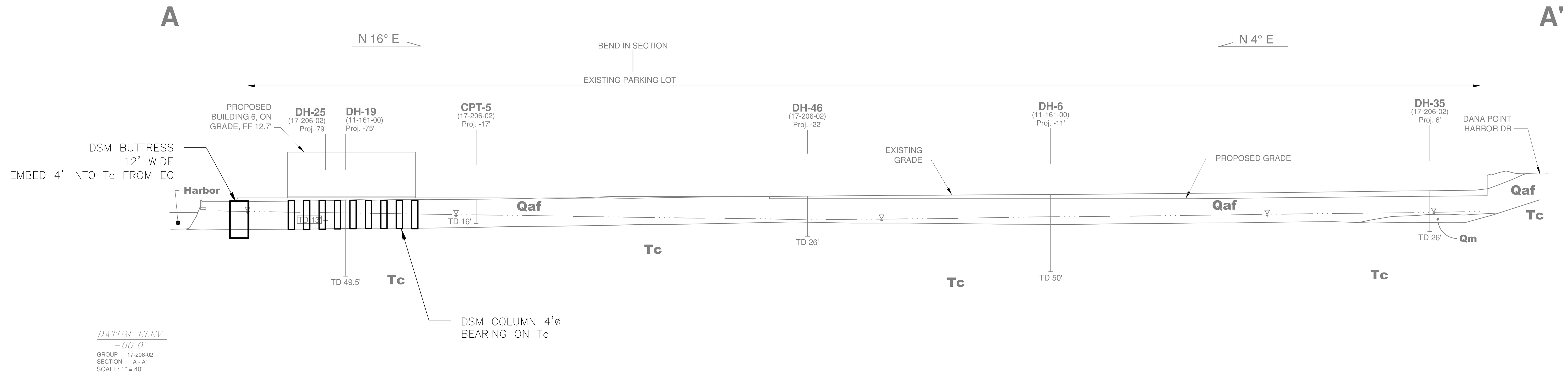

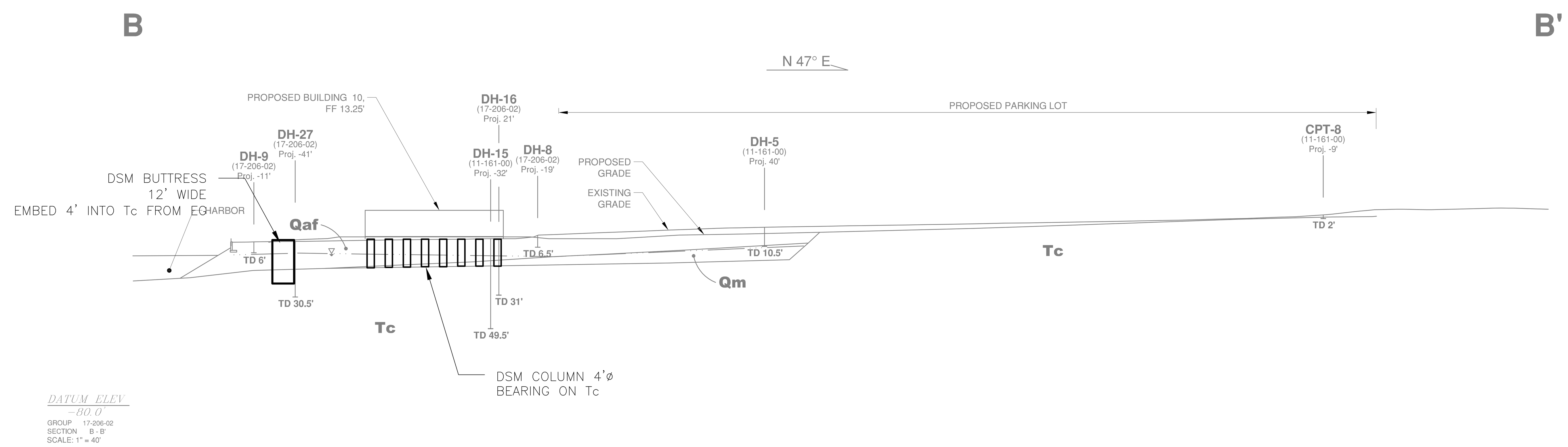

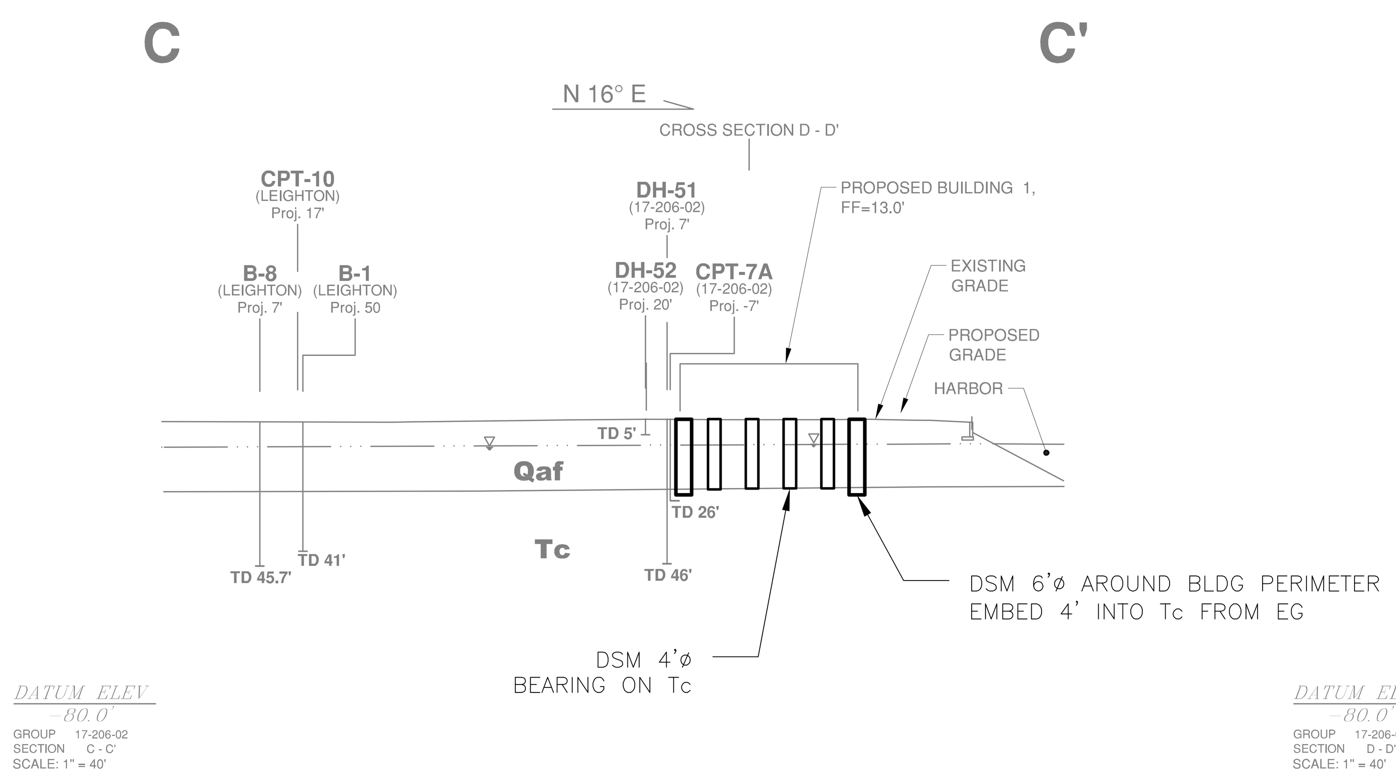

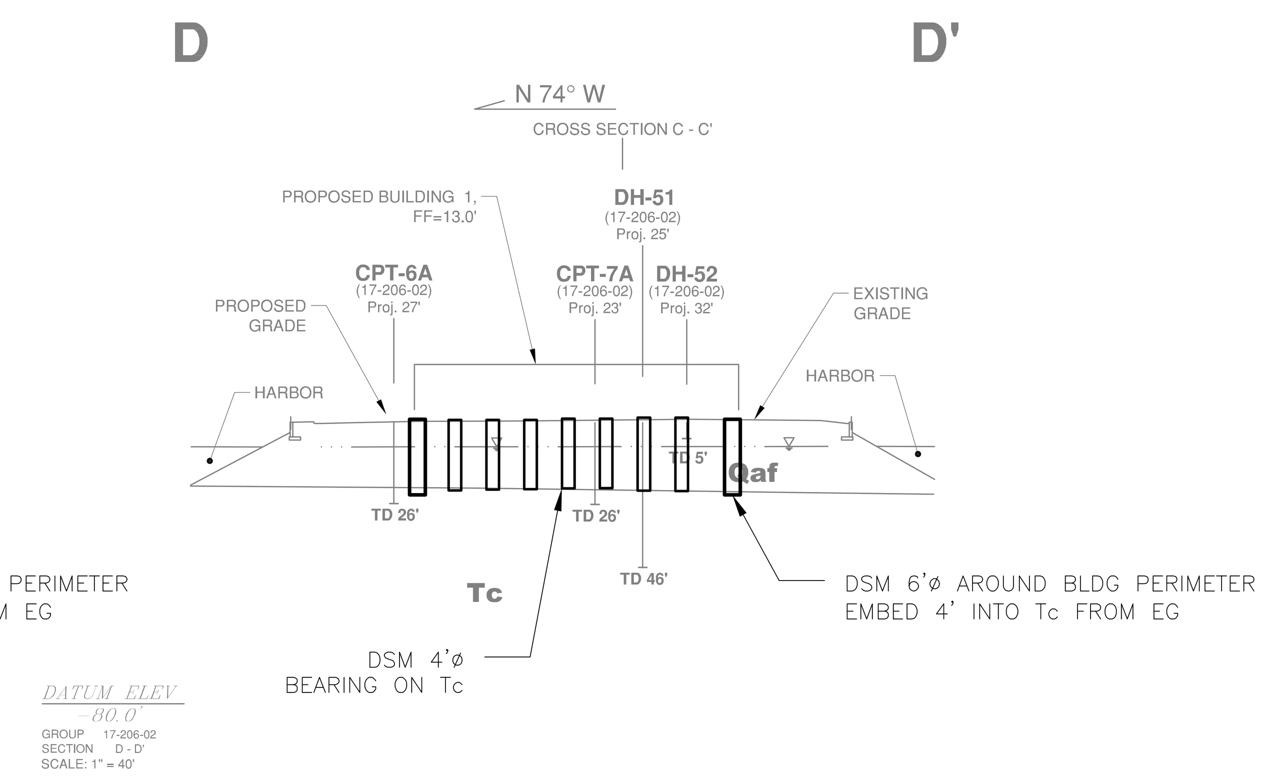

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PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

GEOTECHNICAL SECTIONS

PROJECT NO. —
DATE: 08/23/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-5

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APPENDIX B1

Pseudostatic Slope Stability Analysis

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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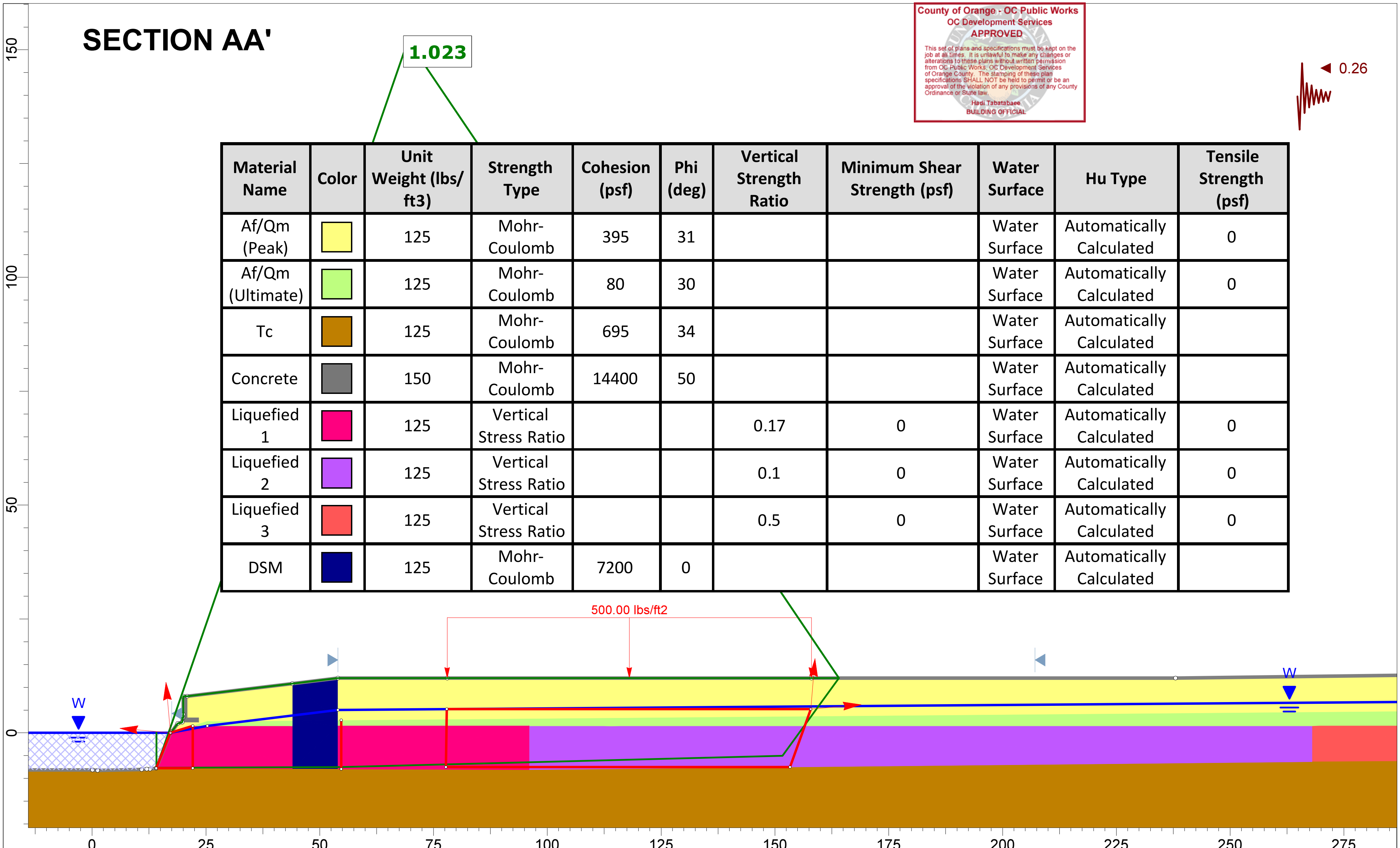
SECTION AA'

1.023

0.26

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Tensile Strength (psf)
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Automatically Calculated	0
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Automatically Calculated	0
Tc		125	Mohr-Coulomb	695	34			Water Surface	Automatically Calculated	
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Automatically Calculated	
Liquefied 1		125	Vertical Stress Ratio			0.17	0	Water Surface	Automatically Calculated	0
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Automatically Calculated	0
Liquefied 3		125	Vertical Stress Ratio			0.5	0	Water Surface	Automatically Calculated	0
DSM		125	Mohr-Coulomb	7200	0			Water Surface	Automatically Calculated	



AGI™
SLIDEINTERPRET 9.012

Project	Dana Point Harbor		
Group	DSM_10ft	Scenario	kh=0.26 Block Search
Drawn By	TT	Company	AGI
Date		File Name	Section_Arev.slmd

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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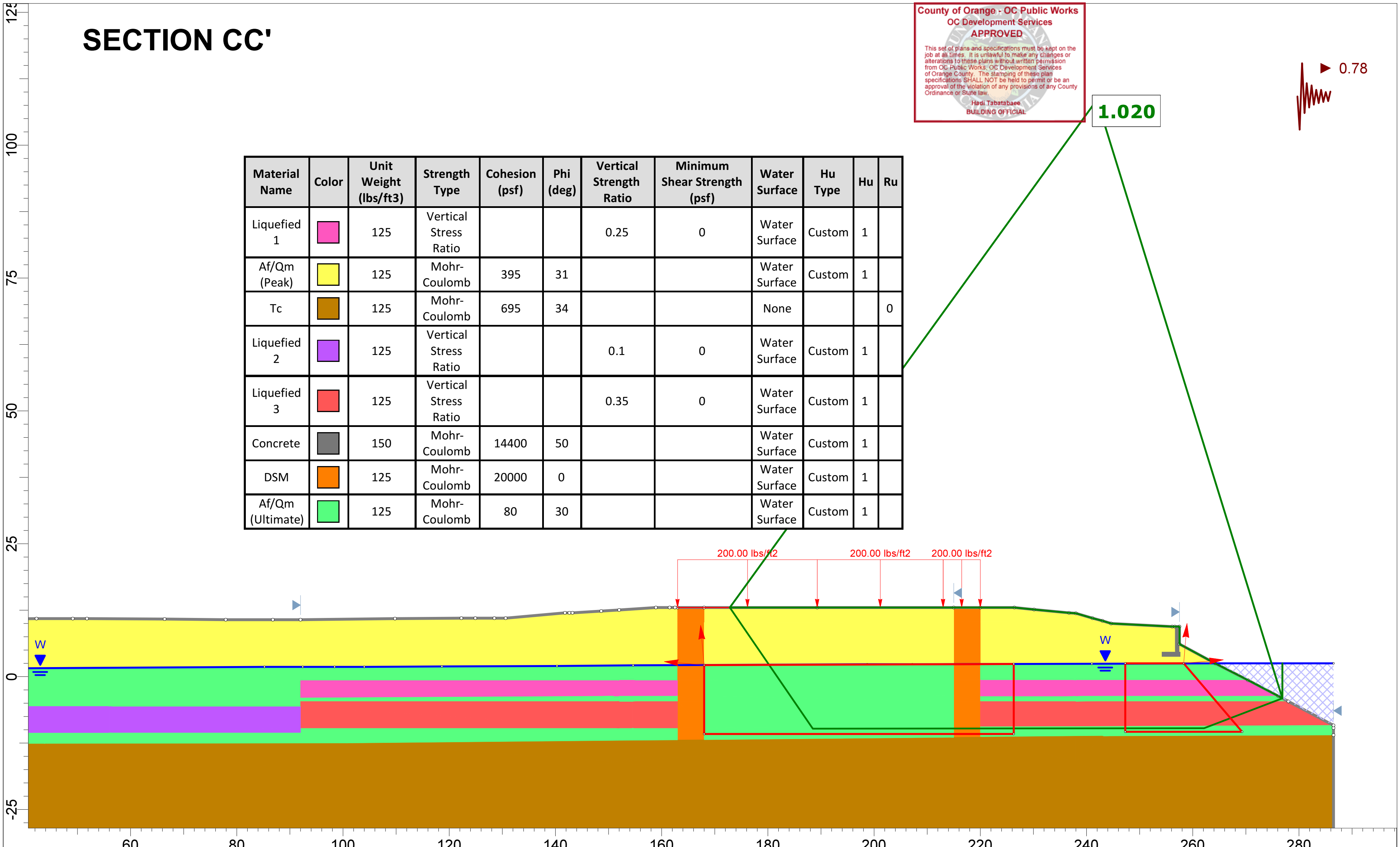
SECTION CC'

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu	Ru
Liquefied 1		125	Vertical Stress Ratio			0.25	0	Water Surface	Custom	1	
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1	
Tc		125	Mohr-Coulomb	695	34			None			0
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Custom	1	
Liquefied 3		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1	
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1	
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1	
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1	



AGI

SLIDEINTERPRET 9.012

Project	Dana Point Harbor		
Group	Group 1	Scenario	kh=0.78 Block Search
Drawn By	TT	Company	AGI
Date		File Name	Section_C.slmd

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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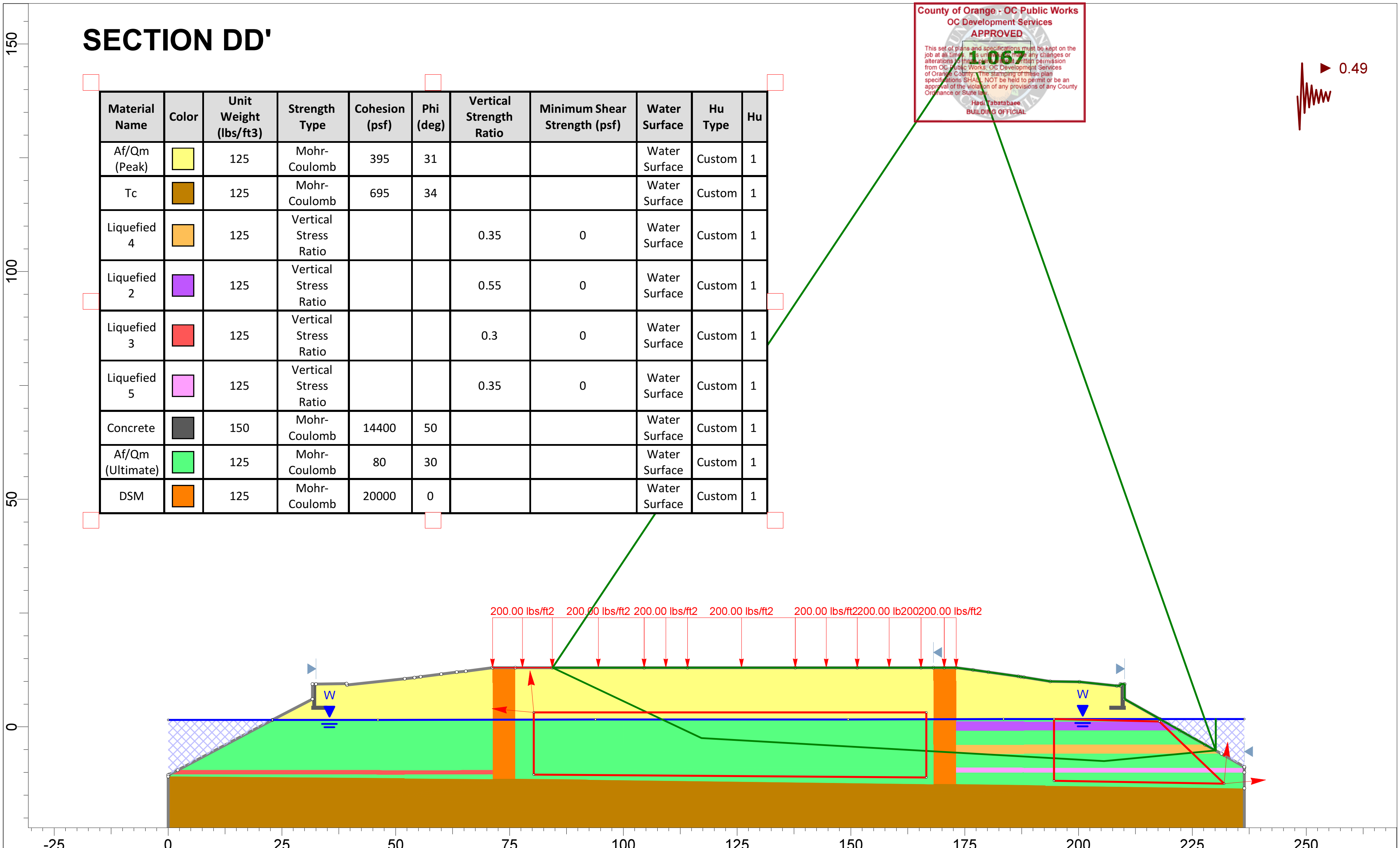
SECTION DD'

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1
Tc		125	Mohr-Coulomb	695	34			Water Surface	Custom	1
Liquefied 4		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Liquefied 2		125	Vertical Stress Ratio			0.55	0	Water Surface	Custom	1
Liquefied 3		125	Vertical Stress Ratio			0.3	0	Water Surface	Custom	1
Liquefied 5		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1



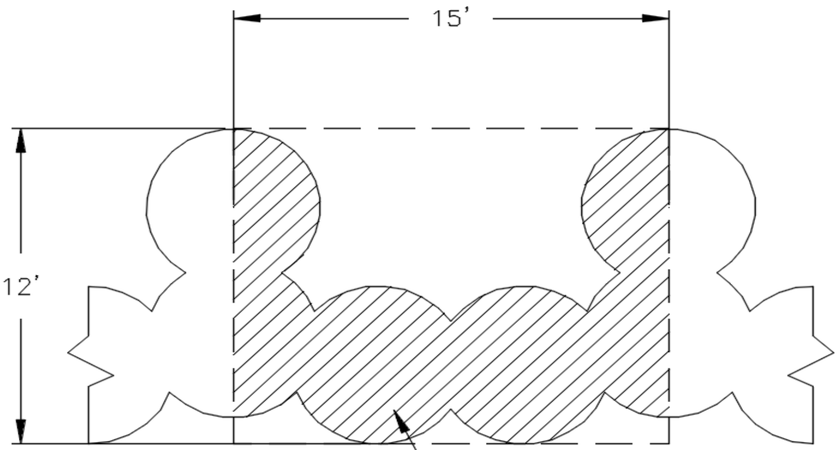
AGI™	Project	Dana Point Harbor	
	Group	Group 1	Scenario: kh=0.5 Block Search
	Drawn By	TT	Company: AGI
SLIDEINTERPRET 9.012	Date	4/15/2021	File Name: Section_D.slmd

APPENDIX B2

Composite Shear Strength of DSM Buttress

Determine composite shear strength of DSM buttress for use in pseudostatic slope stability anlysis
Lateral stread buttress

Geometry:



Input values:

ARR =	58%		Area replacement ratio
q_DSM28 =	150	psi	Design compressive strength of DSM at 28 days
fc =	2		Curing factor (long term)

Calculations:

q_DSM =	300	psi	Long term compressive strength of DSM for seismic condition
s_DSM =	150	psi	Shear strength of DSM = 1/2 compressive strength
=	21600	psf	
s_comp =	12528	psf	Composite shear strenght = s_DSM x ARR (Neglect shear strength of native soils)

Select conservative value of **7200 psf** to ensure strain compatibility

APPENDIX B3

Post-Improvement Slope Lateral Deformation

Seismic Displacement Calculation

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	**0.67**	g
Earthquake magnitude	M	**6.9**	
Spectral acceleration at 1 sec	S1	**0.45**	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	**0.26**	g
Correlated displacement in soils - West US region	d	**1.4**	inches

Seismic Displacement Calculation

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	0.67	g
Earthquake magnitude	M	6.9	
Spectral acceleration at 1 sec	S1	0.45	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	0.49	g
Correlated displacement in soils - West US region	d	**0.1**	inches

Seismic Displacement Calculation
Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	**0.67**	g
Earthquake magnitude	M	**6.9**	
Spectral acceleration at 1 sec	S1	**0.45**	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	**0.78**	g
Correlated displacement in soils - West US region	d	**0.0**	inches

APPENDIX B4

Internal Stability Analysis

DSM Internal Stability Design Calculations - Per FHWA (2013)

Input Parameters		
DSM Panel height (H_dm)=	24	ft
DSM Panel Width (B)=	12	ft
Panel Effective Width (b)=	5.2	ft
Chord Length (c)=	3.3	ft
s_shear=	15	ft
Replacement Ratio (a_s,shear) =	0.347	
Panel Bottom Ele. =	-12	ft
G.W. Ele. =	5	ft
Soil below DSM panel tip:		
Cohesion (C_m) =	695	psf
Friction angle (Phi_m)=	34	deg
Effective Unit Weight=	62.6	pcf
Soil above DSM panel tip:		
Effective Unit Weight=	62.6	pcf
DSM Strength (28 days) =	150	psi
DSM Strength (1 year) =	300	psi
DSM Panel Unit Weight=	125	pcf
Lateral Seismic Coefficient (k_h) =	0.19	g
P_ae =	23,959	lbs/ft
h_a=	8.0	ft
P_p (Rankin or Coulomb Methods)=	31,411	lbs/ft
h_p=	2.5	ft
Va=	7,188	lbs/ft
Vp=	9,423	lbs/ft

Force Calculations		
Panel Weight (W)=	36000	lbs/ft
Buoyancy Force (U)=	12,730	lbs/ft
Inertial Load on Panel (Fa)=	6840	lbs/ft
T=	22528	lbs/ft
N=	33,764	lbs/ft
N'=	21,035	lbs/ft
x_N=	3.17	ft
x_N'=	1.46	ft

Combined Overturning and bearing capacity failure		
q_toe=	**24,438**	psf
N'c=	**42.2**	
N'q=	**29.4**	
N'_gamma (Vesic 1975)=	**41.1**	
q_all =	**80,218**	psf
Is Demand < Allowable?	**DESIGN OK**	

Crushing of DSM Panel at the outside toe		
q_toe=	**24,438**	psf
fv=	0.95	
Fc=	1.3	
S_dm	21600	psf
Vertical Eff. Pressure at the toe ele	1689	psf
q_all =	**32,414**	psf
Is Demand < Allowable?	**DESIGN OK**	

Racking Failure Mode		
T_v=	**905**	psf
fv=	0.95	
Fv=	1.3	
Tv_all=	**3,494**	psf
Is Demand < Allowable?	**DESIGN OK**	

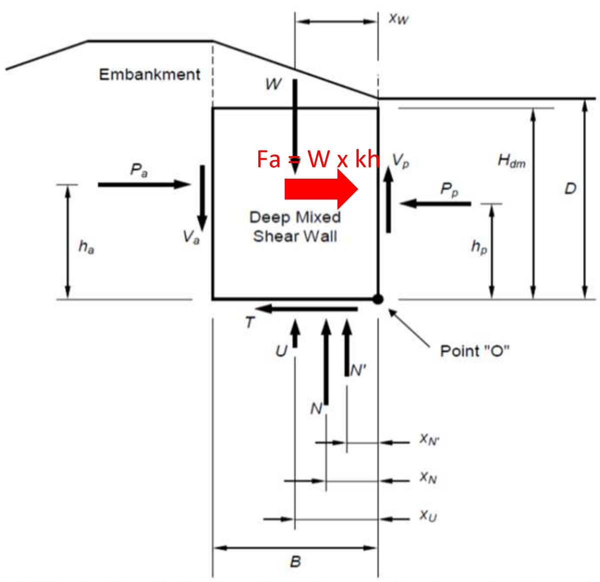


Figure 51. Illustration. Definition sketch for combined overturning and bearing calculations.

Check internal shear

Shear force	46000	lbs/ft	(Given)
Panel spacing	15	ft	
DSM section area per panel	104.7	sf	(Per 15' of length, and including continuous front row)
DSM compressive strength	150	psi	
Available shear strength	75	psi	
Shear stress	46	psi	
Factor of savefy	1.64		OK

APPENDIX C1

DSM Column Structural Capacity

Structural Capacity of 4ft dia. DSM column - Static Condition

Column Diameter=	**4.0**	
F.S.=	**1.5**	
UCS, 28-day strength (psi)=	**150**	
Curing Factor (fc) =	**1.00**	28-day strength
Confining Pressure effects =	**1**	
UCS, 90-day strength (psi)=	**150**	
Allowable pressure (psf)	14400	
Allowable load (kips)	181.0	
Max. Demand - ASD Level (kips)	**180**	
Is Capacity >= Demand?	Yes	

Structural Capacity of 4ft dia. DSM column - Post Liquefaction

Column Diameter=	**4.0**	
F.S.=	**1.3**	
UCS, 28-day strength (psi)=	**150**	
Curing Factor (fc) =	**2.00**	365-day strength
Confining Pressure effects =	**1**	
UCS, 365-day strength (psi)=	**300**	
Allowable pressure (psf)	33231	
Allowable load (kips)	417.6	
Max. Demand - ASD Level (kips)	**308**	including 128k downdrag
Is Capacity >= Demand?	Yes	

APPENDIX C2

DSM Column Geotechnical Capacity

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

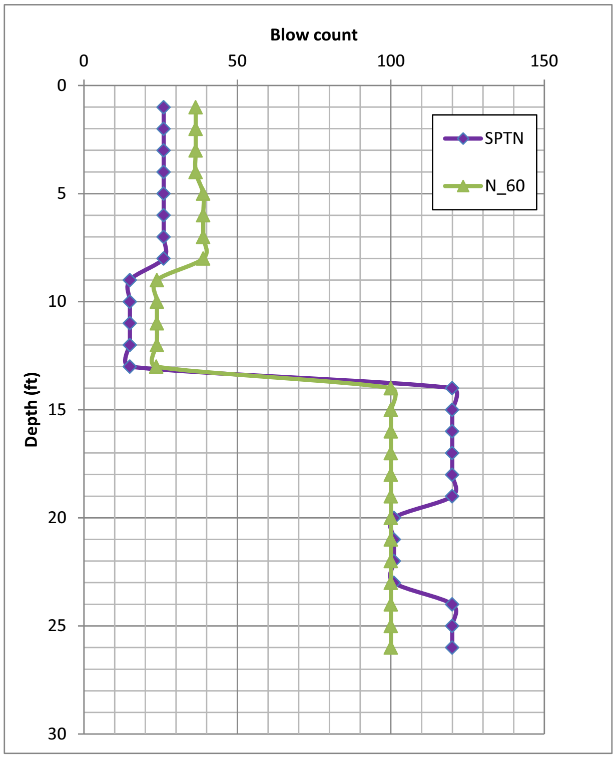
Date 01/08/21

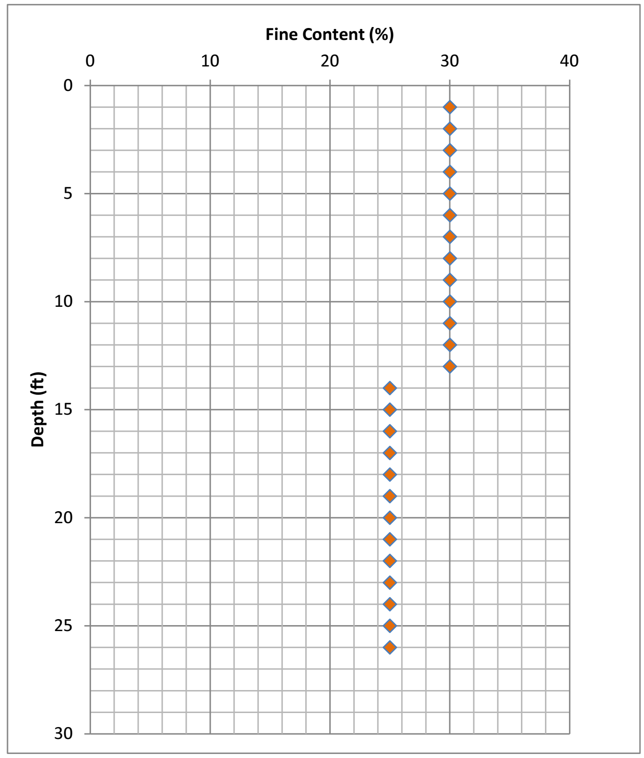
Borehole Number: (11-161-00) DH-17

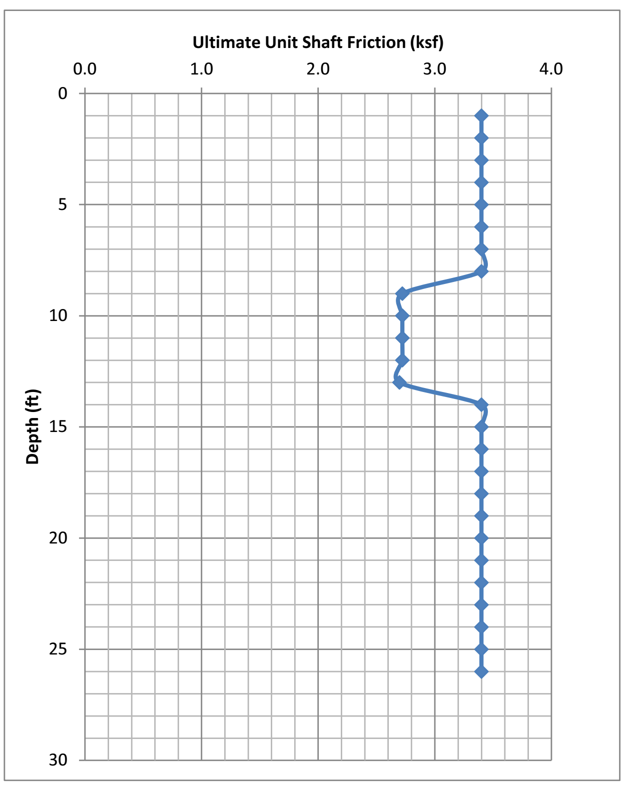
Project Number: N/A

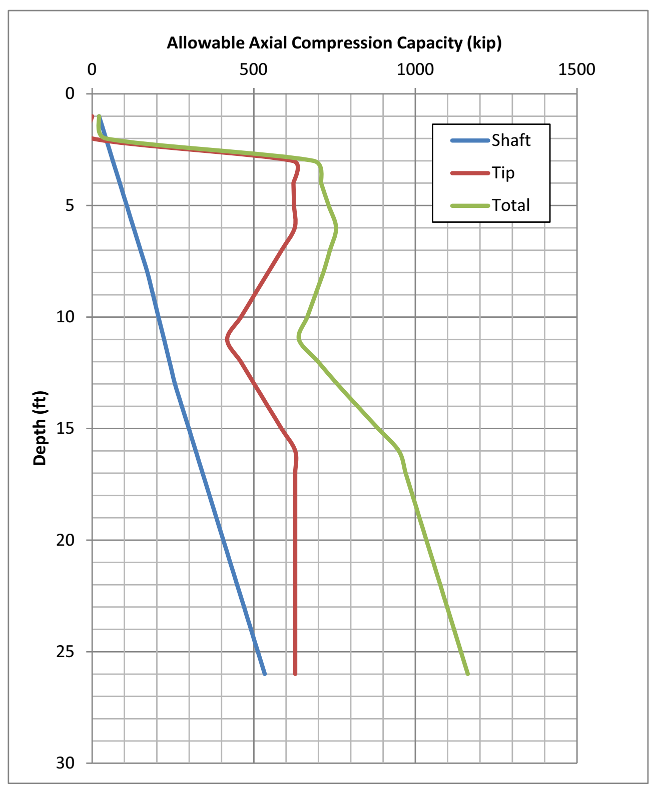
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

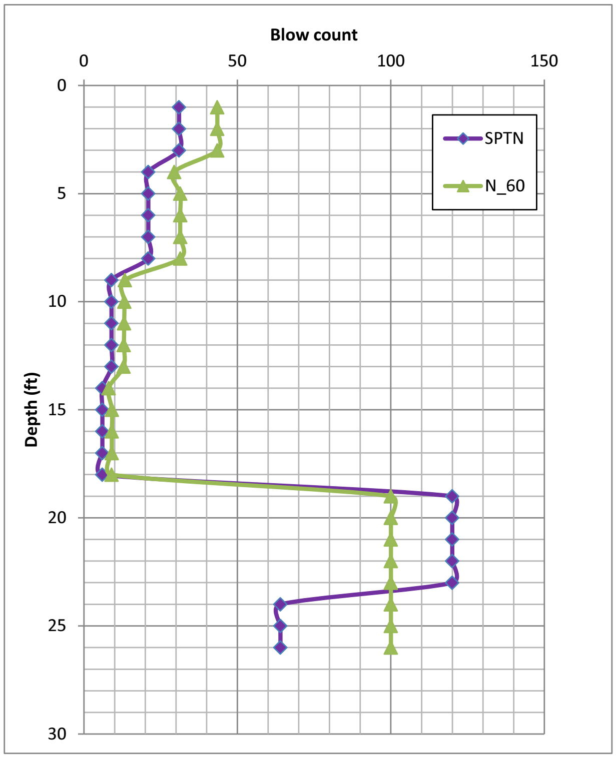
Date 01/08/21

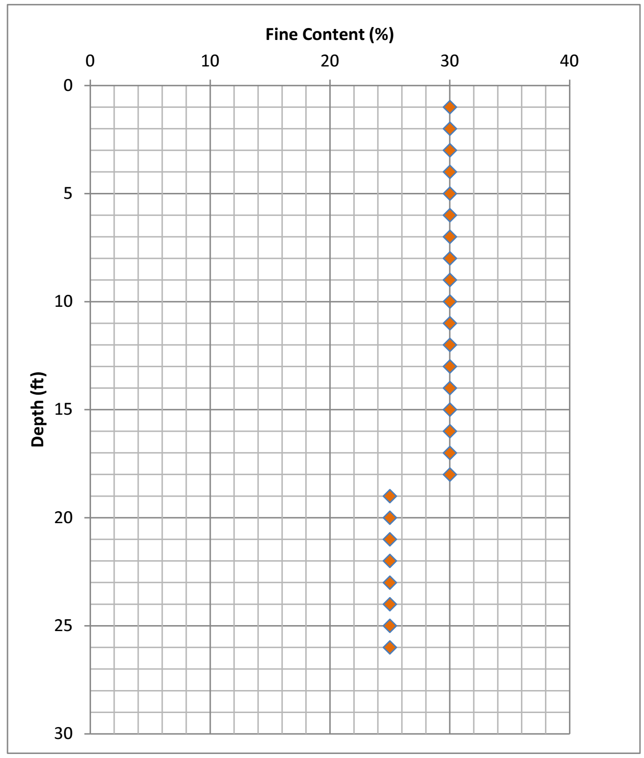
Borehole Number: (11-161-00) DH-19

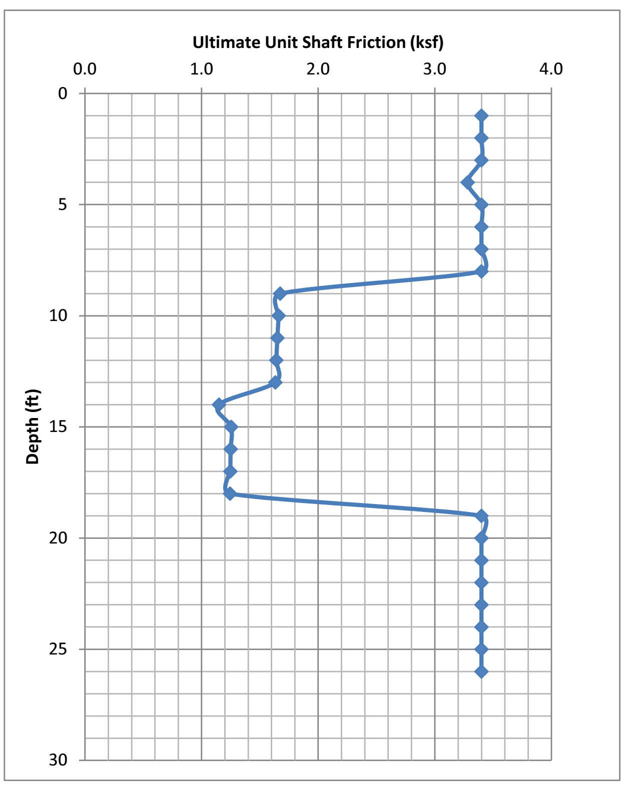
Project Number: N/A

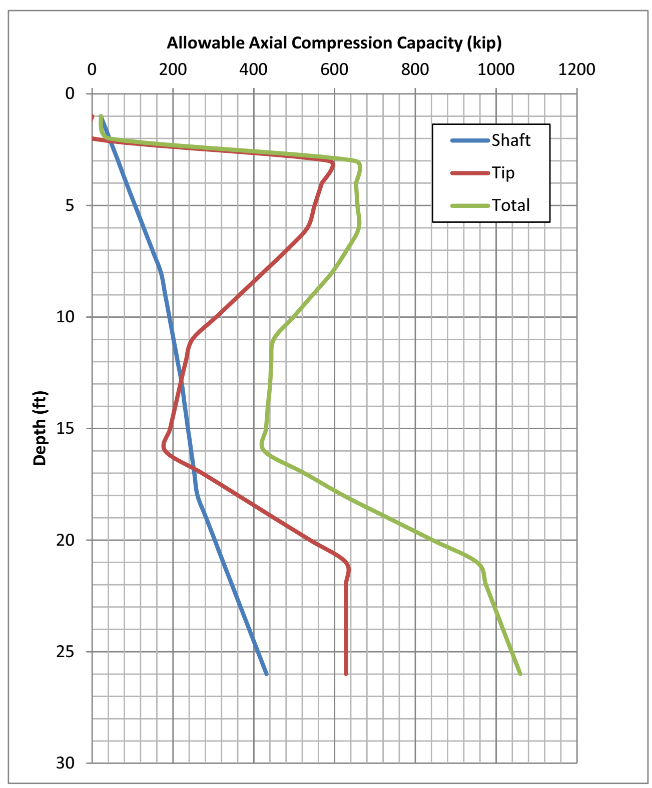
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









DSM GEOTECHNICAL CAPACITY

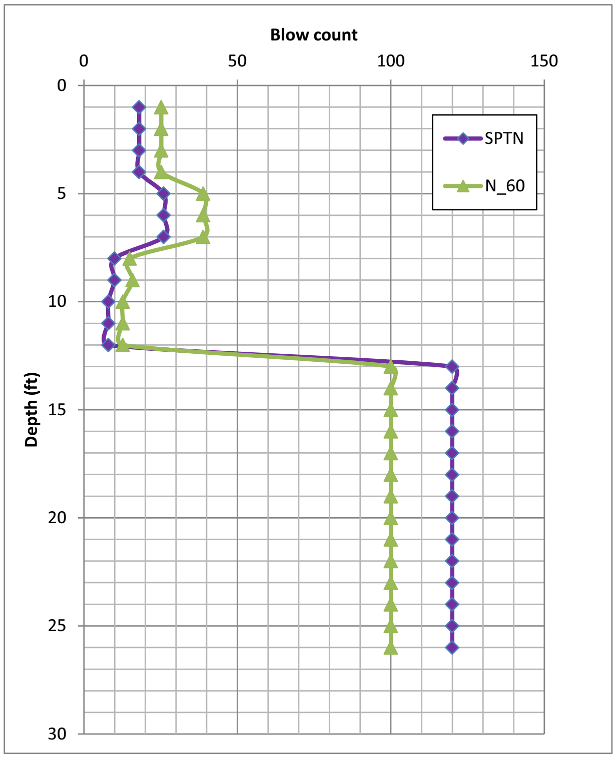
Version 1.0

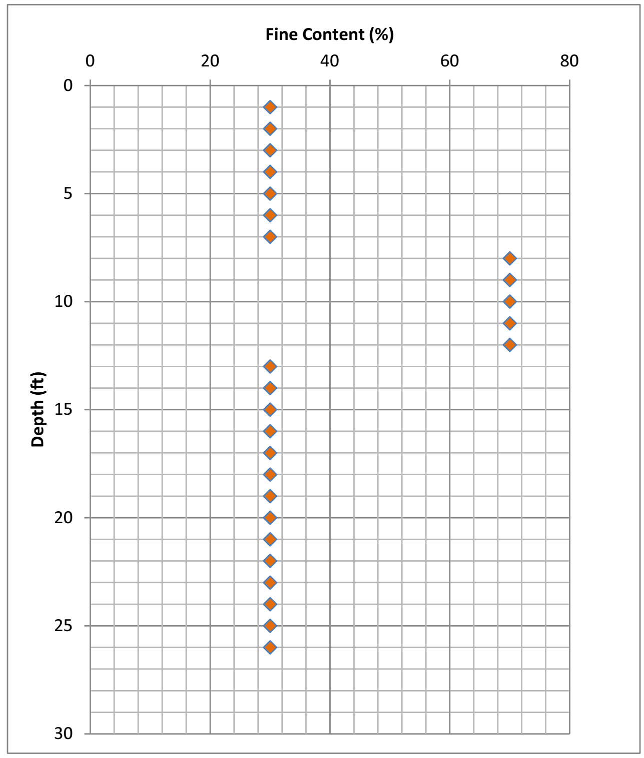
PROJECT INFORMATION

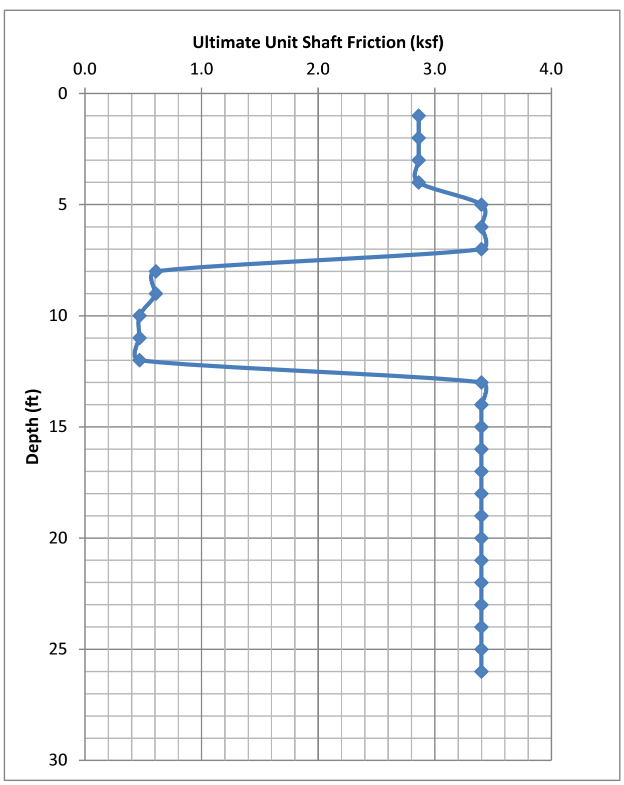
Project Name: Dana Point
Borehole Number: (17-206-02) DH-25
Project Number: N/A
Drawing ref:
Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**

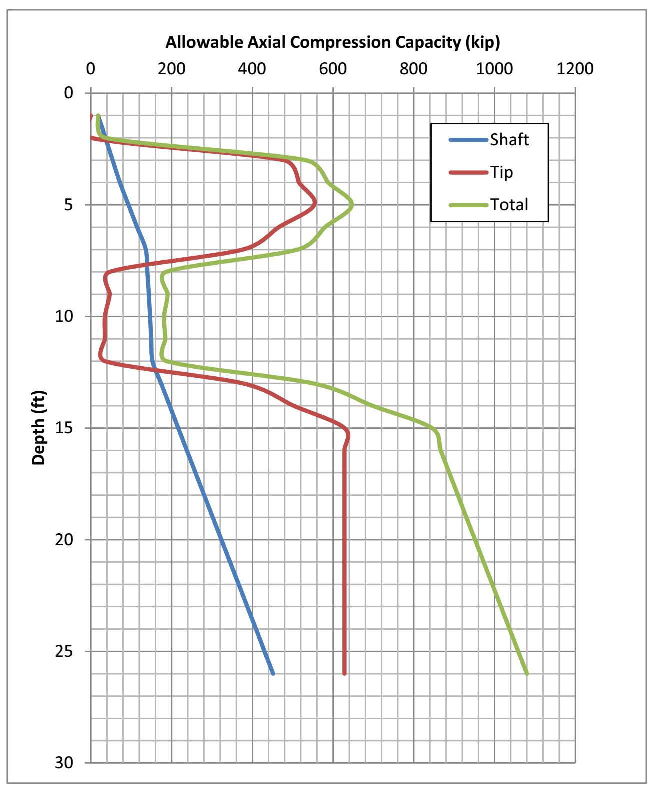
Date 01/08/21

AGI









DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

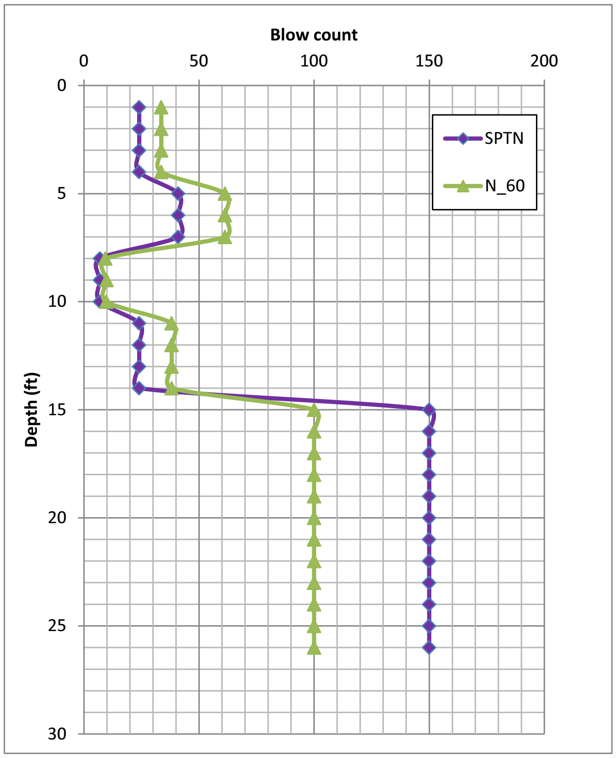
Date 01/08/21

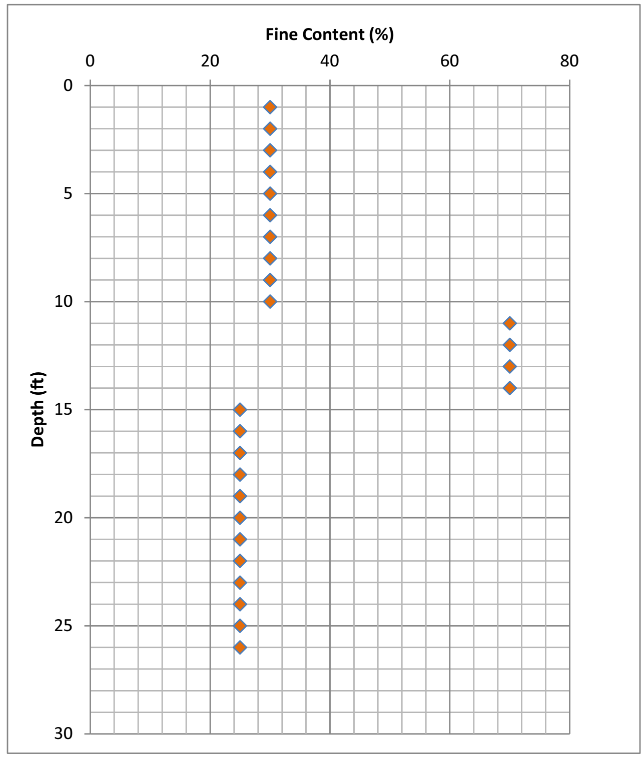
Borehole Number: (17-206-02) DH-26

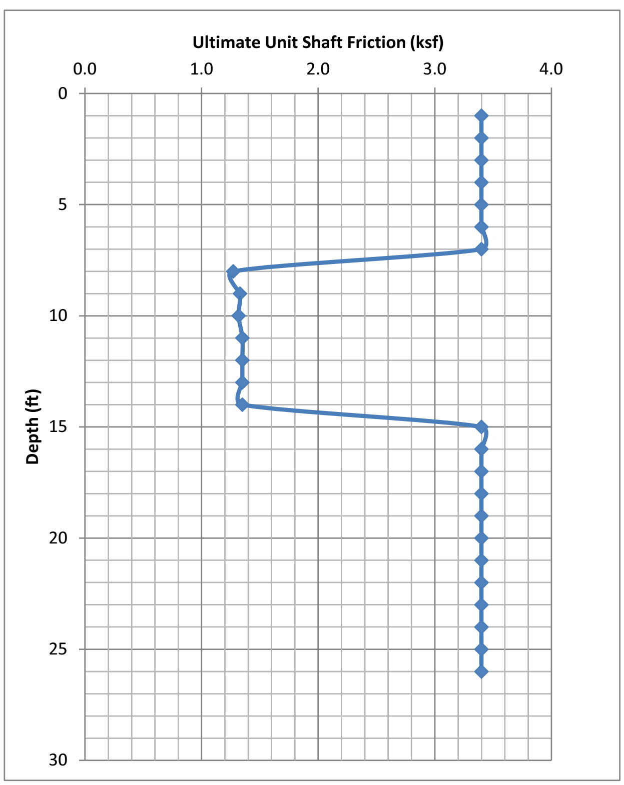
Project Number: N/A

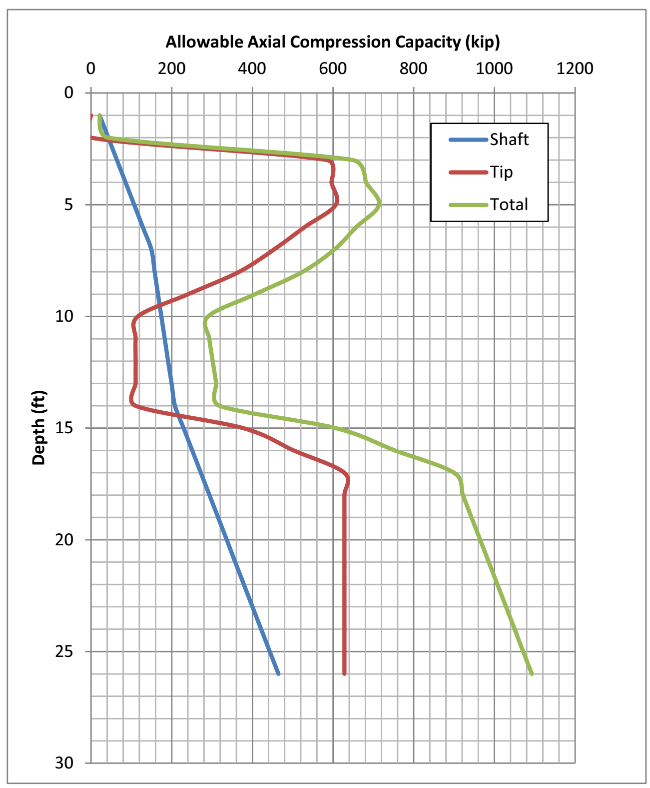
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









APPENDIX C3

DSM Column Settlement

Tzpile Analysis Information

Project Summary

File Name DPH DSM 4ft.rspile
File Version 0.000

Project Title Dana Point Harbor
Analysis DSM 4ft
Date Created 10/25/2018, 8:32:35 AM

Results

Axial Force vs Settlement

Pile Head Axial Force (lbs)	Pile Head Settlement (in)	Pile Toe Axial Force (lbs)	Pile Toe Settlement (in)
200000.00	0.48	81394.78	0.02

Axial Displacement, Axial Force

Axial Displacement, Axial Force

Soil Layer #	Pile Depth (ft)	Axial Displacement (in)	Axial Force (lbs)
1	-0.00	0.477455	200000.0000
1	0.20	0.47156	199985.3497
1	0.40	0.465667	199941.3987
1	0.60	0.459775	199868.1472
1	0.80	0.453886	199765.5950
1	1.00	0.448	199633.7422
1	1.20	0.442119	199472.5887
1	1.40	0.436242	199282.1347
1	1.60	0.430372	199062.3800
1	1.80	0.424509	198813.3247
1	2.00	0.418653	198534.9687
1	2.20	0.412806	198227.3122
1	2.40	0.406969	197890.3550
1	2.60	0.401142	197524.0973
1	2.80	0.395326	197128.5389
1	3.00	0.389522	196703.6799
1	3.20	0.383732	196249.5203
1	3.40	0.377955	195766.0602
1	3.60	0.372192	195253.2994
1	3.80	0.366446	194711.2381
1	4.00	0.360715	194139.8762
1	4.20	0.355002	193539.2138
1	4.40	0.349307	192909.2508
1	4.60	0.343631	192249.9873
1	4.80	0.337975	191561.4233
1	5.00	0.33234	190843.5588
1	5.20	0.326726	190096.3938
1	5.40	0.321135	189319.9283

1	5.60	0.315567	188514.1624
1	5.80	0.310023	187679.0960
1	6.00	0.304504	186814.7292
1	6.20	0.299011	185921.0621
1	6.40	0.293545	184998.0946
1	6.60	0.288107	184045.8267
1	6.80	0.282697	183064.2586
1	7.00	0.277316	182053.3901
1	7.20	0.271966	181013.2215
1	7.40	0.266647	179943.7526
1	7.60	0.26136	178844.9835
1	7.80	0.256105	177716.9143
1	8.00	0.250884	176559.5450
1	8.20	0.245698	175372.8756
1	8.40	0.240547	174156.9062
1	8.60	0.235432	172911.6369
1	8.80	0.230355	171637.0676
1	9.00	0.225316	170333.1984
1	9.20	0.220315	169000.0293
1	9.40	0.215354	167637.5605
1	9.60	0.210434	166245.7920
1	9.80	0.205555	164824.7237
1	10.00	0.200718	163374.3559
1	10.20	0.195925	161894.6885
1	10.40	0.191176	160385.7216
1	10.60	0.186471	158847.4553
1	10.80	0.181813	157279.8895
1	11.00	0.177201	155683.0245
1	11.20	0.172636	154056.8603
1	11.40	0.16812	152401.3968
1	11.60	0.163653	150716.6343
1	11.80	0.159236	149002.5728
1	12.00	0.15487	147259.2123
1	12.20	0.150556	145486.5530
1	12.40	0.146295	143684.5949
1	12.60	0.142087	141853.3380
1	12.80	0.137934	139992.7826
1	13.00	0.133835	138102.9286
1	13.20	0.129793	136183.7761
1	13.40	0.125808	134235.3253
1	13.60	0.121881	132257.5762
1	13.80	0.118013	130250.5289
1	14.00	0.114204	128214.1836
1	14.20	0.110455	126148.5402
1	14.40	0.106768	124053.5989
1	14.60	0.103143	121929.3598
1	14.80	0.0995814	119775.8230
1	15.00	0.0960827	117640.7133
1	15.20	0.0926462	115553.6424
1	15.40	0.0892705	113515.2631
1	15.60	0.0859542	111526.2072
1	15.80	0.0826957	109587.0866
1	16.00	0.0794937	107698.4964
1	16.20	0.0763466	105861.0163

1	16.40	0.0732528	104075.2131
1	16.60	0.0702109	102341.6430
1	16.80	0.0672194	100660.8534
1	17.00	0.0642766	99033.3853
1	17.20	0.0613809	97459.7756
1	17.40	0.0585309	95940.5593
1	17.60	0.0557248	94476.2717
1	17.80	0.052961	93067.4507
1	18.00	0.050238	91714.6390
1	18.20	0.047554	90418.3870
1	18.40	0.0449073	89179.2542
1	18.60	0.0422963	87997.8125
1	18.80	0.0397193	86874.6482
1	19.00	0.0371745	85810.3646
1	19.20	0.0346602	84805.5842
1	19.40	0.0321747	83860.9519
1	19.60	0.029716	82977.1370
1	19.80	0.0272826	82154.8359

General Properties

Pile Loading

Load Case #	Axial Load (lbs)
1	200000.00

Axial Soil Loading

Soil Displacement (in)	Sliding Depth (ft)
0.0000000	0.00

Pile Properties

Property	Value
Name	DSM 4ft
Pile Type:	Cylindrical
Material Type:	Elastic
Young's Modulus (psf)	6480000.00
Diameter (ft)	4.00

Soil Layer Properties

Layers

Layer Name	Layer Type	Thickness (ft)
Soil Layer 1	API Sand	20.00
Soil Layer 2	API Sand	30.00

Soil Layer 1

Property	Value
Soil Type	Sand
Thickness (ft)	20.00
Unit Weight (lbs/ft3)	125.00
Friction Angle (deg)	30.00
Coefficient of Lateral Earth Pressure	1.00
Bearing Capacity Factor	12.00
Maximum Unit Skin Friction (psf)	1400.00
Maximum End Bearing Resistance (psf)	60000.00

Soil Layer 2

Property	Value
Soil Type	Sand
Thickness (ft)	30.00
Unit Weight (lbs/ft3)	125.00
Friction Angle (deg)	34.00
Coefficient of Lateral Earth Pressure	1.00
Bearing Capacity Factor	40.00
Maximum Unit Skin Friction (psf)	2000.00
Maximum End Bearing Resistance (psf)	200000.00

APPENDIX D

Liquefaction-induced Downdrag Force Calculation

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
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Hadi Tabatabaee
BUILDING OFFICIAL

Downdrag Calculations per AASHTO LRFD Bridge Design (2012) - Drilled Shafts

Notes:

1. Please enter the required inputs shown in blue.
2. This spreadsheet should be used for drilled shafts, only.
3. The formulations are based on povisions of AASHTO LRFD Bridge Design, 2012 - Section 10.8.
4. Per section 10.8.3.5.2, Beta method is used for cohesionless material , where N60 is average SPT blow count corrected only for hammer efficiency.
5. Put zero values for Su and N60 if not applicable.
6. Units are all Imperial. The macro must be modified for metric units.
7. Do not add any row or column to this spreadsheet.
8. The spreadsheet is formulated up to row No. 6000.

Input Parameters

Pile Diameter =	4	ft
Wall thickness	24.0	inch Use D/2 for concrete piles
Elastic Young's Modulus =	12960.0	ksf
Depth where FF settlement is 0.4" =	19.0	ft
Column Depth =	20.0	ft
Ground Water Table Depth =	10.0	ft

Click below to run analysis

Calculate Downdrag Force & the Resulting Pile Elastic Compression

Outputs

Negative Friction (Downdrag) =	128.7	kips
Pile Elastic Compression=	0.02	inch
Ultimate Positive Friction =	12.6	kips
Ultimate End Bearing =	706.5	kips

Input Parameters							Calculation Results							
Depth (ft)	Liquefiable?	(Su_liq)/sigma'	Cohesive Material- Su (psf)	Cohesionless Material - N60 (blows/ft)	Is the soil gravelly sand or gravel?	Unit Weight (pcf)	Sigma_v' (psf)	alpha	Beta	Moblized Friction (psf)	Average Mob. Friction (psf)	Negative Friction, i.e., downdrag (kips)	Positive Friction (kips)	Cumulative Comp. due to downdrag load (inch)
0.00	No		0.0	20.0	No	125.0	0.00	0.00	0.00	0.00	0.00	0.00		0.00
1.00	No		0.0	20	No	125.0	125.00	0.00	1.40	175.57	87.78	1.10		0.00
2.00	No		0.0	20	No	125.0	250.00	0.00	1.33	333.66	254.62	4.30		0.00
3.00	No		0.0	20	No	125.0	375.00	0.00	1.29	482.45	408.06	9.43		0.00
4.00	No		0.0	20	No	125.0	500.00	0.00	1.25	623.72	553.09	16.38		0.00
5.00	No		0.0	20	No	125.0	625.00	0.00	1.21	758.51	691.12	25.07		0.00
6.00	No		0.0	20	No	125.0	750.00	0.00	1.18	887.55	823.03	35.41		0.00
7.00	No		0.0	20	No	125.0	875.00	0.00	1.16	1011.34	949.44	47.34		0.00
8.00	No		0.0	20	No	125.0	1000.00	0.00	1.13	1130.29	1070.81	60.80		0.00
9.00	No		0.0	20	No	125.0	1125.00	0.00	1.11	1244.71	1187.50	75.72		0.01
10.00	No		0.0	20	No	125.0	1250.00	0.00	1.08	1354.88	1299.79	92.05		0.01
11.00	Yes	0.17	0.0	0.0	No	125.0	1312.60	-	-	223.14	789.01	101.97		0.01
12.00	Yes	0.17	0.0	0.0	No	125.0	1375.20	-	-	233.78	228.46	104.84		0.01
13.00	Yes	0.17	0.0	0.0	No	125.0	1437.80	-	-	244.43	239.11	107.84		0.01
14.00	Yes	0.17	0.0	0.0	No	125.0	1500.40	-	-	255.07	249.75	110.98		0.01
15.00	Yes	0.17	0.0	0.0	No	125.0	1563.00	-	-	265.71	260.39	114.25		0.01
16.00	Yes	0.17	0.0	0.0	No	125.0	1625.60	-	-	276.35	271.03	117.66		0.01
17.00	Yes	0.17	0.0	0.0	No	125.0	1688.20	-	-	286.99	281.67	121.20		0.01
18.00	Yes	0.17	0.0	0.0	No	125.0	1750.80	-	-	297.64	292.32	124.87		0.01
19.00	Yes	0.17	0.0	0.0	No	125.0	1813.40	-	-	308.28	302.96	128.68		0.01
20.00	No		0.0	120.0	No	125.0	1876.00	0.00	0.90	1695.63	1001.96		12.59	
21.00	No		0.0	120.0	No	125.0	1938.60	0.00	0.89	1722.95	1709.29			
22.00	No		0.0	120.0	No	125.0	2001.20	0.00	0.87	1749.11	1736.03			
23.00	No		0.0	120.0	No	125.0	2063.80	0.00	0.86	1774.12	1761.62			
24.00	No		0.0	120.0	No	125.0	2126.40	0.00	0.85	1798.01	1786.06			
25.00	No		0.0	120.0	No	125.0	2189.00	0.00	0.83	1820.78	1809.39			
26.00	No		0.0	120.0	No	125.0	2251.60	0.00	0.82	1842.45	1831.61			
27.00	No		0.0	120.0	No	125.0	2314.20	0.00	0.81	1863.04	1852.74			

APPENDIX E

PLAXIS Analysis of LTP Section

Static and seismic performance of the proposed LTP system under slab load of 300 psf was evaluated using the finite element computer program PLAXIS, 2D. The geometry of the FE modal was composed of two-dimensional (2D) plane-strain model of:

a. 4ft diameter DSM columns at 12ftx12ft spacing and 20ft deep;
b. Three (3) layers of 12" thick cement-treated fill with UCS=200psi;
c. Soil layers from the ground information collected from CPTs and borings.

The effective width of the DSM columns were taken as 1.05 ft in order to account for the three-dimensional effects in the 2D plain-strain model. Equivalent secant elastic parameters and shear strength of the native soils were obtained from the site investigation data. Table A below presents the input soil parameters.

Table A. Input Soil Properties for PLAXIS analysis.

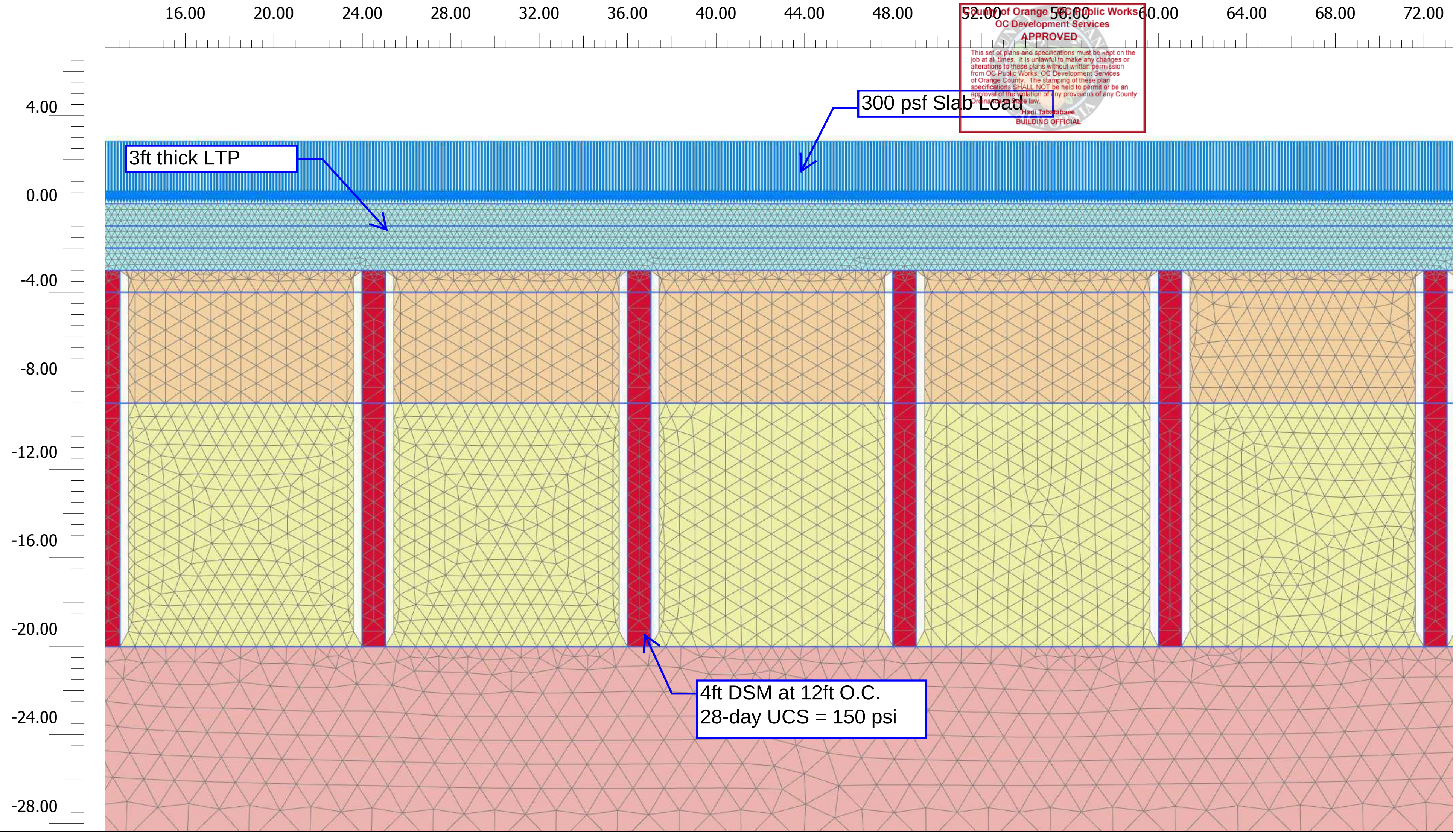
Depth (ft)	Soil Type	Static Condition		Liquefied Condition	
		Secant Young's Modulus (ksf)	Shear Strength	Secant Young's Modulus (ksf)	Shear Strength
0 to 9	Af/Qm	400	Phi = 31, c = 395 psf	-	-
9 to 20	Af/Qm (below GWT)	400	Phi = 30, c = 80 psf	100	Phi = 5.7 deg
Below 20	Tc	3000	Phi = 34, c = 695 psf	-	-
-	LTP (UCS, 28day=200 psi)	7200	14400 psf	14400 (365 day UCS)	28800 psf (365 day UCS)
-	CDSM (UCS, 28day=150 psi)	6480	10800 psf	12960 (365 day UCS)	21600 psf (365 day UCS)

The main goal of the analysis was to ensure that the deformations are in a tolerable ranges and LTP system did not show any signs of failure in tension and compression under the slab load during static and seismic loadings. Geometry of the model, deformations and stresses are presented in the following pages.

Output Version 20.1.0.98

LTP Model - Static Loading Condition

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245



Connectivity plot

Project description			Date
DPH LTP Design			4/11/2021
Project filename	**Step**	**Company**	
LTP_Design_Static	124	Advanced Geosolutions Inc (AGI)	

Output Version 20.1.0.98

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

Deformation Contours - Static Loading Condition

County of Orange OC Public Works
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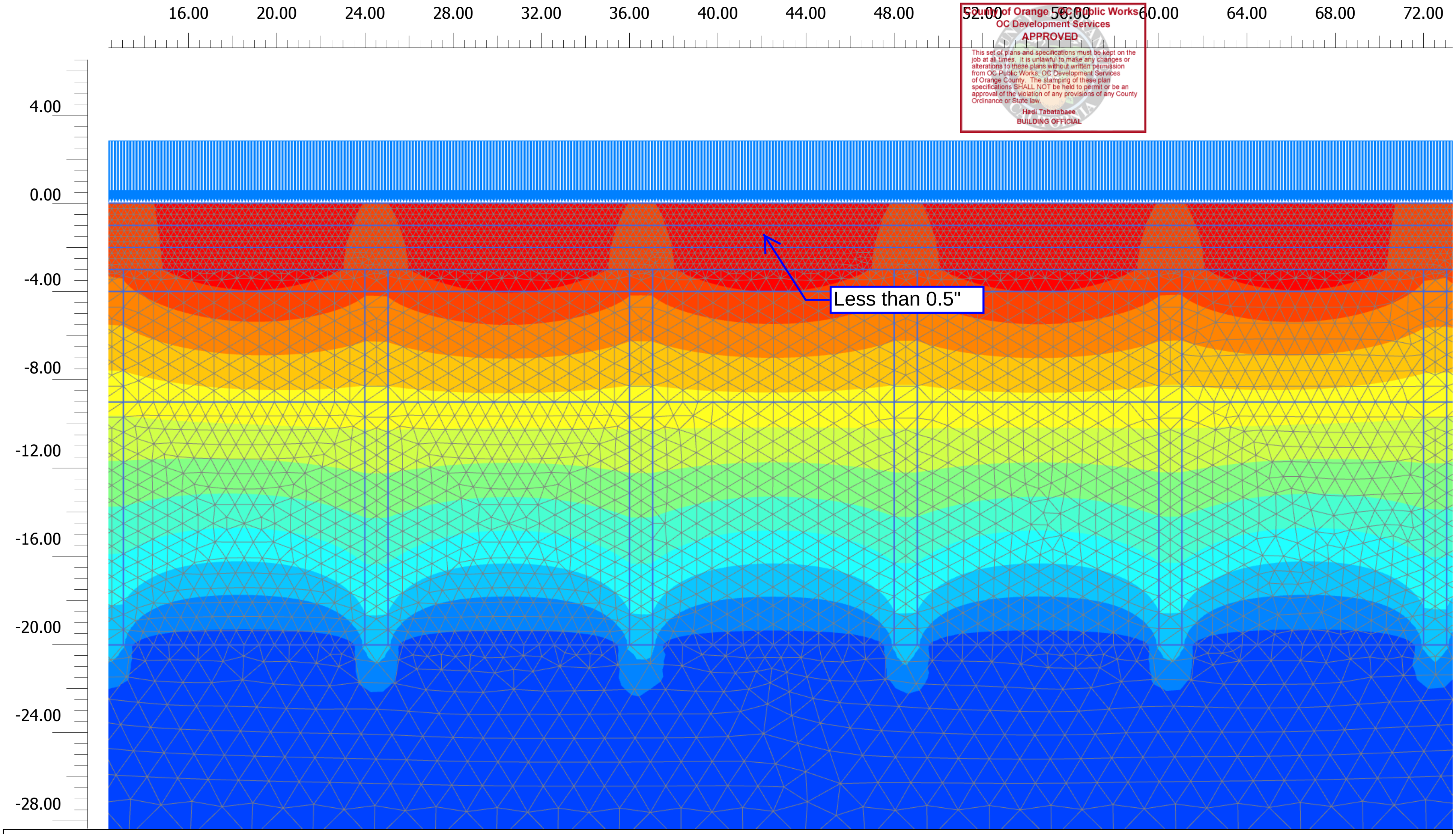
Hadi Tabatabaee
BUILDING OFFICIAL



Total displacements u_y (scaled up 200 times)

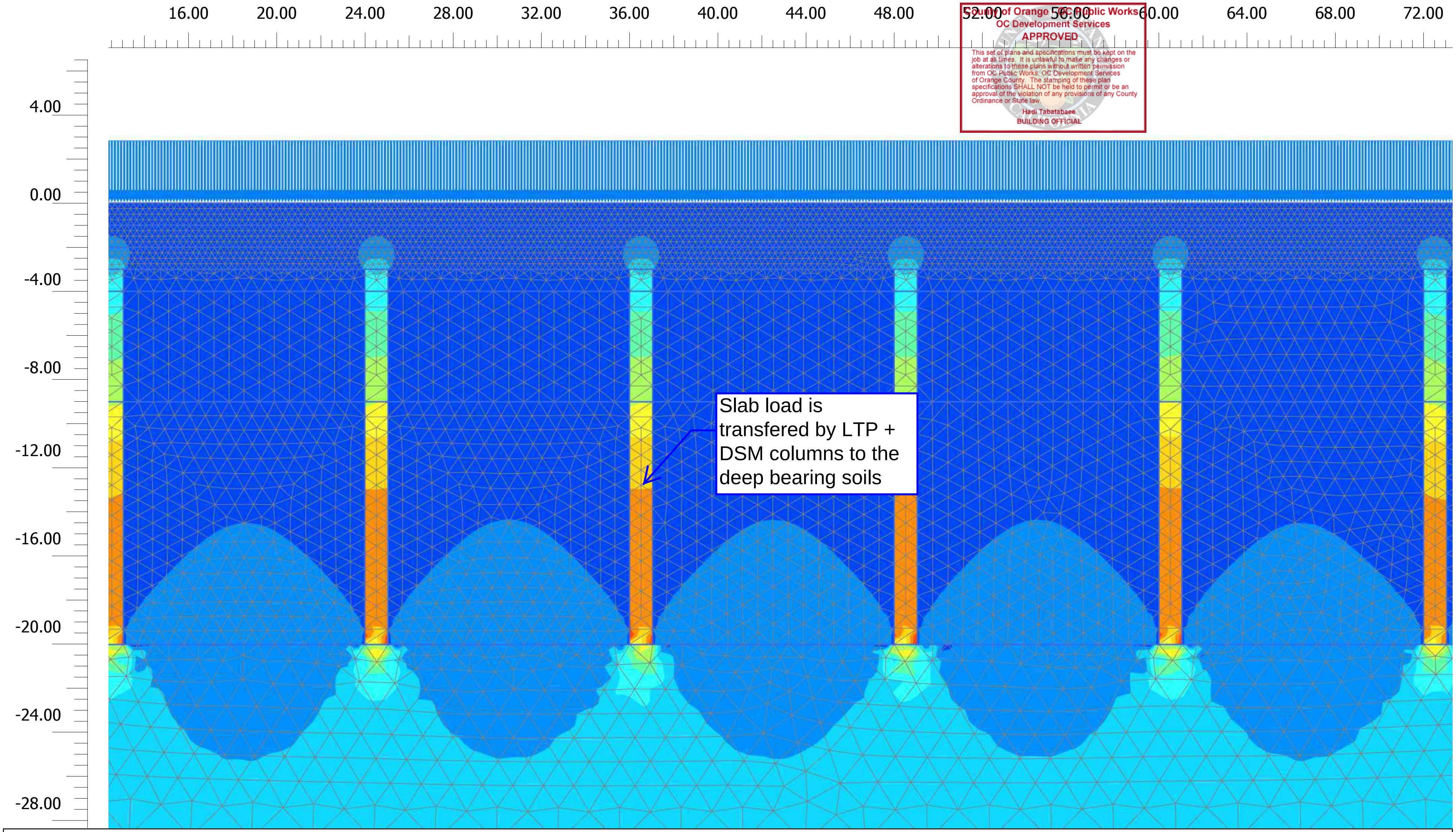
Maximum value = 0.000 ft (Element 13635 at Node 14266)

Minimum value = -0.01189 ft (Element 220 at Node 2397)

AGI	*Project description* DPH LTP Design		*Date* 4/11/2021
	Project filename LTP_Design_Static	*Step* 124	*Company* Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Vertical Stress Contours - Static Loading Condition



Cartesian effective stress σ'_{yy} (scaled up 0.200×10^{-3} times)

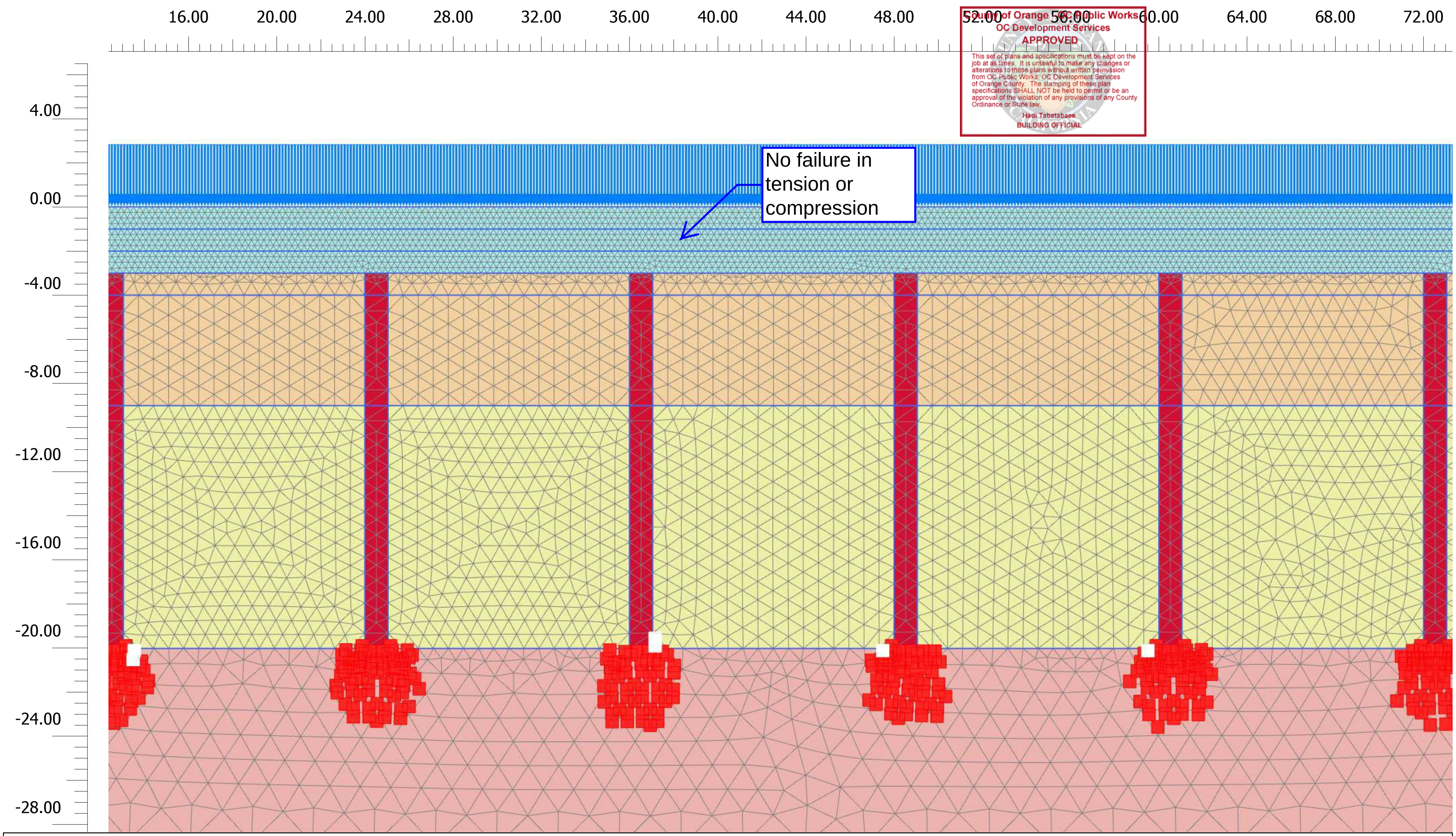
Maximum value = 287.2 lbf/ft² (Element 14799 at Node 18824)

Minimum value = -10.47×10^{3} lbf/ft² (Element 12027 at Node 19297)

AGI™	*Project description* DPH LTP Design		*Date* 4/11/2021
	Project filename LTP_Design_Static	*Step* 124	*Company* Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Potential Failures within LTP - Static Loading Condition



Plastic points (scaled up 0.00 times)

Failure point

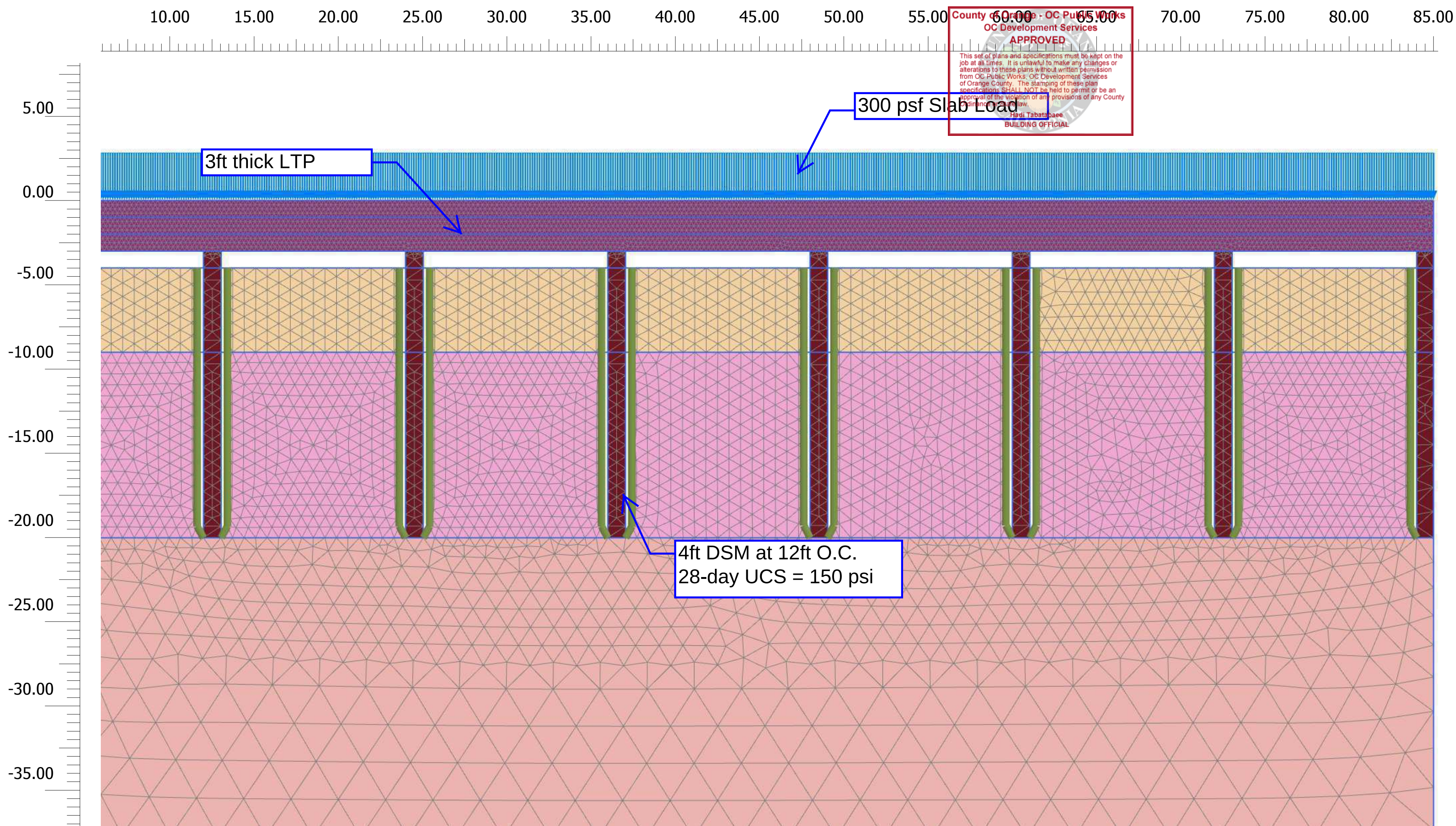
Tension cut-off point

Project description		Date
DPH LTP Design		4/11/2021

Project filename	Step	Company
LTP_Design_Static	124	Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

LTP Model - Seismic Loading Condition

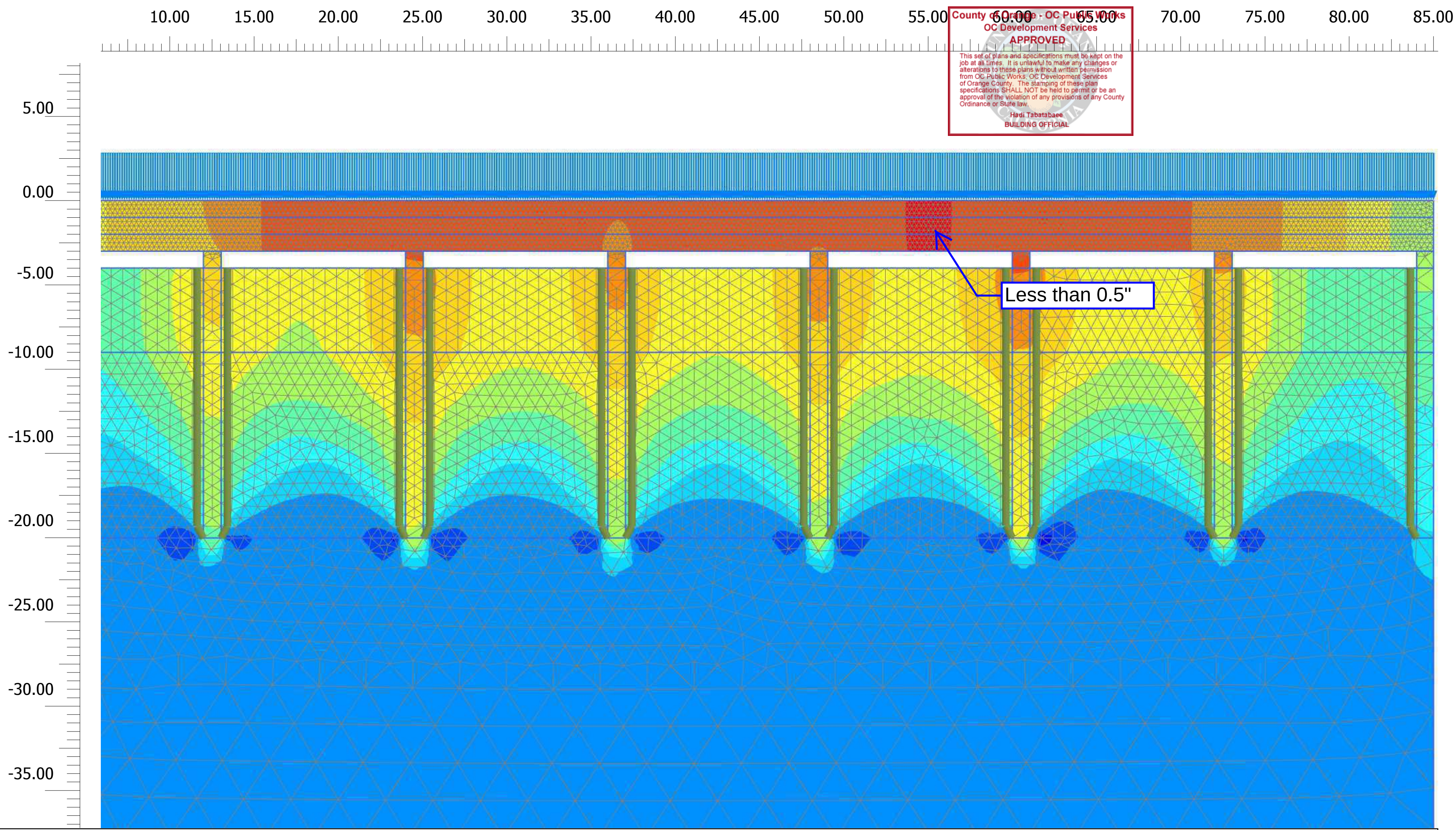


Connectivity plot

AGI	*Project description* DPH LTP Design		*Date* 4/11/2021
	Project filename LTP_Design_Seismic	*Step* 192	*Company* Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Deformation Contours - Seismic Loading Condition



Total displacements u_y (scaled up 100 times)

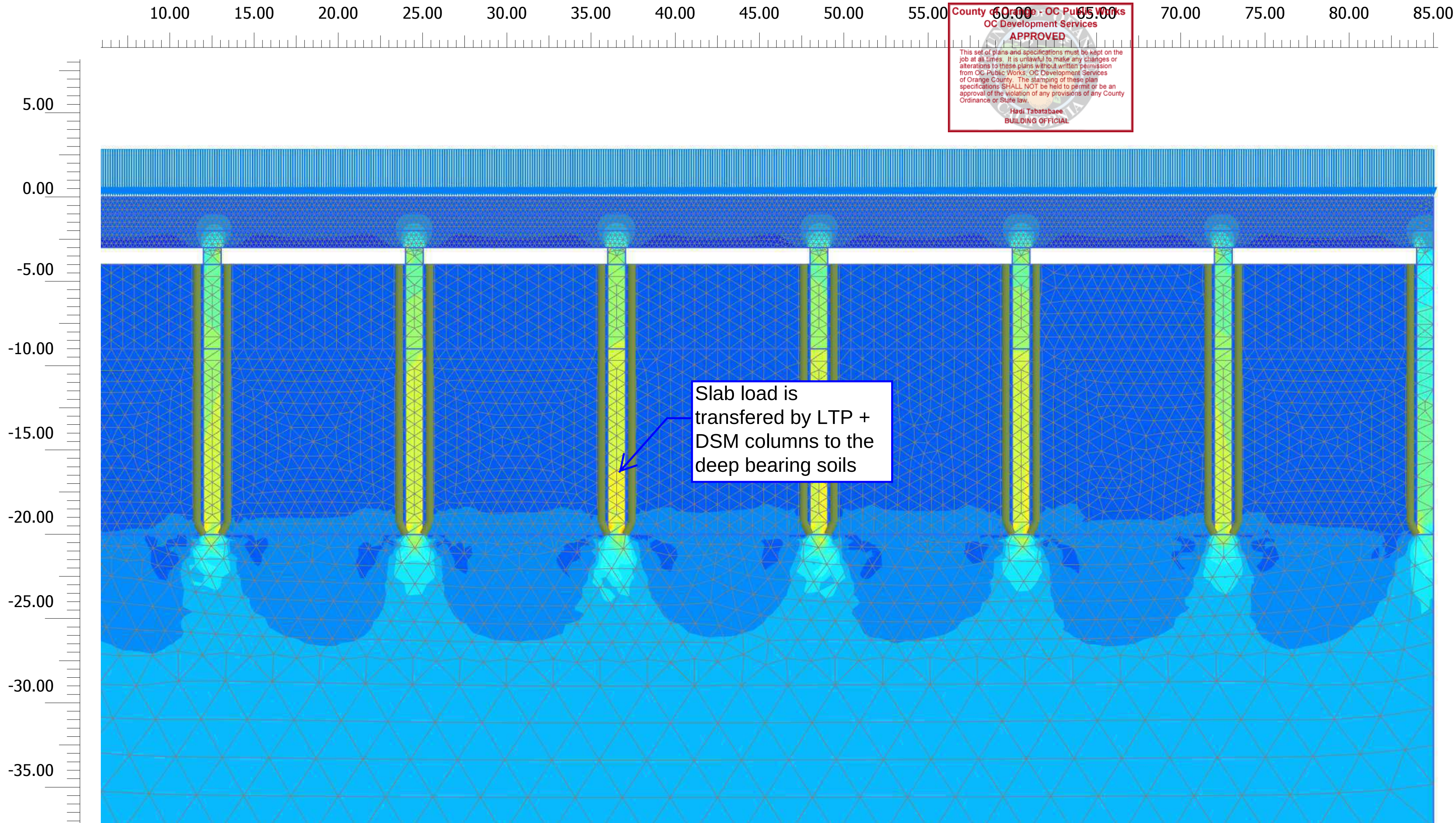
Maximum value = 3.638×10^{-3} ft (Element 12726 at Node 22739)

Minimum value = -0.01813 ft (Element 385 at Node 18873)

AGI	Project description: DPH LTP Design		Date: 4/11/2021
	Project filename: LTP_Design_Seismic	Step: 192	Company: Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Vertical Stress Contours - Seismic Loading Condition



Cartesian effective stress σ'_{yy} (scaled up 0.200×10^{-3} times)

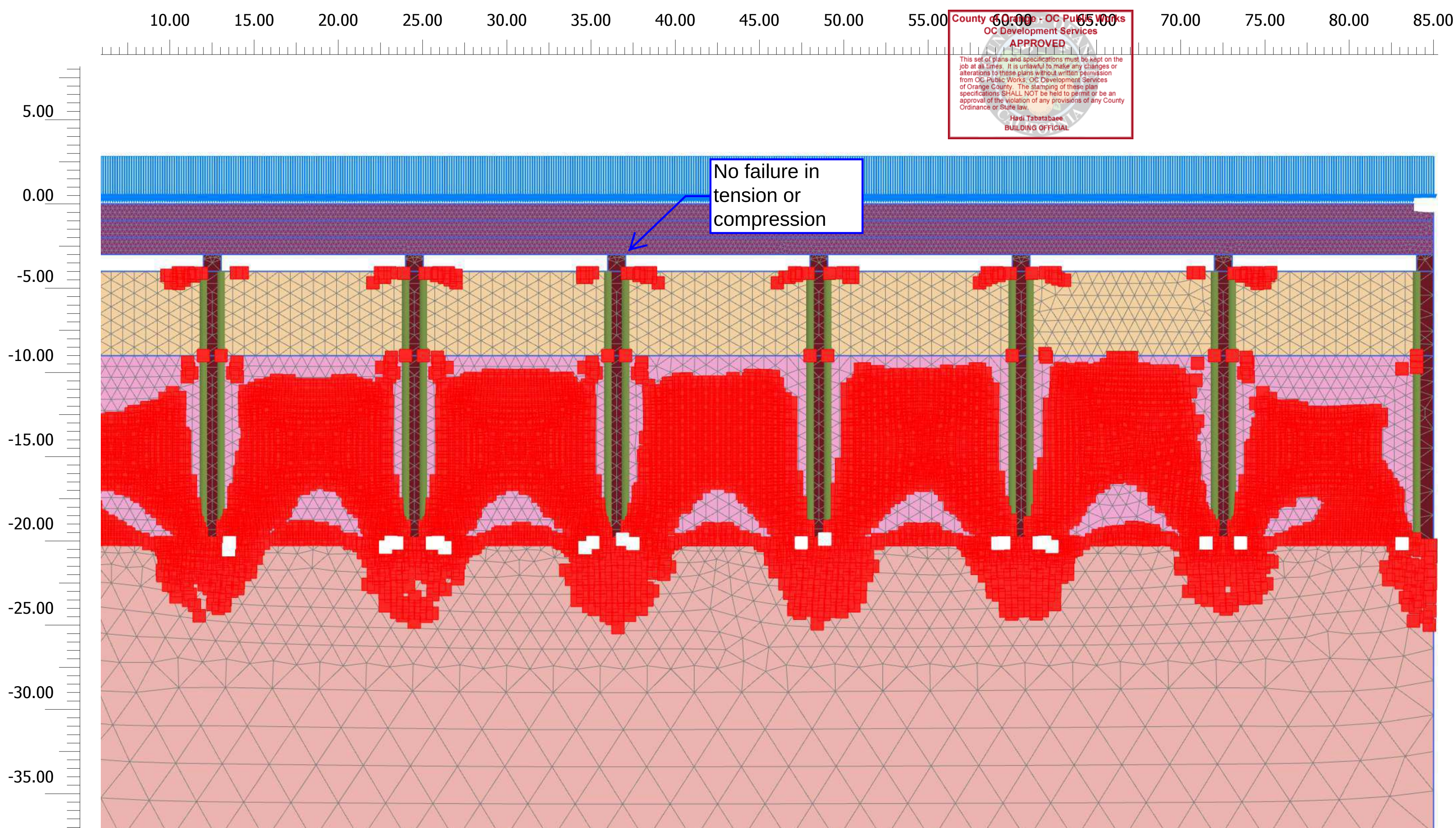
Maximum value = 1246 lbf/ft² (Element 6346 at Node 29371)

Minimum value = -15.50×10^3 lbf/ft² (Element 8067 at Node 27896)

AGI	Project description DPH LTP Design		Date 4/11/2021
	Project filename LTP_Design_Seismic	Step 192	Company Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Potential Failures within LTP - Seismic Loading Condition



Plastic points (scaled up 0.00 times)

Failure point

Tension cut-off point

AGI	Project description DPH LTP Design		Date 4/11/2021
	Project filename LTP_Design_Seismic	Step 192	Company Advanced Geosolutions Inc (AGI)

APPENDIX F

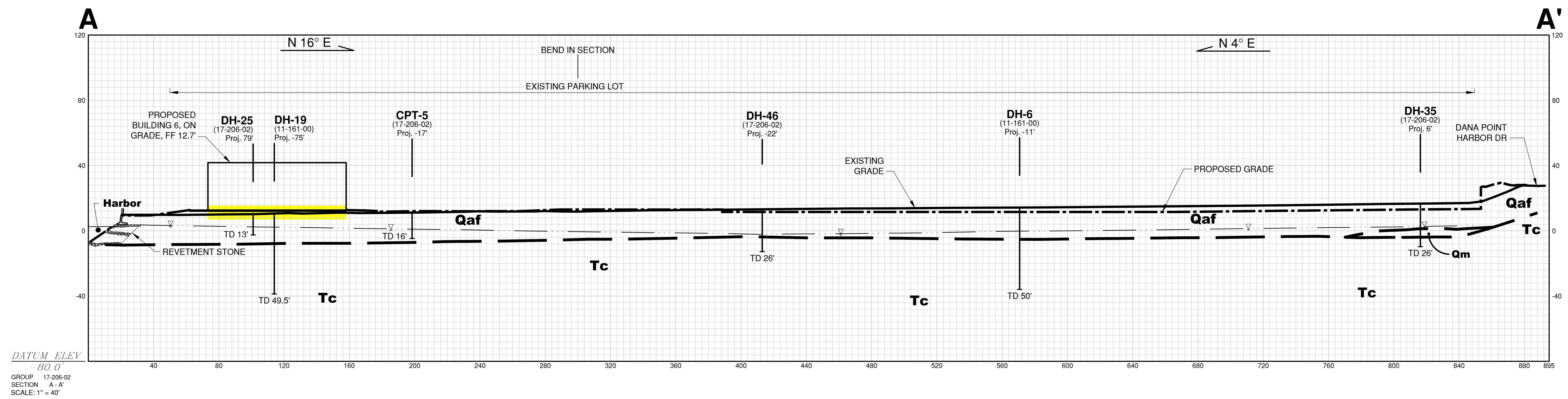
Revised GMU Plates 2 and 3

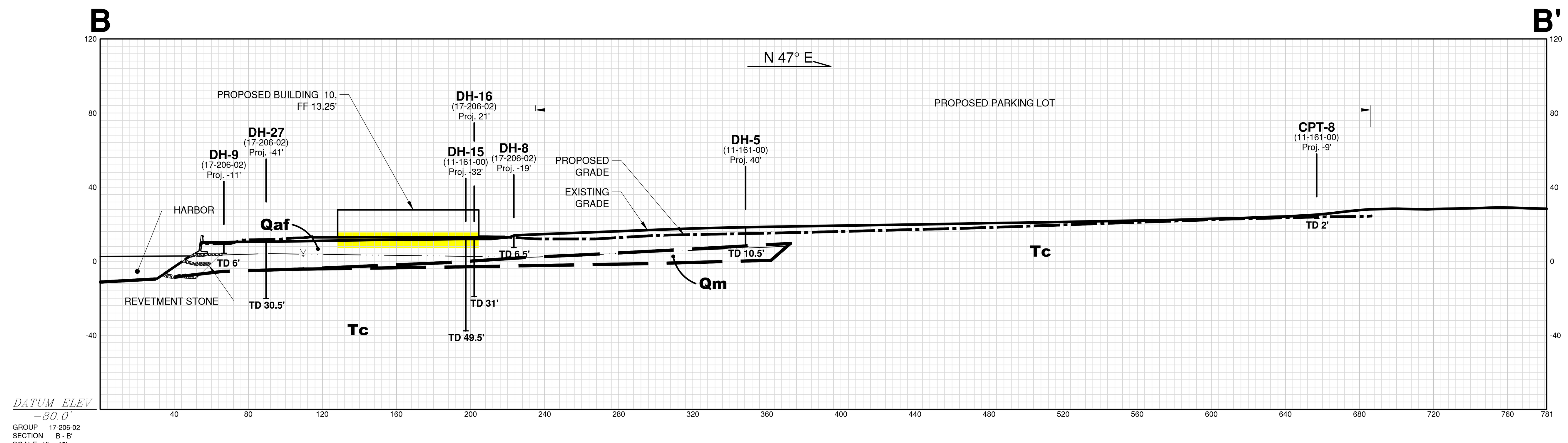
GEOTECHNICAL LEGEND

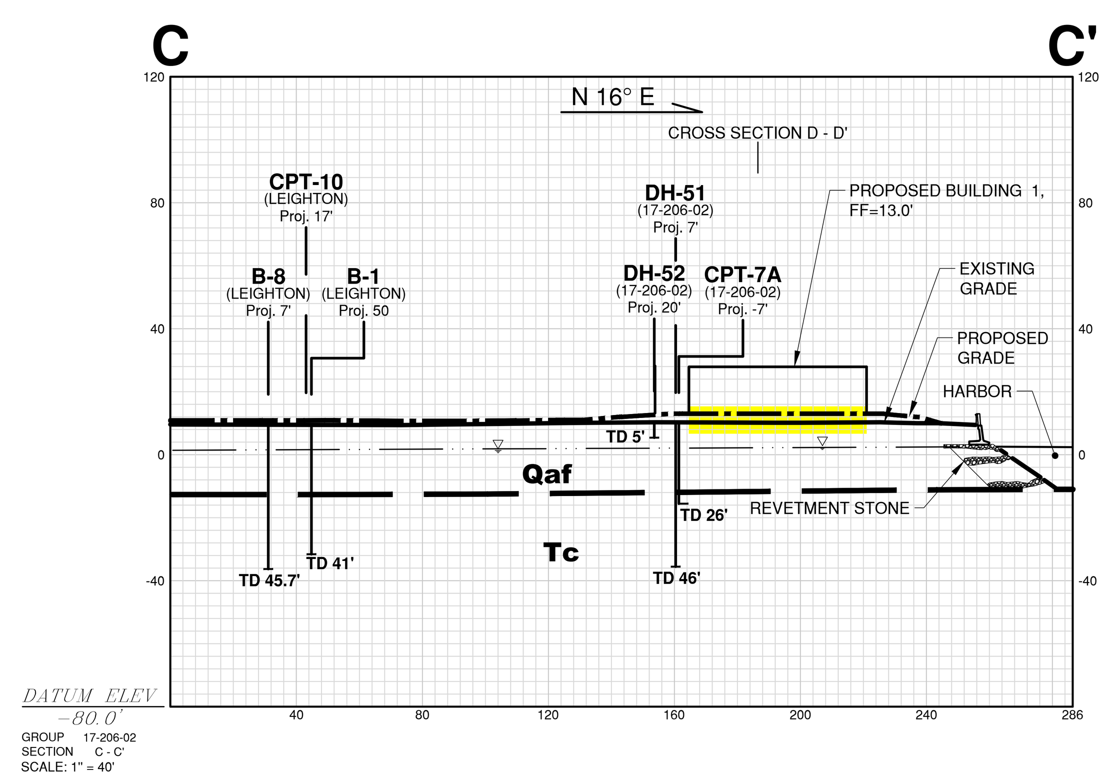
Qaf	ENGINEERED ARTIFICIAL FILL
Qm	MARINE DEPOSITS, CIRCLED WHEN BURIED
Tc	CRISTIANITOS FORMATION, CIRCLED WHEN BURIED
Tm	MONTEREY FORMATION, CIRCLED WHEN BURIED
DH	APPROXIMATE DRILL HOLE LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT 17-206-02
DH	APPROXIMATE INFILTRATION TEST LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT NO. 17-206-02
CPT-7A	APPROXIMATE LOCATION OF GMU CONE PENETRATION TEST HOLE PROJECT 17-206-02
DH-4	APPROXIMATE LOCATION OF GMU DRILL HOLE LOCATIONS (PROJECT 11-161-00)
DH-24	APPROXIMATE LOCATION OF GMU INFILTRATION TESTS (PROJECT 11-161-00)
CPT-3	APPROXIMATE LOCATION OF GMU CONE PENETRATION TEST HOLE (PROJECT 11-161-00)
C-4	APPROXIMATE LOCATION OF GMU ASPHALT CORE HOLE (PROJECT 11-161-00)
B-8	ESTIMATED LOCATION OF PREVIOUS BORING BY LEIGHTON (PROJECT 600024-004, DATED 12/6/07)
B-2	ESTIMATED LOCATION OF PREVIOUS BORING BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
CPT-10	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-004, DATED 12/6/07)
CPT-1	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
DYB 12-01	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2012-034, DATED 10/05/12)
B-2	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2005-022, DATED 11/29/05)
	GEOLOGIC CONTACT
	BURIED GEOLOGIC CONTACT
B B'	GEOTECHNICAL SECTION
	LIMITS OF REPORT
	PROPOSED LTP LIMITS (EXTENDED TO EDGE OF BUILDING FOUNDATIONS ENVELOPE)

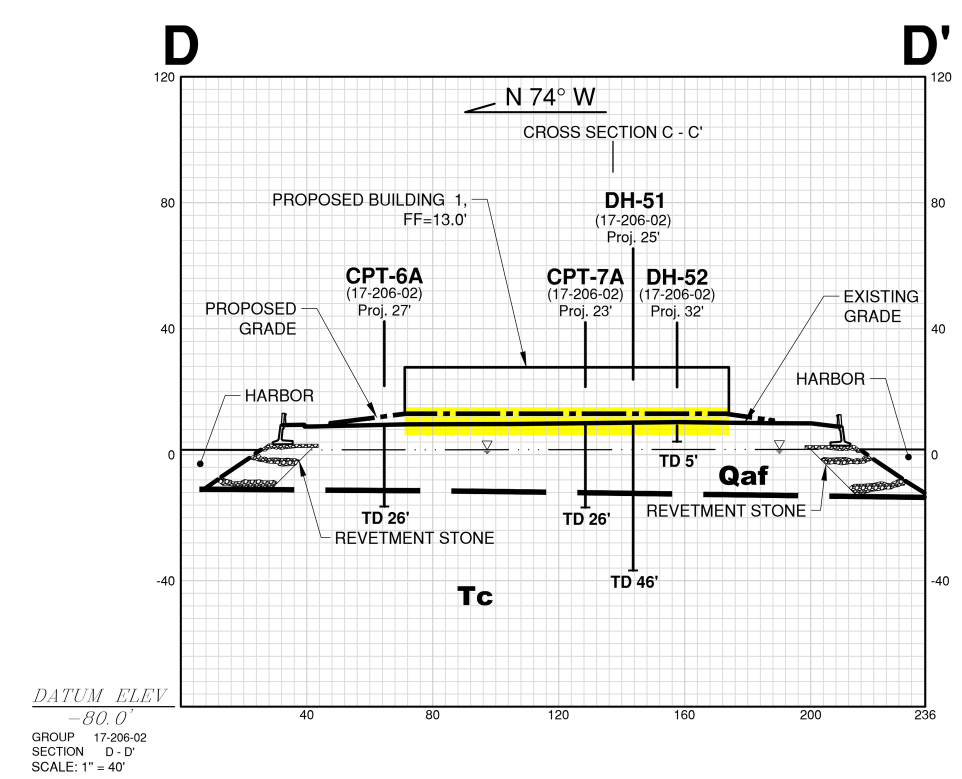
Composite Geotechnical Map
Commercial Buildings
Commercial Component Dana
Point Harbor Partners, LLC.

Date:	August 27, 2021	Plate 2
Project No.:	17-206-02	









PROPOSED LTP LIMITS (EXTENDED TO EDGE OF BUILDING FOUNDATIONS ENVELOPE)

0 40' 80'

Geotechnical Sections

Commercial Buildings
Commercial Component Dana Point Harbor Partners, LLC.

GMU

Date:	August 27, 2021
Project No.:	17-206-02
Plate	3

DRAWING: g:\2017\17-206-02\Dwg\1720602_dph_commercial_plate_3_geo_sections.dwg PLOTTED: 8/27/2021 5:06 PM BY: Jesus Mano

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

APPENDIX G

Additional AGI Stability/Lateral Spread Analyses

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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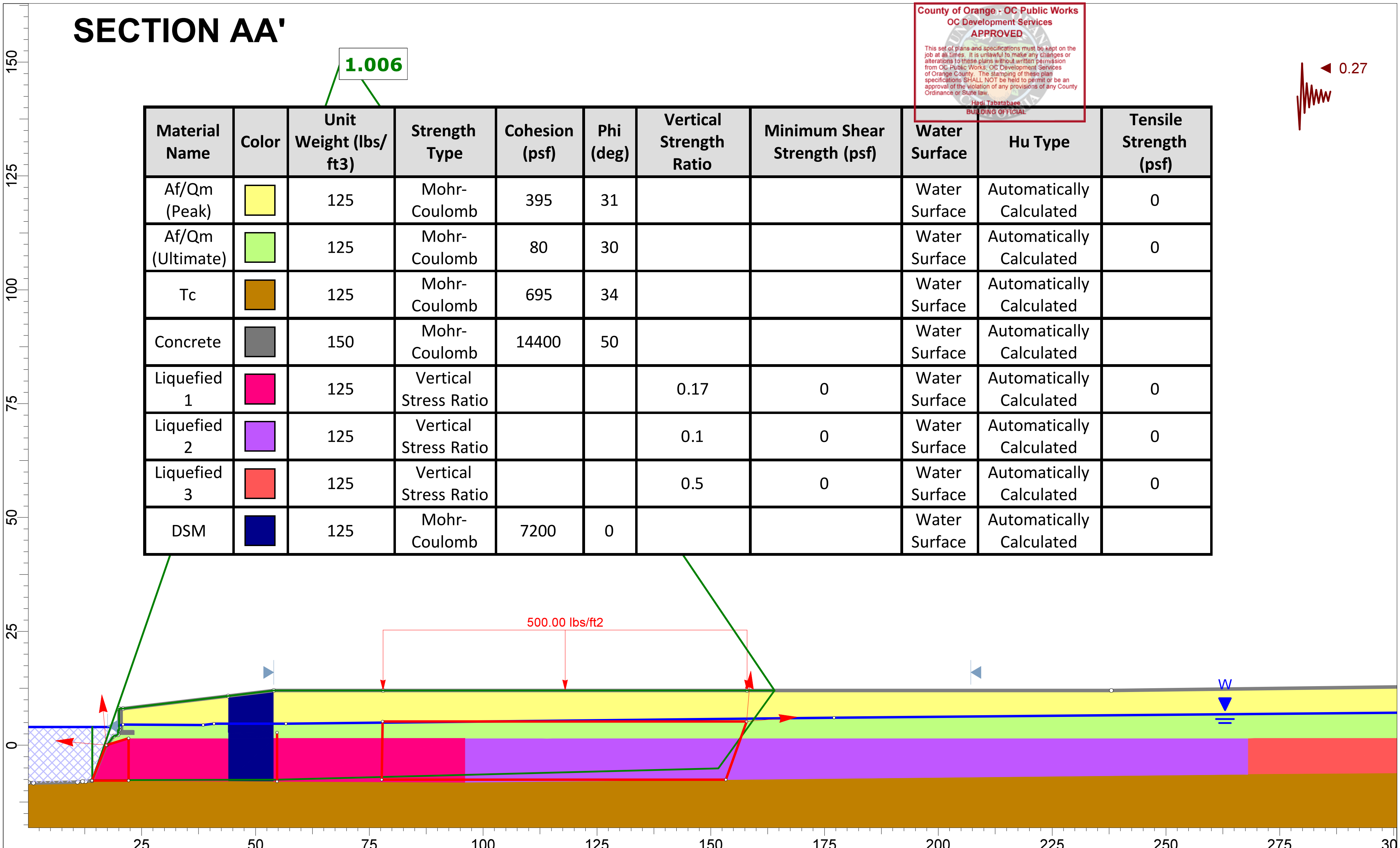
BUILDING OFFICIAL

SECTION AA'

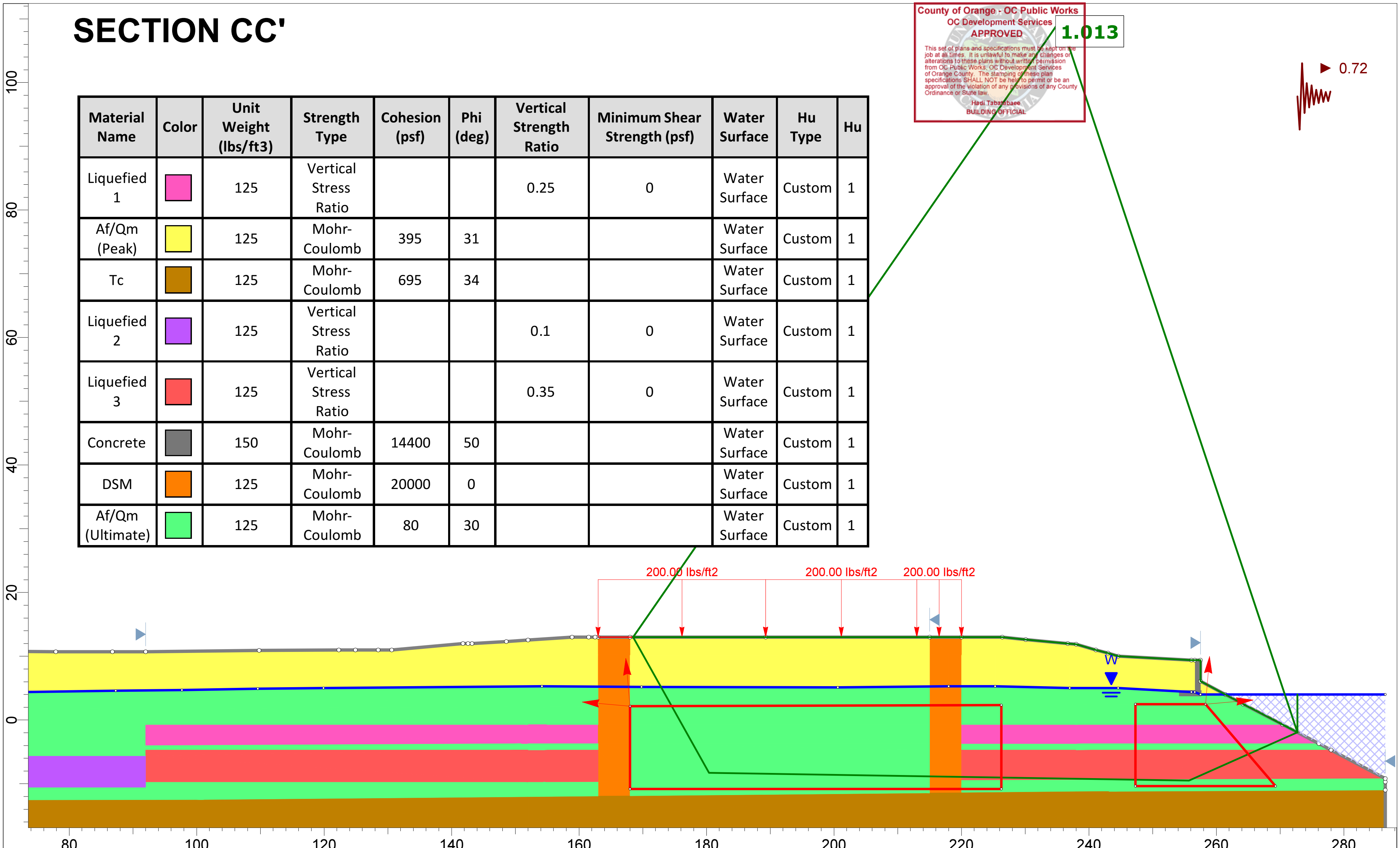
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Tensile Strength (psf)
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Automatically Calculated	0
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Automatically Calculated	0
Tc		125	Mohr-Coulomb	695	34			Water Surface	Automatically Calculated	
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Automatically Calculated	
Liquefied 1		125	Vertical Stress Ratio			0.17	0	Water Surface	Automatically Calculated	0
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Automatically Calculated	0
Liquefied 3		125	Vertical Stress Ratio			0.5	0	Water Surface	Automatically Calculated	0
DSM		125	Mohr-Coulomb	7200	0			Water Surface	Automatically Calculated	



AGI™	*Project*	Dana Point Harbor	
	Group DSM_10ft	*Scenario* kh=0.26 Block Search	
	Drawn By TT	*Company* AGI	
SLIDEINTERPRET 9.012	*Date*	*File Name* Section_Arev.slmd	

SECTION CC'

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Liquefied 1		125	Vertical Stress Ratio			0.25	0	Water Surface	Custom	1
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1
Tc		125	Mohr-Coulomb	695	34			Water Surface	Custom	1
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Custom	1
Liquefied 3		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1



AGI			
Project	Dana Point Harbor		
Group	Group 1	Scenario	kh=0.78 Block Search
Drawn By	TT	Company	AGI
Date		File Name	Section_C.slmd

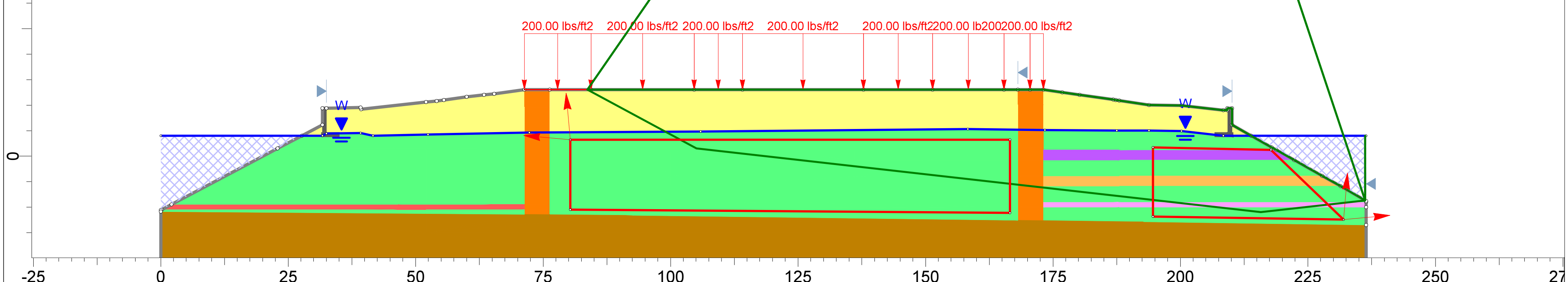
SLIDEINTERPRET 9.012

SECTION DD'

1.074

0.49

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1
Tc		125	Mohr-Coulomb	695	34			Water Surface	Custom	1
Liquefied 4		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Liquefied 2		125	Vertical Stress Ratio			0.55	0	Water Surface	Custom	1
Liquefied 3		125	Vertical Stress Ratio			0.3	0	Water Surface	Custom	1
Liquefied 5		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1



SLIDEINTERPRET 9.012

Project	Dana Point Harbor		
Group	Group 1	Scenario	kh=0.5 Block Search
Drawn By	TT	Company	AGI
Date	4/15/2021	File Name	Section_D.slmd

Seismic Displacement Calculation - Section A

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	0.67	g
Earthquake magnitude	M	6.9	
Spectral acceleration at 1 sec	S1	0.45	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	0.27	g
Correlated displacement in soils - West US region	d	**1.3**	inches

Seismic Displacement Calculation - Section C

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	0.67	g
Earthquake magnitude	M	6.9	
Spectral acceleration at 1 sec	S1	0.45	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	0.72	g
Correlated displacement in soils - West US region	d	**0.0**	inches

Seismic Displacement Calculation - Section A

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	0.67	g
Earthquake magnitude	M	6.9	
Spectral acceleration at 1 sec	S1	0.45	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	0.49	g
Correlated displacement in soils - West US region	d	**0.1**	inches

GMU

May 27, 2021

Mr. Bryon Ward, President
DANA POINT HARBOR PARTNERS, LLC
c/o BURNHAM-WARD PROPERTIES
1100 Newport Center Drive, Suite 200
Newport Beach, CA 92660

GMU Project 17-206-02

Subject: Geotechnical Review of AGI Deep Soil Mixing (DSM) Submittal, Dana Point Harbor Revitalization – Commercial Component, City of Dana Point, County of Orange, California

References:

(1) Deep Soil Mixing Design Submittal, Dana Point Harbor Commercial Core, City of Dana Point, County of Orange, California, prepared by Advanced GeoSolutions, Inc. (AGI), dated May 27, 2021 (AGI Reference: L19-1748).

(2) Our "Geotechnical Investigation Report, Volumes 1, 2, and 3, Dana Point Harbor Revitalization: Buildings 1 through 12 – Commercial Component, City of Dana Point, California," dated May 27, 2021 (GMU Project 17-206-02).

Dear Mr. Ward:

The purpose of this correspondence is to confirm in writing that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) Deep Soil Mixing (DSM) design submittal by Advanced GeoSolutions, Inc. (AGI) for the subject project. The AGI submittal is to support the foundation design of the proposed buttress and eight (8) new retail/office/surf museum/restaurant buildings (Buildings 1, and 6-12) for the commercial core. The subject site is bounded by Dana Point Harbor Drive, the planned realignment of Golden Lantern, and the new proposed parking structure and existing parking lot on the north, the existing boat launch ramp and Embarcadero Marina area on the east, the existing Casitas Place and the existing Marina Inn for the future Hotel component site on the west, and the existing sea wall and harbor on the south.

As is standard of practice, Quality Control (QC) for the Deep Soil Mix (DSM) installations will performed <u>by both</u> the DSM contractor and the Geotechnical Engineer of Record (GMU). The QC requirements to be completed by the contractor are contained on Sheet GI-2 contained in the attached reference (1) AGI plans under "General Notes and Details". Note VII under 3.4 Quality Control and Quality Assurance also refers to supplemental testing by the "engineer". This supplemental DSM QC testing will be performed full-time by one of GMU's Senior Engineering Technicians reporting directly to the Geotechnical Engineer-of-Record (GE) and includes:

- Observation, documentation, and verification of geotechnical conditions.
- Determination/verification that bedrock has been reached in the buttress and under each building to design penetration depth prescribed at each DSM location.
- Depth and diameter of each DSM.
- Verification and sampling of DSM installation per design.
- Observation and documentation of load testing.

It should be further noted that all the above QC test results will be submitted to the GE of record at GMU for his review and acceptance from a geotechnical engineering perspective.

Based on our review, the attached reference (1) AGI Deep Soil Mixing design submittal has been prepared in general accordance with the parameters and recommendations presented in our reference (2) report. All the recommendations included herein, and in our reference (2) report, remain applicable to the site improvements; thus, the subject design submittal is acceptable from a geotechnical perspective.

Should you have any questions, please do not hesitate to contact us.

Respectfully submitted,

David R. Atkinson
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GREGORY P. SILVER
GE 2336
GEOTECHNICAL
STATE OF CALIFORNIA

Gregory Silver, M.Sc., PE, GE 2336
President / CEO
Principal Geotechnical Engineer

(Three (3) print copies and electronic copy)

Attachment:
AGI Deep Soil Mixing Design Submittal

cc: SMS Architects
Attn: Mr. Brandon Dedmon (electronic copy)

Tindall Consulting
Attn: Mr. John Tindall (electronic copy)

Westling and Associates
Attn: Mr. Josh Westling (electronic copy)

TAIT Engineering
Attn: Ms. Daniela Malott (electronic copy)

Advanced Geosolutions, Inc.
Attn: Mr. Justin Martos (electronic copy)

dra/17-206-02L Geotechnical Review of AGI Deep Soil Mixing Submittal for DPHP, LLC Commercial Component (5-27-21)

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

Advanced Geosolutions, Inc.
13 Orchard Road, Suite 105
Lake Forest, California 92630
P (310) 796-9000 F (310) 796-9001

County of Orange - OC Public Works
OC Development Services
APPROVED
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Hadi Tabatabaee
BUILDING OFFICIAL

May 27, 2021 AGI Ref: L19-1748

GMU Geotechnical, Inc.
Attn: Mr. David R. Atkinson
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688

Re: Deep Soil Mixing Design Submittal
Dana Point Harbor Commercial Core
City of Dana Point, County of Orange, California

Dear Mr. Atkinson:

In accordance with our Subconsulting Agreement, AGI is pleased to submit this design report and drawings for the deep soil mixing ground improvement at the Dana Point Harbor, Commercial Core project.

We are glad to be of service. Please contact us if you have any question regarding the attached document.

Sincerely,

ADVANCED GEOSOLUTIONS, Inc.

Thomas Tran

Justin Martos, P.E., G.E.
Project Manager

Thomas Tran, P.E.
Design Engineer

ADVANCED GEOSOLUTIONS INC
Ground Improvement and Specialty Piling Contractors

GROUND IMPROVEMENT BY DEEP SOIL MIXING

DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CALIFORNIA

Submittal No. 01

DESIGN SUBMITTAL

May 27, 2021

1.0 INTRODUCTION

Advanced Geosolutions, Inc. (AGI) is pleased to present this design submittal package for deep soil mixing (DSM) at the planned redevelopment area located at the harbor in Dana Point, California. We understand the redevelopment involves the construction of new hotels, new commercial buildings and new marine facilities. The submittal herein addresses the design for the commercial area of this redevelopment.

The geotechnical report by GMU identifies medium dense to dense sandy artificial fill at the site down to a depth of approximately 20 feet below grade at the time of geotechnical exploration. They recommended ground improvement to mitigate excessive seismically induced lateral spreading at the project site. Ground improvement is also intended to mitigate uncertainty about the competence of the undocumented artificial fill soils and the potential associated risk with constructing structures overlying those materials. DSM was selected by the design team as the most appropriate ground improvement technique for this project based on the soil conditions, performance goals, efficiency, and site constraints.

Our design meets the performance criteria as described in the following sections. Concepts, calculations, means, and methods in this design are deemed intellectual property of AGI, and shall remain confidential. AGI's design, and any other related information, shall not be made available to another party other than the members of the design team without the express written consent of AGI. We anticipate that a set of construction drawings and specifications will be put out to bid but only the minimal set of documents required to bid the installation work should be distributed to bidders as approved by AGI.

2.0 REFERENCE DOCUMENTS AND INFORMATION

In preparing this design AGI relied on information provided by the design team, including:

- Geotechnical Investigation Report, Volumes 1, 2, and 3, Dana Point Harbor Revitalization: Buildings 1 through 12 – Commercial Component, City of Dana Point, California. Report no. 17-206-02 prepared by GMU and dated 5/27/2021.
- Site plan CAD file provided by GMU
- Foundation plan for building 1 prepared by KPFF dated 10/8/2020
- Foundation plans for buildings 6-9 prepared by KPFF dated 4/9/2021
- Foundation plans for building 10-12 prepared by KPFF dated 4/12/2021

3.0 DESIGN CRITERIA

Per the Geotech report's recommendation and discussion with the design team, the ground improvement shall be designed in consideration of the following performance criteria:

- Design earthquake Magnitude (Mw) = 6.9 and PGA = 0.67g

- Reduce lateral spread movement to 3 inches or less behind the DSM buttress
- Ground improvement will directly support all footings with at least 5,000 psf allowable bearing pressure.
- Limit total static settlement to 1 inch or less.
- Reduce total seismic settlement to 0.5 inch or less.
- Building slab-on-grade areas require improvement or support to mitigate potential poor performance of undocumented fill materials.

4.0 CEMENT DEEP SOIL MIXING (DSM) DESIGN

The proposed DSM layout is presented in Appendix A. The DSM program includes two components: (1) DSM buttress along the waterfront, between the existing seawall and the proposed building, and (2) discrete DSM columns under the proposed buildings to support structural loads with a soil-cement load transfer platform (LTP) to distribute slab loading to the DSM columns.

The buttress is 12 feet wide and consists of overlapping 6-ft diameter DSM with a continuous front row. The columns will embed 4 feet into the Capistrano formation.

The DSM system supporting Buildings 6 through 12 consists of 4-ft diameter columns centered under all footings. In addition, the same 4-ft diameter columns are installed in a 12-ft grid pattern throughout slab-on-grade areas in building interiors. The 4-ft diameter DSM columns for building support will extend to practical refusal to rest on competent bedrock materials.

The DSM design unconfined compressive strength (UCS) is 150 psi at 28 days.

4.1 Lateral Spread

AGI performed a pseudostatic slope stability analysis in order to determine the post-improvement critical horizontal seismic coefficient (also called yield acceleration, k_y), which is a necessary input value to estimate lateral slope deformation. The analysis is presented in Appendix B1. The slope geometry and soils parameters used in the model were provided by GMU.

For section A, the composite shear strength of the DSM buttress was calculated based on the area replacement ratio (ARR), and this calculation is shown in Appendix B2. For sections C and D, the DSM block is modeled as a 5-ft wide (effective width) zone with 100% ARR on the perimeter of Building 1, while the soils inside the block is assigned unimproved strength without liquefaction.

AGI estimated lateral spread deformation using the empirical equations outlined in NCHRP Report 611 (2008), and the calculation is shown in Appendix B3. The results are summarized in Table 1 below.

Table 1. Estimated Post-improvement Slope Deformation

Section	Ky from pseudostatic analysis	Estimated Slope deformation (inch)
Section A	0.26g	1.4
Section C	0.78g	0.0
Section D	0.49g	0.1

AGI performed all applicable internal stability checks of the buttress in accordance with FHWA guidelines. Those checks included bearing capacity, overturning, crushing at the toe, racking, and internal shear failures. The analysis is included in appendix B4.

4.2 Building Support

The structural capacity and geotechnical capacity calculation are included in Appendix C1 and C2, respectively. The analysis results indicate that the allowable load on a 4-ft diameter DSM column bearing on bedrock is 200 kips.

Building loading information was not provided with the structural drawings but we understand the footings were sized for 5,000 psf. Therefore the required number of DSM column supporting each footing was determined by taking the footing area, multiply by 5.0 ksf, and divide by 200 kips.

4.3 Static Settlement

Since the DSM columns will bear directly on formation material, the main source of static settlement is the elastic compression of the soil cement. This was calculated using the software RSPile by Rocscience. The calculation is shown in Appendix C3. The elastic modulus of DSM material was selected based on FHWA's recommended correlation (300 times design compressive strength).

The result indicates static settlement of the DSM column under design load is approximately 0.5 inch.

4.4 Seismic Settlement

The DSM columns transfer building loads to bedrock, but it does not densify the surrounding soils. When the soils liquefy after an earthquake, it would induce downdrag forces on the DSM columns which causes additional compression and settlement.

AGI estimated the magnitude of liquefaction-induced downdrag and column compression using method for piles, as outlined in the AASHTO Bridge Design Manual. This calculation is shown in Appendix D, which shows that downdrag force is approximately 128 kips for a 4-ft diameter column. And the corresponding seismic settlement due to DSM column compression is less than 0.1 inch.

The structural capacity and geotechnical capacity checks of Appendices C1 and C2 also ensure that the DSM column can resist this downdrag load in addition to the building design load.

5.0 DSM INSTALLATION METHOD

Cement Deep Soil Mixing is performed using a specialty, purpose-built drilling tool consisting of a series of mixing blades and/or paddles extending radially from a hollow stem. In general, as the mixing tool is advanced into the soil, the hollow stem is used as a conduit to pump grout slurry (a mixture of cement and water) and injected at the tip of the tool while blending the soils. Pre-augering or trenching operations may be used to facilitate mechanical breakdown and blending of firm or stiff soils, or to remove the upper strata before DSM operations, or to assist with spoil control. The resulting DSM product is an improved soil-cement column with low compressibility, high stiffness, and significant load carrying capacity. Typical DSM equipment and mixing tools are shown below in Figure 1.

Grout will be batched on site using an in-line jet valve or weight control system. We anticipate that cement and water will be the only components for the grout slurry. Water and/or cement component quantities are adjusted to achieve the target specific gravity prior to pumping it to the mixing drill rig. The batch plant and pump are expected to be located in an area to avoid relocating the facility during the entire DSM operation.

Figure 1. DSM mixing tool assembly (left) and track-mounted drilling rig constructing a DSM column (right)

6.0 LOAD TRANSFER PLATFORM (LTP)

As described above the design includes a LTP consisting of cement-treated soils at the ground surface. The LTP will be constructed in three 12-inch-thick lifts for a three-foot-thick section of soil cement to a design strength of 200 psi at 28 days. LTP will be constructed after completion of the DSM scope placing the lifts over the top of the DSM columns throughout the structural footprints of the buildings. The LTP is designed to transfer load from the floor slab to the regularly spaced DSM columns at 12 feet on-center. See Geotechnical Report for other requirements.

We have assumed slab loading (Dead plus live) of 300 psf for this design. The performance of the LTP under load was analyzed using 2D plane strain finite element in PLAXIS, which is presented in Appendix E. The analysis demonstrates that the specified LTP will provide satisfactory performance under 300 psf floor load. The design also conservatively assumes that the artificial soils underlying the LTP may settle and accounts for the potential that a gap may form below the bottom of the LTP and the underlying soil such that no support is provided other than by the DSM columns.

7.0 DEEP SOIL MIXING QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Quality Control / Quality Assurance will be performed in accordance with the DSM specifications as outlined on the approved drawings.

8.0 LOAD TRANSFER PLATFORM QUALITY CONTROL

LTP Quality Control will be performed in accordance with the Geotechnical Report's recommendations.

9.0 CONCLUDING REMARKS

This ground improvement preliminary design is submitted to address the geotechnical concerns of the proposed buildings. The design uses DSM ground improvement technique to meet the project requirements provided to AGI.

The layout of our ground improvement program is presented in AGI's shop drawing (Appendix A). Relevant strength parameters of the design will be verified by the UCS results.

This design was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing under similar conditions and in the same locality. No warranty is made nor implied.

We appreciate the opportunity to provide our services for this project. Please contact the undersigned with any questions regarding this document.

Sincerely,

ADVANCED GEOSOLUTIONS, Inc.

Justin Martos, P.E., G.E.
Project Manager

Thomas Tran, P.E.
Design Engineer

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

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References

FHWA (2013) “Federal Highway Administration Design Manual: Deep Mixing for Embankment and Foundation Support”. Publication No. FHWA-HRT-13-046. U.S. Department of Transportation, Federal Highway Administration

Kitazume, M. and Terashi, M. "The Deep Mixing Method", CRC Press 2013.

Lunne, T., Robertson, P.K., and Powellm J.J.M. (1997) “Cone Penetration Testing in Geotechnical Practice”

NCHRP (2008) Report 611 “Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankments”. Transportation Research Board

Rayamajhi,D., Nguyen, T., Ashford, S., Boulanger, R., Lu, J., Elgamal, and Shao, L. (2014). ” Numerical Study of Shear Stress Distribution for Discrete Columns in Liquefiable Soils.” J. Geotech. Geoenviron. Eng., 140, 2014.

APPENDIX A

Layout Drawings

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Hadi Tabatabaee
BUILDING OFFICIAL

DANA POINT HARBOR COMMERCIAL COMPONENT DEEP SOIL MIXING
DANA POINT, CALIFORNIA

SHEET INDEX

GROUND IMPROVEMENT DESGINER:	ADVANCED GEOSOLUTIONS, INC.
CIVIL ENGINEER:	TAIT & ASSOCIATES, INC.
STRUCTURAL ENGINEER:	KPFF
GEOTECHNICAL ENGINEER:	GMU GEOTECHNICAL, INC.

VICINITY MAP

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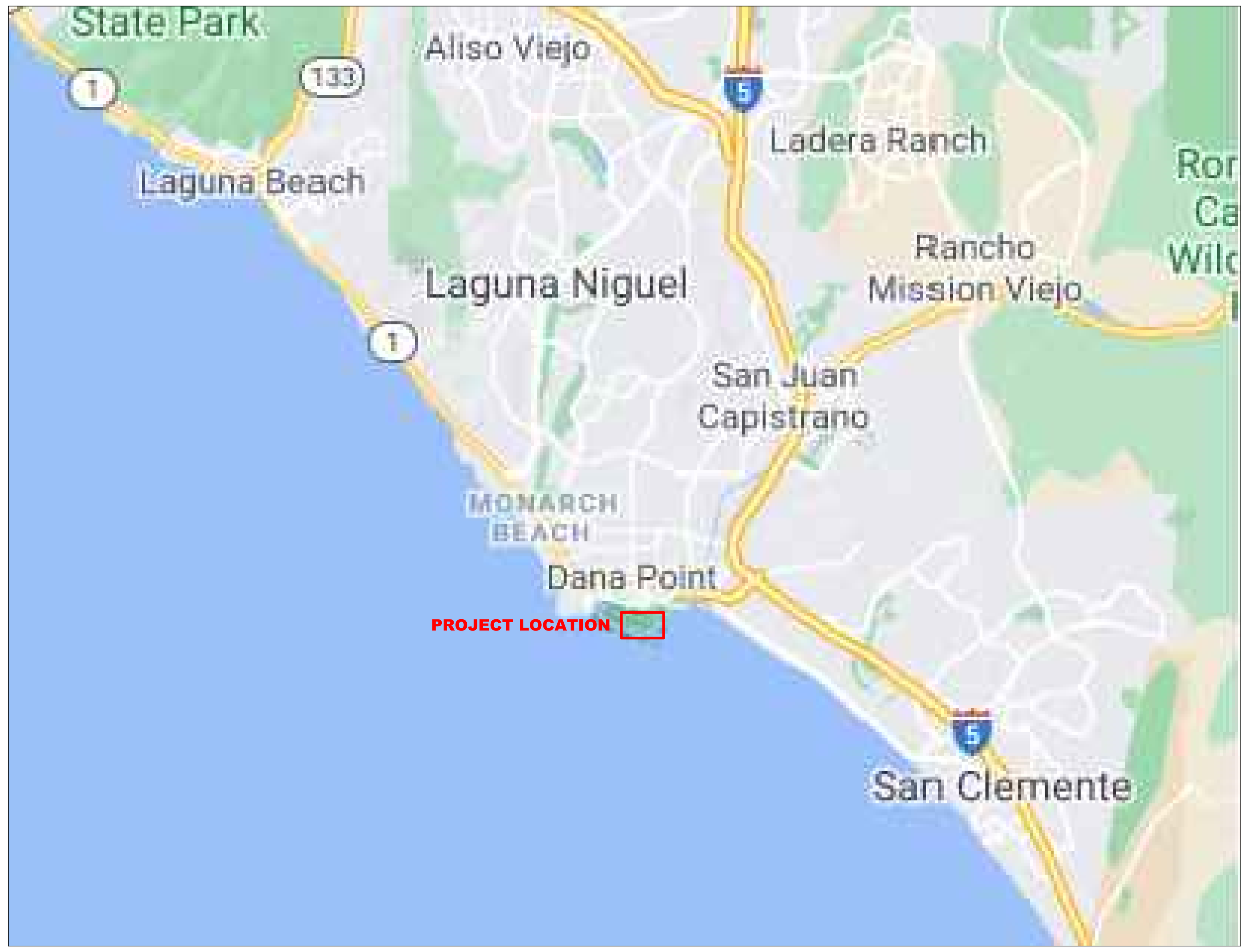

MAP DATA: GOOGLE 2020

LOCATION MAP

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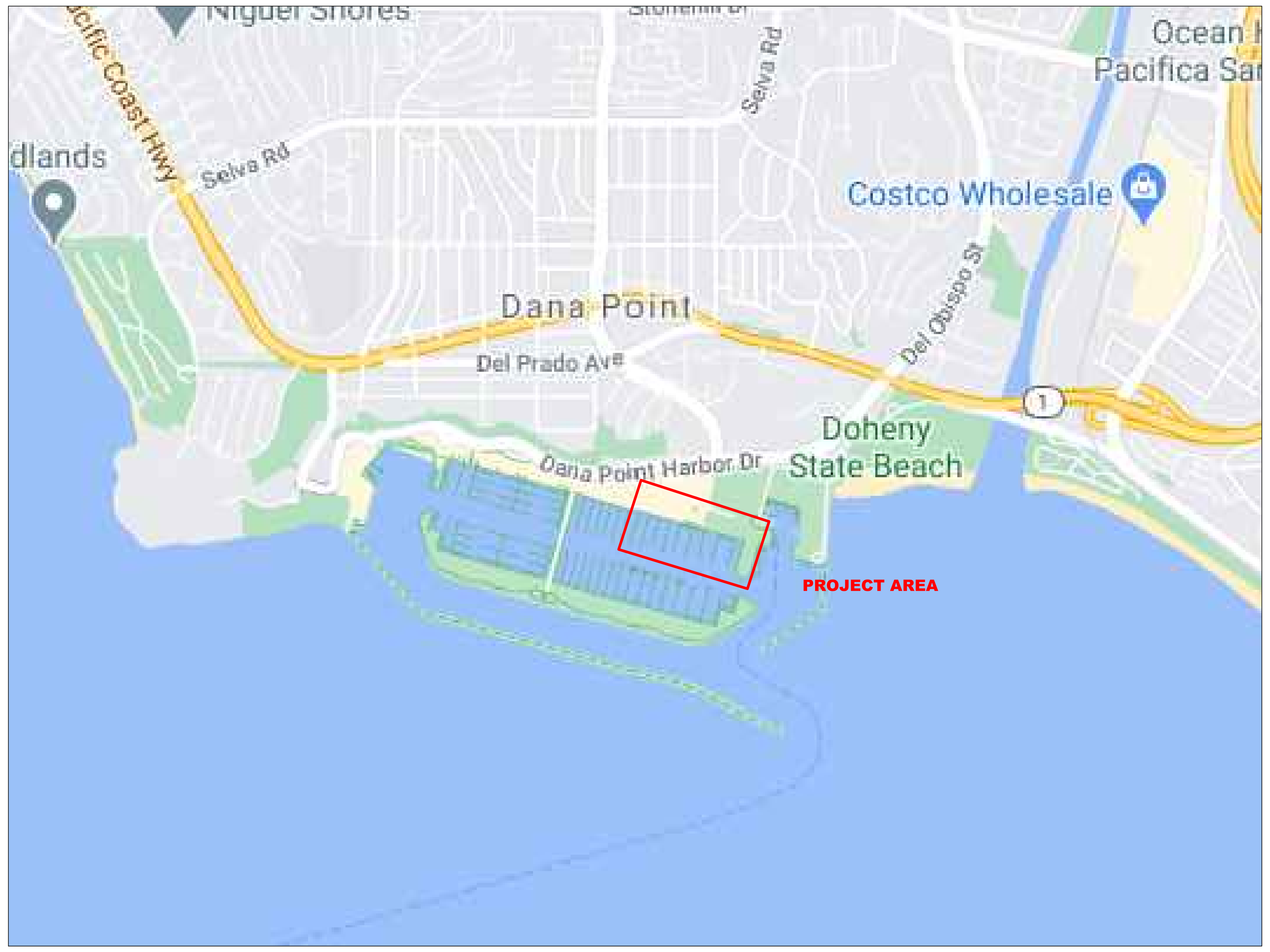

MAP DATA: GOOGLE 2020

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REVISIONS

NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

COVER SHEET

PROJECT NO. –

DATE: 05/27/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-1

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PART 1 – GENERAL

1.1 SCOPE

A. DEEP SOILS MIXING (DSM) SHALL BE INSTALLED TO MITIGATE POTENTIAL FOR LATERAL SPREADING AND UNCERTAIN PERFORMANCE OF UNDOCUMENTED ARTIFICIAL FILL.

B. A LOAD TRANSFER PLATFORM (LTP) SHALL BE CONSTRUCTED THROUGHOUT ALL BUILDING FOOTPRINTS TO TRANSFER FLOOR SLAB LOADING TO UNDERLYING DSM COLUMNS AND PREVENT ADVERSE SETTLEMENT IN FLOOR SLAB AREAS THAT MAY RESULT FROM NEW LOADING APPLIED TO UNDERLYING UNDOCUMENTED ARTIFICIAL FILL.

C. THE DSM PLAN IS PREPARED IN ACCORDANCE WITH THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT PREPARED BY GMU DATED 5/27/2021.

D. THIS DESIGN IS BASED ON THE GEOTECHNICAL CHARACTERIZATION AND SOIL PARAMETERS PRESENTED IN THE REFERENCED GEOTECHNICAL REPORT, AS WELL AS LOAD REQUIREMENTS INDICATED ON THE STRUCTURAL DRAWINGS. THIS DESIGN WAS CONDUCTED IN A MANNER CONSISTENT WITH THE LEVEL OF CARE AND SKILL ORDINARILY EXERCISED BY MEMBERS OF THE GEOTECHNICAL ENGINEERING PROFESSION CURRENTLY PRACTICING UNDER SIMILAR CONDITIONS AND IN THE SAME LOCALITY. NO WARRANTY IS MADE NOR IMPLIED.

1.2 REFERENCES

A. GEOTECHNICAL INVESTIGATION REPORT, VOLUMES 1, 2, AND 3, DANA POINT HARBOR REVITALIZATION BUILDINGS 1 THROUGH 12, COMMERCIAL COMPONENT – REPORT NO. 17-206-02 PREPARED BY GMU DATED MAY 27, 2021.

B. ASTM C150 – SPECIFICATION FOR PORTLAND CEMENT

C. ASTM D1633 – STANDARD TEST METHODS FOR COMPRESSIVE STRENGTH OF MOLDED SOIL-CEMENT CYLINDERS

D. ASTM D4380 – DENSITY OF BENTONITE SLURRIES

F. FEDERAL HIGHWAY ADMINISTRATION DESIGN MANUAL: DEEP MIXING FOR EMBANKMENT, AND FOUNDATION SUPPORT, PUBLICATION NO. FHWA-HRT-13-046, OCTOBER 2013.

1.3 DEFINITIONS

A. DEEP SOIL MIXING (DSM) – A SOIL IMPROVEMENT TECHNIQUE USED TO CONSTRUCT IN SITU SOIL STRUCTURES OR TREAT SOILS IN PLACE, WITHOUT EXCAVATION OR DEWATERING. SOIL MIXING USES A LARGE, CRANE OR DRILL RIG – MOUNTED TURNTABLE TO INSERT A LARGE-DIAMETER (TYPICALLY 3- TO 8 -FOOT DIAMETER) TOOL INTO THE GROUND WHILE INJECTING AND MIXING A GROUT WITH THE SOIL. STABILIZED SOIL COLUMNS ARE CREATED THAT MAY BE JOINED TOGETHER BY OVERLAPPING TO FORM RETAINING WALLS OR FOUNDATION ELEMENTS, OR TO TREAT A LARGE BLOCK OF SOIL OR SLUDGE.

B. ASTM – ASTM INTERNATIONAL.

C. OWNER – THE OWNER AS REFERRED TO HEREIN IS DANA POINT HARBOR PARTNERS, LLC, C/O BURNHAM-WARD PROPERTIES.

D. ENGINEER – THE ENGINEER IS THE OWNER'S GEOTECHNICAL ENGINEER OF RECORD TO ACT ON ITS BEHALF IN THE EXECUTION OF THESE SPECIFICATIONS.

E. CONTRACTOR – REFERS TO THE GENERAL CONTRACTOR DIRECTLY CONTRACTED WITH THE OWNER AND SUBCONTRACTING THE DSM SCOPE TO THE DSM SUBCONTRACTOR.

F. DEEP SOIL MIXING SUBCONTRACTOR (DSM SUBCONTRACTOR) – AN INDIVIDUAL OR COMPANY WHO HAS HAD PROVEN AND SUCCESSFUL EXPERIENCE IN SOIL MIXING CONSTRUCTION.

G. GROUT – A STABLE COLLOIDAL SUSPENSION OF POWDERED CEMENT, BENTONITE, ADDITIVES AND/OR OTHER SIMILAR MATERIALS IN WATER. THE TERMS "GROUT" AND "SLURRY" ARE USED INTERCHANGEABLY IN THESE SPECIFICATIONS.

H. INJECTION RATIO – A VOLUMETRIC RATIO OF GROUT TO SOILS (E.G., 100 GALLONS/CUBIC YARD) TO BE MIXED IN A DSM COLUMN. THE GROUT INJECTION RATIO IS DETERMINED FOR EACH COLUMN BASED ON THE COLUMN DIMENSIONS, SOIL DENSITY, PATTERN OF TREATMENT, AND DESIRED APPLICATION RATE.

I. DSM COLUMN – ONE COMPLETED INSERTION, INJECTION AND MIXING OF THE SOIL WITH THE MIXING AUGER TO THE DESIGN DEPTH. THIS CREATES A COLUMN OF TREATED SOIL THE SAME DIAMETER AS THE MIXING AUGER. THE COLUMN MAY BE PRIMARY (THROUGH VIRGIN SOILS), SECONDARY (CONNECTING PRIMARY COLUMNS), TERTIARY, ETC.

J. WORKING PLATFORM – THE WORKING PLATFORM IS THE LEVELED AND STABLE SURFACE FROM WHICH THE DSM EQUIPMENT OPERATES.

K. MIXING AUGER/TOOL – THE SPECIAL TOOL THAT ATTACHES TO THE KELLY BAR AND IS INSERTED INTO THE GROUND TO MIX THE SOILS. THE TOOL MAY BE FITTED WITH PORTS FOR INJECTING GROUT, MIXING PADDLES, AUGER BLADES, ETC.

L. BLADE ROTATION NUMBER (BRN) – NUMBER OF BLADES X (RATE OF PENETRATION PLUS RATE OF WITHDRAWAL (IN REVOLUTIONS/METER). FOR EXAMPLE FOR 5 BLADES, RATE OF PENETRATION = 1 REVOLUTION/25 MM (40 REVOLUTIONS/M), AND RATE OF WITHDRAWAL = 1 REVOLUTION/20 MM (50 REVOLUTIONS/M), THE BRN = 5 X (40 + 50) = 450.

M. OBSTRUCTION – OBSTRUCTIONS ARE DEFINED AS MATERIALS CLASSIFIED AS UNDERGROUND UTILITIES, TREES (OR PARTS THEREOF), METAL, MAN-MADE OBJECTS, WOODEN/CONCRETE/STEEL OR ANY OTHER TYPE OF PILE OR DEEP FOUNDATION, OR NATURAL GROUND MATERIALS LARGER THAN A MAXIMUM COBBLE SIZE (8 INCHES MAXIMUM DIMENSION).

N. MIXING BLADE – A SINGLE MIXING BLADE SHALL CONSTITUTE A PAIR OF MIXING PADDLES ATTACHED TO THE SHAFT OF THE MIXING TOOL AT THE SAME ELEVATION. THE CUTTING PADDLES MAY ALSO BE CONSIDERED AS A MIXING BLADE.

O. DOSAGE – EXPRESSED AS THE MASS OF BINDER INTRODUCED PER VOLUME OF MIXED IN-SITU SOIL (E.G. KG/M^3).

1.4 SUBMITTALS

A. DSM WORK PLAN INCLUDING:

I. ASSIGNED NUMBER OF EACH COLUMN AS ID FOR INSTALLATION RECORD

II. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE INSTALLATION PER PLANS AND SPECIFICATIONS, INCLUDING SPECIFICATIONS OF THE GROUT BATCHING AND VERTICAL DRILL EQUIPMENT INTENDED FOR USE ON THE PROJECT.

III. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE QUALITY CONTROL REQUIREMENTS PER PLANS AND SPECIFICATIONS.

IV. PRELIMINARY SOIL MIX DESIGN INDICATING TYPE OF BINDER MATERIAL AND VOLUMETRIC PROPORTIONS FOR INITIAL TRIALS ON-SITE TO BE ADJUSTED BASED ON FIELD OBSERVATIONS AND EARLY STRENGTH RESULTS (SEE PART 3.2 TEST SECTION).

B. ACCURATE DAILY RECORDS OF THE WORK TO BE SUBMITTED BY CLOSE OF BUSINESS THE FOLLOWING DAY, INCLUDING:

I. COLUMN ID

II. DIAMETER

III. WORKING PAD ELEVATION

IV. MIXING DEPTH

V. START TIME

VI. TIME AT TIP ELEVATION

VII. FINISH TIME

VIII. MIXING DURATION

IX. GROUT MIX DETAILS (PERCENT WATER AND REAGENT BINDER)

X. GROUT INJECTION WITH DEPTH

XI. TOTAL INJECTED GROUT

XII. BLADE ROTATION NUMBER (BRN) WITH DEPTH

D. ANY PROPOSED CHANGE IN THE WORK PROCEDURES PLAN MADE NECESSARY BY CONDITIONS ENCOUNTERED DURING CONSTRUCTION FOR REVIEW AND APPROVAL BY THE ENGINEER.

E. MATERIAL CERTIFICATIONS FOR CEMENT BINDER TO BE USED IN THE PROJECT.

F. WEIGHTS: CERTIFICATES OF BATCH WEIGHTS FOR EACH TRUCK LOAD DELIVERED IF ON-SITE BATCH PLANT IS NOT USED.

G. ADMIXTURES/POZZOLANS/ADDITIVES SUBJECT TO THE APPROVAL OF THE ENGINEER, IF USED.

H. QC TEST RESULTS: SUBMIT ALL QC TEST RESULTS WITHIN 48 HOURS OF TESTING.

I. REPORT SUMMARIZING TEST SECTION RESULTS AND CALIBRATION OF DRILLING EFFORT CRITERIA FOR COLUMN DEPTH TERMINATION APPROVED BY THE ENGINEER.

J. AS-BUILT REPORT DOCUMENTING THE CONSTRUCTED LOCATIONS AND DIMENSIONS OF ALL DSM COLUMNS, COMPILATION OF ALL QUALITY CONTROL AND QUALITY ASSURANCE DATA COLLECTED FOR THE PROJECT, AND EXPLANATION OF ANY DEVIATION FROM THE PLANS AND SPECIFICATIONS PREVIOUSLY REVIEWED APPROVED TO THE SATISFACTION OF THE ENGINEER.

K. THE CONTRACTOR WILL SUBMIT A WORK PLAN DETAILING THE CONSTRUCTION AND QA/QC OF THE LTP, MEETING THE DESIGN REQUIREMENTS HEREIN AND IN THE GEOTECHNICAL REPORT.

1.5 ACCEPTANCE

A. ACCEPTANCE OF THE DSM WORK WILL BE BASED ON COMPLIANCE WITH THE STRENGTH AND GEOMETRY REQUIREMENTS OF THE PLANS AND SPECIFICATIONS AS VERIFIED BY THE ENGINEER'S QA TESTING. THE MATERIAL FORMED BY MIXING THE GROUT WITH THE IN SITU SOIL SHALL MEET A MINIMUM REQUIRED UNCONFINED COMPRESSIVE STRENGTH OF 150 POUNDS PER SQUARE INCH (PSI) AT 28 DAYS. TESTS WILL BE CONSIDERED PASSING IF THEY ARE AT LEAST 90% OF THE 150 PSI STRENGTH REQUIREMENT PROVIDED THAT NO MORE THAN 10% OF ALL TESTS FALL BELOW THE REQUIREMENT AND THE OVERALL AVERAGE STRENGTH EXCEEDS THE REQUIREMENT. IF THE UNCONFINED COMPRESSIVE STRENGTH RESULTS DO NOT MEET THAT CRITERIA, THE DSM SUBCONTRACTOR SHALL SUBMIT A MITIGATION PLAN FOR REVIEW AND APPROVAL BY THE ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS

A. FRESH OR RECLAIMED WATER, FREE OF ANY DELETERIOUS SUBSTANCE THAT COULD ADVERSELY AFFECT THE GROUT PROPERTIES SHALL BE USED.

B. BINDER AGENT USED FOR THE PROJECT SHALL CONSIST OF PORTLAND CEMENT TYPE II/V CONFORMING TO ASTM DESIGNATION C150. THE CEMENT SHALL BE ADEQUATELY PROTECTED FROM MOISTURE AND CONTAMINATION WHILE IN TRANSIT AND STORAGE AT THE JOB SITE. RECLAIMED CEMENT OR CEMENT CONTAINING LUMPS OR DELETERIOUS MATTER SHALL NOT BE USED.

C. THE WATER AND CEMENT SHALL BE PREMIXED TO FORM A GROUT FOR INJECTION AND MIXING WITH THE IN-SITU SOIL. MATERIALS SHALL BE COMBINED IN PREDETERMINED WEIGHED PROPORTIONS WITH ITS QUALITY EVALUATED BY SPECIFIC GRAVITY MONITORED AT LEAST ONCE PER INSTALLATION BY MUD BALANCE.

D. THE DESIGN UNCONFINED COMPRESSIVE STRENGTH OF THE SOIL-CEMENT MATERIAL COMPRISING THE DSM COLUMNS IS 150 PSI AT 28 DAYS.

PART 3 – EXECUTION

3.1 EQUIPMENT

A. A PURPOSE BUILT HOLLOW STEM AND MIXING PADDLE TOOL ATTACHED TO A HIGH TORQUE ROTARY DRILL ON TRACKS SHALL BE USED TO ACCOMPLISH THE DSM. MIXING TOOLS OF 4- AND 6-FOOT-DIAMETER WILL BE IMPLEMENTED FOR THIS PROJECT. MIXING TOOLS SHALL CONSIST OF A MINIMUM OF FOUR (4) MIXING BLADES (4 PAIRS OF MIXING PADDLES).

B. CEMENT WILL BE STORED IN PURPOSE BUILT SILOS.

C. WATER SHALL BE MIXED WITH CEMENT IN A PURPOSE-BUILT WEIGH-BATCH MIXER TO PRODUCE SLURRY WITH A CONSISTENT SPECIFIC GRAVITY OR WATER:CEMENT RATIO FOR PROPER MIXING. JET VALVE MIXING OR OTHER CONTINUOUS MIXING METHODS WILL NOT BE ALLOWED.

D. GROUT SHALL BE DELIVERED TO THE MIXING RIG BY APPROPRIATELY SIZED POSITIVE DISPLACEMENT PUMPS. PROGRESSIVE CAVITY PUMPS SHALL NOT BE ALLOWED.

3.2 TEST SECTION

A. LOCATIONS: PRIOR TO INITIATING PRODUCTION WORK, DSM SUBCONTRACTOR SHALL INSTALL A MINIMUM OF TWO DSM COLUMNS WITH VARYING MIX DESIGN DOSAGE AT EACH OF THE SIX TEST SECTION LOCATIONS INDICATED ON THE PLANS.

B. EVALUATION GOALS: THE PURPOSE OF THE TEST SECTION IS TO EVALUATE THE FOLLOWING ITEMS PRIOR TO INITIATING PRODUCTION WORK. THE DSM SUBCONTRACTOR MAY PROCEED IMMEDIATELY TO PRODUCTION WHILE TEST SECTION EVALUATION RESULTS ARE PENDING BUT DOES SO AT ITS OWN RISK.

I. COLUMN DEPTH: COLUMN INSTALLATION DEPTHS FOR THE PROJECT ARE CONTROLLED BY THE DEPTH TO THE CAPISTRANO FORMATION CONTACT AS DESCRIBED IN SECTION 3.3.G. DURING TEST SECTION INSTALLATION ADJACENT TO EXISTING EXPLORATION DATA, DSM SUBCONTRACTOR SHALL MONITOR AND RECORD INDICATORS OF DRILLING EFFORT (E.G. ROTARY TORQUE APPLIED AND CROWD PRESSURE). DSM SUBCONTRACTOR SHALL PROPOSE A READILY IDENTIFIABLE METRIC SUBJECT TO THE ENGINEER'S APPROVAL FOR THE DRILL OPERATOR TO OBSERVE DURING INSTALLATION AS EVIDENCE OF ENCOUNTERING THE CAPISTRANO FORMATION.

II. MIX CONSISTENCY: DURING TEST SECTION MIXING THE DSM SUBCONTRACTOR AND ENGINEER SHALL OBSERVE

III. STRENGTH: A MINIMUM OF TWO WET-GRAB SAMPLES SHALL BE COLLECTED FROM EACH TEST SECTION COLUMN INSTALLED AT DEPTHS OF 1/3 AND 2/3 THE TOTAL INSTALLATION DEPTH. EACH SAMPLE COLLECTED SHALL BE CAST INTO CYLINDERS FOR UNCONFINED COMPRESSION STRENGTH TESTING AND EVALUATION AS DESCRIBED IN SECTION 3.4.B.

IV. LOAD TEST: DSM SUBCONTRACTOR SHALL CONDUCT A MINIMUM OF FOUR LOAD TESTS PER THE REQUIREMENTS OF THIS SPECIFICATION TO ASSESS THE 4-FOOT-DIAMETER DSM COLUMN GEOTECHNICAL CAPACITY ADJACENT TO EXPLORATORY TEST DATA. SEE PROPOSED LOAD TEST LOCATIONS ON SHEET GI-3.

3.3 CONSTRUCTION

A. INSTALL DSM COLUMNS AT THE LOCATIONS AND TO THE DEPTH INDICATED ON THE DSM PLAN.

B. HORIZONTAL ALIGNMENT: THE DSM COLUMNS SHALL BE CAREFULLY SURVEYED AND STAKED OUT PRIOR TO INSTALLATION. THE COLUMNS SHALL BE CONSTRUCTED WITHIN 4 INCHES OF THE LOCATIONS SHOWN ON THE DRAWINGS.

C. VERTICAL ALIGNMENT: VERTICAL ALIGNMENT OF THE AUGER STROKE WILL BE CONTROLLED BY THE EQUIPMENT OPERATOR. THE COLUMN VERTICALITY SHALL HAVE A TOLERANCE OF 1:50 MAXIMUM DEVIATION.

D. MIXING SHAFT SPEED: THE MIXING SHAFT SPEED (RPMS) SHALL BE ADJUSTED TO ACCOMMODATE AN ADEQUATE RATE OF MIXING SHAFT PENETRATION BASED ON THE DEGREE OF DRILLING DIFFICULTY. THE MIXING SHAFT SPEED CAN BE ADJUSTED ACCORDING TO DRILLING DIFFICULTY.

E. BOTTOM MIXING: THE BOTTOM OF THE COLUMNS SHALL BE DOUBLE MIXED BY RAISING THE MIXING SHAFTS FIVE FEET OFF THE BOTTOM AND THEN REINSERTING THEM FOR REMIXING.

F. GROUT TAKE: THE GROUT TAKE (OR INJECTION RATE) PER VERTICAL FOOT OF COLUMN WILL BE ADJUSTED TO THE REQUIREMENTS OF THE DESIGN MIX. APPROPRIATE DELIVERY PUMPS SHALL BE USED TO TRANSFER THE GROUT FROM THE MIX PLANT TO THE DSM RIG. A FLOW MONITORING DEVICE WILL BE INSTALLED IN THE GROUT LINE TO DETECT LINE BLOCKAGE AND ELECTRONICALLY RECORD INJECTION RATES AND VOLUMES VERSUS DEPTH AND TIME FOR QUALITY CONTROL MONITORING.

I. THE RATE OF APPLICATION MAY BE CONTROLLED AND MONITORED BY ADJUSTING THE PUMP OUTPUT TO THE PENETRATION RATE SO THAT A PRESET GROUT TAKE CAN BE ACHIEVED. TYPICALLY, THE APPLICATION RATE CAN BE SUCCESSFULLY CONTROLLED BY EXPERIENCED OPERATORS ONCE THE PATTERN OF OPERATION IS ESTABLISHED.

II. SOME VARIATIONS OF THE GROUT TAKE WILL OCCUR DUE TO FIELD CONDITIONS. HOWEVER, THE OVERALL APPLICATION RATE TO EACH STROKE CAN BE MONITORED, CALCULATED AND CONTROLLED. ADDITIONAL MIXING IS TO BE USED WHEN NECESSARY TO DISTRIBUTE THE GROUT THROUGH THE ENTIRE COLUMN. THE INJECTION OF GROUT TO EACH STROKE WILL BE MONITORED, CHECKED BY CALCULATION AND RECORDED.

G. COLUMN DEPTH:

I. BUTTRESS COLUMNS: COLUMNS INSTALLED FOR THE LATERAL SPREAD BUTTRESS SHALL BE INSTALLED TO A MINIMUM OF 4 FEET BEYOND THE CAPISTRANO FORMATION CONTACT AS IDENTIFIED BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER. PRACTICAL REFUSAL (AS DEFINED IN SECTION 3.3.H) ENCOUNTERED PRIOR TO ACHIEVING THE REQUIRED 4-FOOT EMBEDMENT INTO CAPISTRANO FORMATION MAY BE APPROVED BY THE ENGINEER ON A CASE-BY-CASE BASIS BUT THE DSM SUBCONTRACTOR SHALL BE PREPARED TO INITIATE PREDRILLING IF NEEDED TO ACHIEVE THE REQUIRED EMBEDMENT AT NO ADDITIONAL COST TO THE OWNER.

II. BUILDING SUPPORT COLUMNS: DSM COLUMNS INTENDED FOR SUPPORT OF THE RETAIL BUILDINGS SHALL BE INSTALLED TO A MINIMUM OF 1 FOOT BEYOND THE CAPISTRANO FORMATION CONTACT OR TO PRACTICAL REFUSAL. MEANS OF IDENTIFYING THE CAPISTRANO FORMATION CONTACT WILL BE BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

H. OBSTRUCTION/MIXING SHAFT PRACTICAL REFUSAL: IF OBSTRUCTIONS ARE ENCOUNTERED WHICH REDUCE THE RATE OF PENETRATION TO ONE FOOT PER MINUTE FOR TWO MINUTES UNDER FULL POWER, THE STROKE SHALL BE COMPLETED IN ACCORDANCE WITH THE SPECIFICATIONS AND REMEDIAL MEASURES WILL BE TAKEN. SUBCONTRACTOR SHALL NOTIFY CONTRACTOR TO INVESTIGATE, CONFIRM, AND REMOVE SAID OBSTRUCTIONS FROM THE SOIL MIXING AREA. ONCE CONTRACTOR REMOVES OBSTRUCTIONS AND BACKFILLS AND COMPACTS (IN LIFTS NOT TO EXCEED 3 FEET IN UNCOMPACTED THICKNESS) THE REMOVAL AREA WITH GRANULAR SAND OR SANDY GRAVEL MATERIAL, THE DSM SUBCONTRACTOR SHALL RETURN TO MIXING THE BACKFILLED AREAS AND REMAINING DSM COLUMNS PER PLANS AND SPECS. IF REMOVAL OF OBSTRUCTIONS BY CONTRACTOR DAMAGES A PREVIOUSLY INSTALLED DSM COLUMN, ASSOCIATED RE-INSTALLATION WORK SHALL BE COMPENSATED BY AS EXTRA AT THE CONTRACT UNIT PRICES. IF IT IS INFEASIBLE OR IMPRACTICAL TO CLEAR AN OBSTRUCTION FROM A DESIGN INSTALLATION LOCATION, CONTRACTOR MAY PROPOSE A MODIFICATION TO THE DESIGN PROVIDED THE ORIGINAL PERFORMANCE IS MAINTAINED SUBJECT TO THE REVIEW AND APPROVAL OF THE ENGINEER.

I. MIXING ENERGY: THE DSM SUBCONTRACTOR SHALL MIX EACH COLUMN WITH SUFFICIENT MIXING ENERGY THROUGHOUT TO PROPERLY PROCESS THE SOIL CEMENT PRODUCT. THE MIXING ENERGY SHALL BE DEMONSTRATED BY MEASURED AND RECORDED BRN REPORTED FOR EACH INSTALLATION AND THE MIXING ENERGY APPLIED SHALL MINIMALLY ACHIEVE THAT REQUIRED TO PRODUCE SATISFACTORY RESULTS DURING THE TEST SECTION.

J. NO EXCAVATION OR HEAVY GRADING BY CONTRACTOR SHALL PROCEED PRIOR TO 3 DAYS AFTER DSM COLUMN CONSTRUCTION UNLESS APPROVED BY THE DSM DESIGN ENGINEER.

K. UTILITY TRENCH: EXCAVATE THE COMPLETED DSM COLUMNS AS NECESSARY FOR UNDERGROUND UTILITIES. TRENCH BACKFILL WILL BE AS FOLLOW:

I. FOR TRENCHES CUT INTO BUTTRESS DSM AND ABOVE GWT: BACKFILL WILL NATIVE SOILS OR AS APPROVED BY THE ENGINEER.

II. FOR TRENCHES CUT INTO BUTTRESS DSM AND EXTEND BELOW GWT: BACKFILL WITH CEMENT SLURRY WITH COMPRESSIVE STRENGTH OF AT LEAST 300 PSI.

III. UTILITIES TRENCHES WILL AVOID CUTTING INTO THE DISCRETE 4' DIAMETER DSM COLUMNS SUPPORTING BUILDINGS AND SLABS.

L. MANAGEMENT OF SPOIL TO BE COORDINATED BETWEEN CONTRACTOR AND DSM SUBCONTRACTOR.

3.4 QUALITY CONTROL AND QUALITY ASSURANCE

A. PRIOR TO CONSTRUCTION, A PRELIMINARY MIX DESIGN SHALL BE GENERATED BY THE SUBCONTRACTOR. THE MIX DESIGN MAY BE OBTAINED BASED ON SITE SOILS AND LABORATORY TESTING, OR ALTERNATIVELY, BASED ON THE SUBCONTRACTORS DATABASE IN SIMILAR SOIL CONDITIONS AND STRENGTH REQUIREMENTS.

B. WET SAMPLING: THE DSM SUBCONTRACTOR SHALL OBTAIN WET BULK SAMPLES OF THE SOIL CEMENT MIX AND CAST IT IN CYLINDERS FOR SUBSEQUENT QUALITY CONTROL TESTING BY THE DSM SUBCONTRACTOR, AND QUALITY ASSURANCE TESTING AND ACCEPTANCE BY THE ENGINEER.

I. ONE SAMPLE WILL BE RETRIEVED PER WORK DAY PER RIG.

II. THE VOLUME OF SAMPLE RECOVERED DURING EACH SAMPLING SHALL BE SUFFICIENT TO CAST 6 SAMPLE CYLINDERS EACH MEASURING 3" DIAMETER BY 6" HIGH. A ½" SIEVE WILL BE USED TO SCREEN THE MATERIAL IN ORDER TO FACILITATE APPROPRIATE SCALING OF INCLUSIONS AND PROPER MODELING OF THE 3 INCH CYLINDERS.

III. OF THE 6 CYLINDERS CAST, 3 WILL BE PROVIDED TO THE ENGINEER FOR QUALITY ASSURANCE TESTING AND 3 WILL BE RETAINED BY THE DSM SUBCONTRACTOR FOR QUALITY CONTROL TESTING.

IV. TO AVOID DISTURBANCE, THE CYLINDERS ARE TO BE CURED ON SITE IN A COOLER WITH A SMALL AMOUNT OF WATER TO MAINTAIN A STABLE, COOL AND MOIST CURING ENVIRONMENT FOR 2 DAYS.

V. AFTER QUALITY ASSURANCE SAMPLES ARE RETRIEVED BY THE ENGINEER, ALL WET GRAB SAMPLES SHALL BE STORED IN A MOIST ROOM (NOT SUBMERGED) IN ACCORDANCE WITH ASTM C 192 UNTIL THE TEST DATE.

VI. THE QUALITY CONTROL SAMPLES WILL BE TESTED (BY THE DSM SUBCONTRACTOR) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 3-DAY, 7-DAY, AND 14-DAY AFTER CASTING. THE RESULTS WILL BE USED TO EXTRAPOLATE THE EXPECTED STRENGTH AT 28-DAYS.

VII. THE QUALITY ASSURANCE SAMPLES WILL BE TESTED (BY THE ENGINEER) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 7-DAY, 14-DAY, AND 28-DAY AFTER CASTING.

VII. WHEN TIME OR SCHEDULE DOES NOT PERMIT A 28-DAY CURING STRENGTH EVALUATION, THE FOLLOWING UCS AGING CORRELATION WILL BE TENTATIVELY APPLIED TO THIS JOB:

28 : 7 DAY, 1.57

VIII. THE ABOVE CORRELATION MAY BE ADJUSTED FOR SITE-SPECIFIC FINDINGS AS THE PROJECT DEVELOPS.

IX. THE DESIGN STRENGTH FOR THIS PROJECT AT 28-DAYS IS 150 PSI. SUBJECT TO THE APPROVAL OF THE ENGINEER, 7-DAY TEST RESULTS MAY BE ACCEPTED BASED ON THE CORRELATION ABOVE OR A REVISED CURING FACTOR BASED ON PROJECT-SPECIFIC STATISTICAL ANALYSIS OF AVAILABLE DATA.

C. LOAD TEST:

I. DSM SUBCONTRACTOR SHALL PERFORM A MINIMUM OF FOUR COMPRESSION LOAD TEST ON 4-FOOT-DIAMETER COLUMNS AT THE TEST SECTION LOCATION SPECIFIED FOR THE BUILDINGS ON THE DRAWINGS.

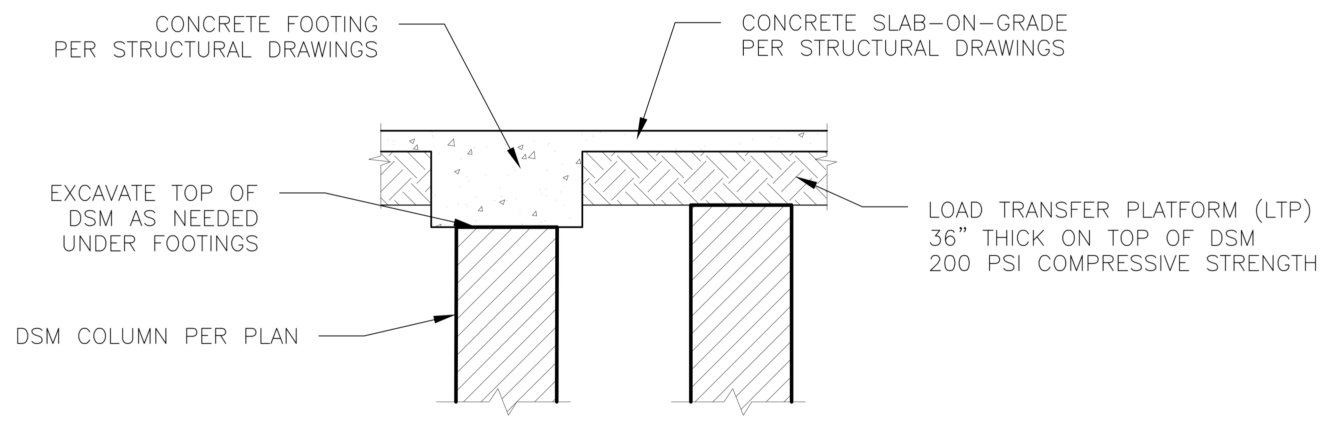
II. COMPRESSION LOAD TEST SHALL BE IN GENERAL ACCORDANCE WITH ASTM D1143. THE TEST COLUMN SHALL BE CONDUCTED TO AT LEAST 150% OF THE STATIC DESIGN LOAD.

III. LOAD TEST WILL NOT BE PERFORMED BEFORE THE COLUMN HAS ACHIEVED SUFFICIENT UNCONFINED COMPRESSIVE STRENGTH AS DEMONSTRATED BY LABORATORY TESTING ON WET GRAB SAMPLES.

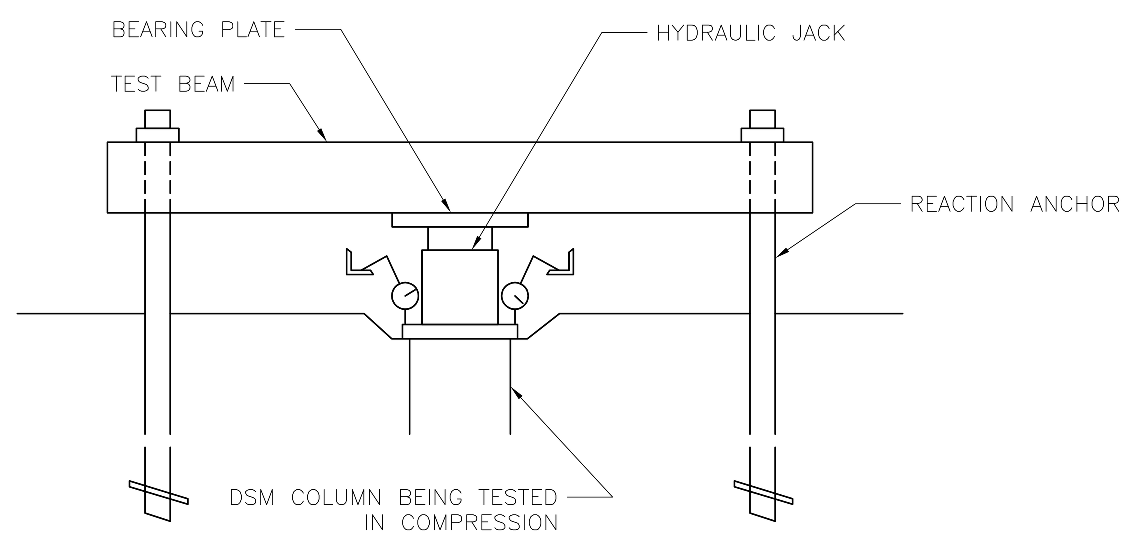
D. OBSERVATION: A REPRESENTATIVE OF THE ENGINEER SHALL BE PRESENT FULL-TIME DURING ALL INSTALLATION WORK TO OBSERVE THE CONSTRUCTION OF THE DSM COLUMNS, SAMPLING, AND TESTING TO VERIFY THE DSM SUBCONTRACTOR PERFORMS THE WORK IN SUBSTANTIAL CONFORMANCE WITH THESE SPECIFICATIONS. THE ENGINEER SHALL MAINTAIN PARALLEL HAND RECORDS OF PERTINENT INSTALLATION DATA FOR COMPARISON WITH REPORTED INSTALLATION LOGS AND OBTAIN TEST SPECIMENS OF THE WET-SAMPLES COLLECTED FOR QUALITY ASSURANCE TESTING.

END OF SECTION

COMPRESSION TEST LOADING SCHEDULE		
DESIGN LOAD =	200	KIPS
PERCENT OF DL	LOAD VALUE	HOLD DURATION
(%)	(KIP)	(MIN)
5%	10	4
10%	20	4
15%	30	4
20%	40	4
25%	50	4
30%	60	4
35%	70	4
40%	80	4
45%	90	4
50%	100	4
55%	110	4
60%	120	4
65%	130	4
70%	140	4
75%	150	4
80%	160	4
85%	170	4
90%	180	4
95%	190	4
100%	200	4
105%	210	4
110%	220	4
115%	230	4
120%	240	4
125%	250	4
130%	260	4
135%	270	4
140%	280	4
145%	290	4
150%	300	4
125%	250	4
100%	200	4
75%	150	4
50%	100	4
25%	50	4
5%	10	4
0%	0	-



TYPICAL BUILDING SUPPORT DETAIL
SCALE: NTS



LOAD TEST SETUP
SCALE: NTS

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REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
GENERAL NOTES AND DETAILS

PROJECT NO. –
SHEET NUMBER: GI-2
DATE: 05/27/2021
SCALE: AS SHOWN

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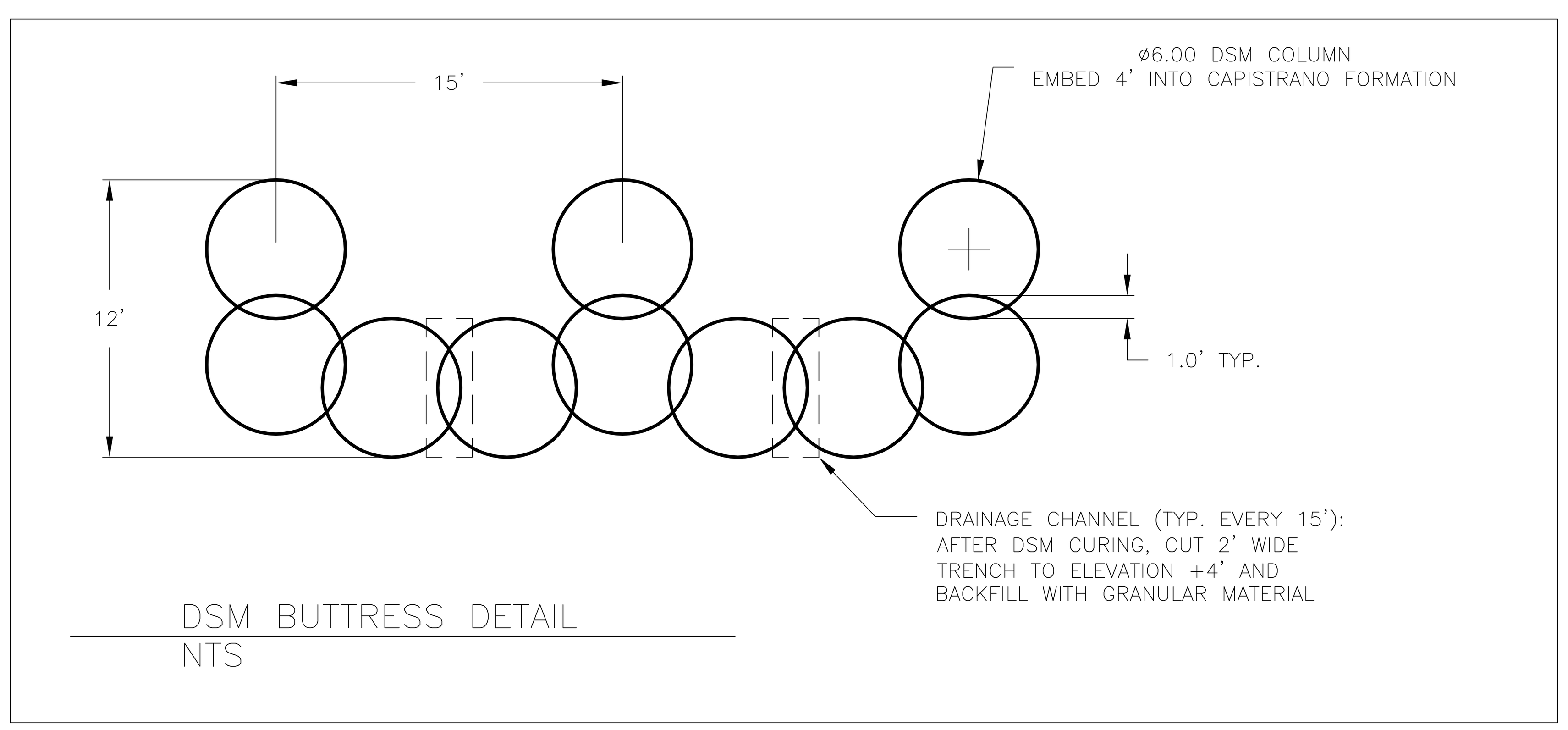
LEGEND:

CPT-4 (11-161-00) Tc @ 16'	APPROXIMATE LOCATION OF CPT APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)
DH-17 (11-161-00) Tc @ 19'	APPROXIMATE LOCATION OF BORE HOLE APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)
D — D'	GEOTECHNICAL CROSS-SECTION

NOTES:

1. SITE PLAN BACKGROUND BY TAIT DATED 5/27/2021 AND SHOWN FOR REFERENCE ONLY.
2. SEE REFERENCE GEOTECHNICAL REPORT FOR LOGS OF BORINGS AND CPTS.



DSM BUTTRESS DETAIL
NTS

DSM PLAN
SCALE: 1" = 40'

0' 40' 80'
SCALE: 1"=40'

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REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING PLAN

PROJECT NO. –	SHEET NUMBER:
DATE: 05/27/2021	GI-3
SCALE: AS SHOWN	

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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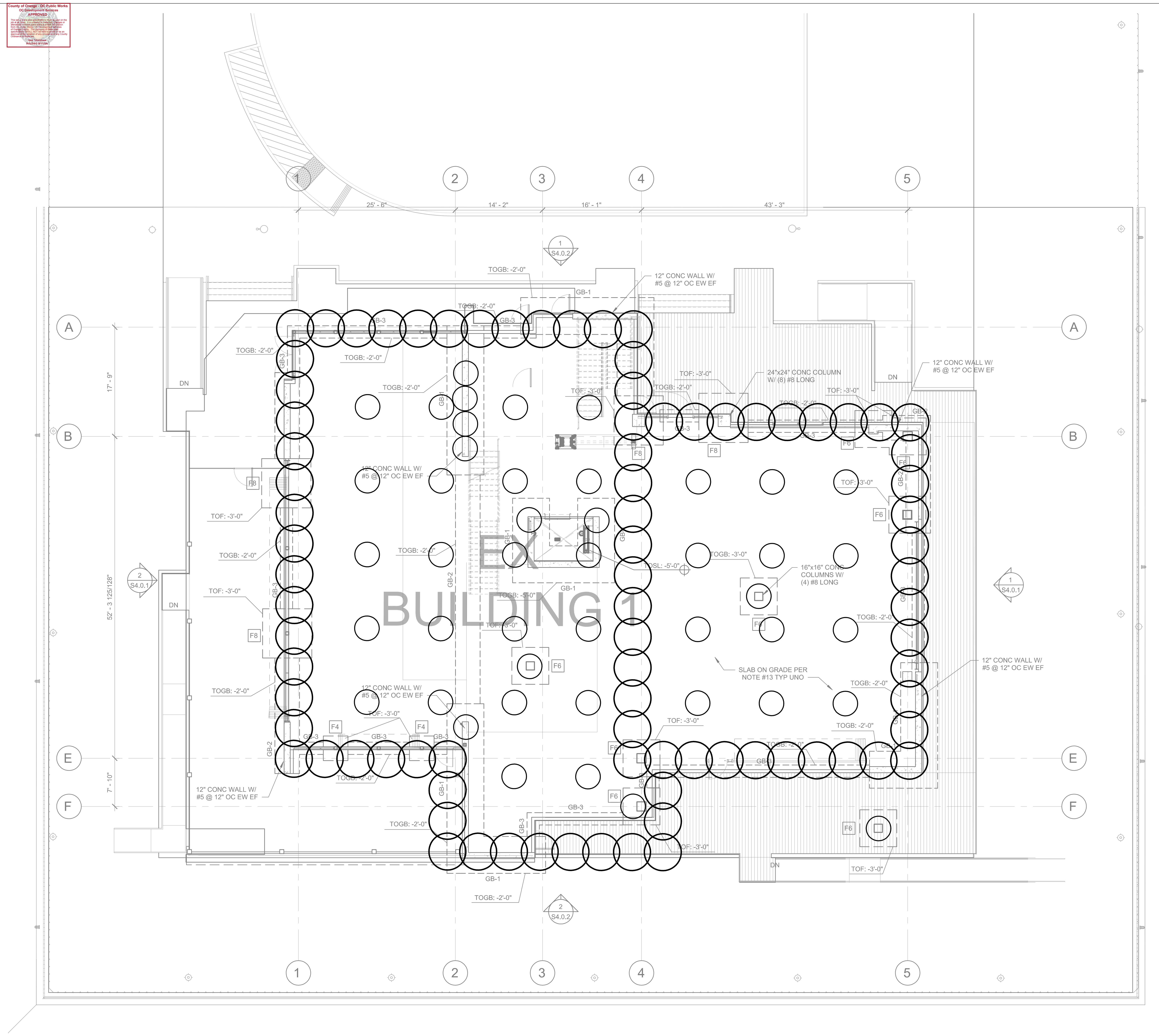

DSM COLUMN LAYOUT – BUILDING 1

SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø BEARING ON CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

1. FOUNDATION PLAN PREPARED BY KPFF DATED 10/8/2020 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

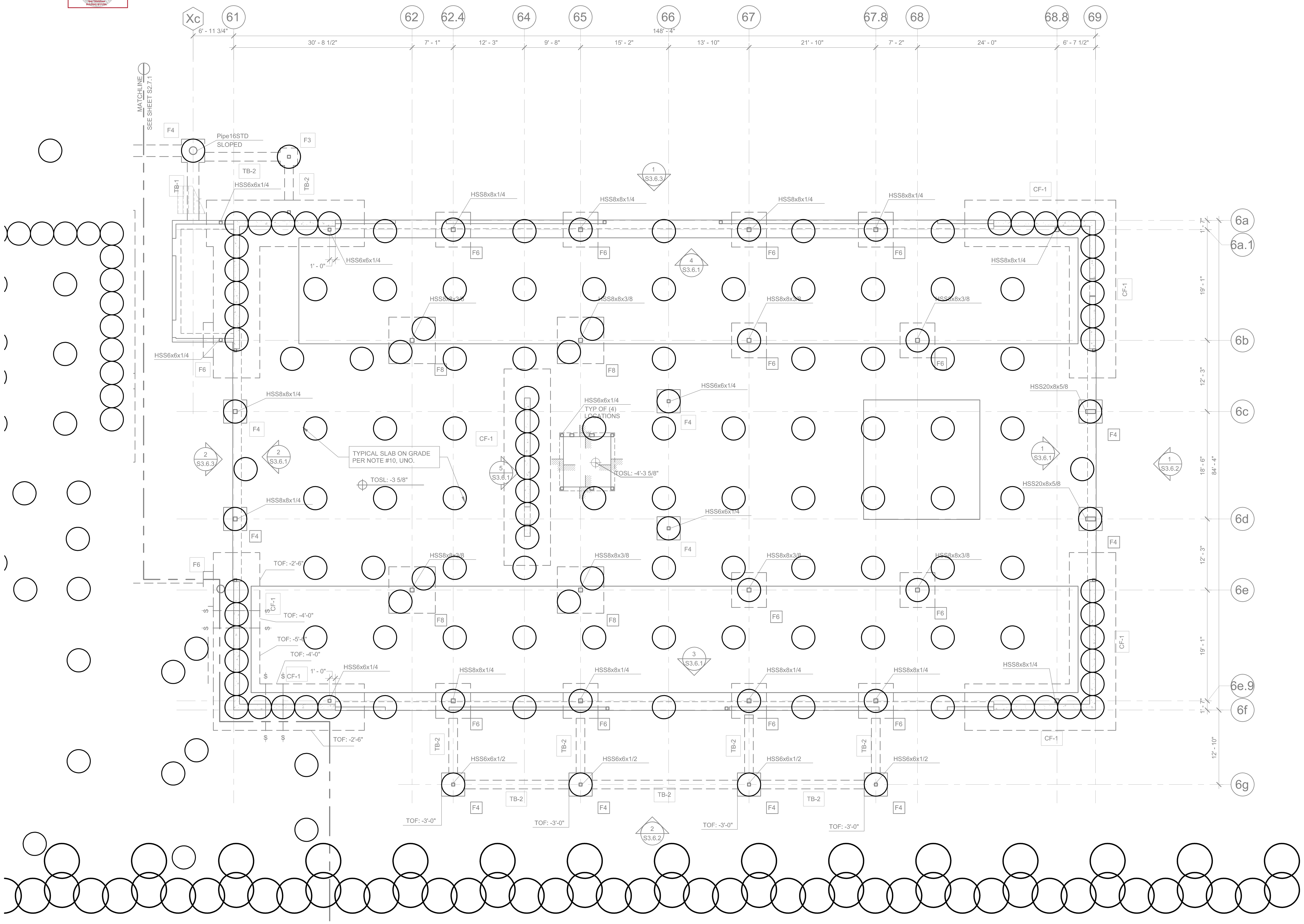
DEEP SOIL MIXING LAYOUT – BUILDING 1

PROJECT NO. –

DATE: 05/27/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.1



DSM COLUMN LAYOUT – BUILDING 6
SCALE: 1/8" = 1'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 4/9/2021 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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THOMAS TRAN
C 91763
REGISTERED PROFESSIONAL ENGINEER
CIVIL
STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 6

PROJECT NO. –
DATE: 05/27/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.2

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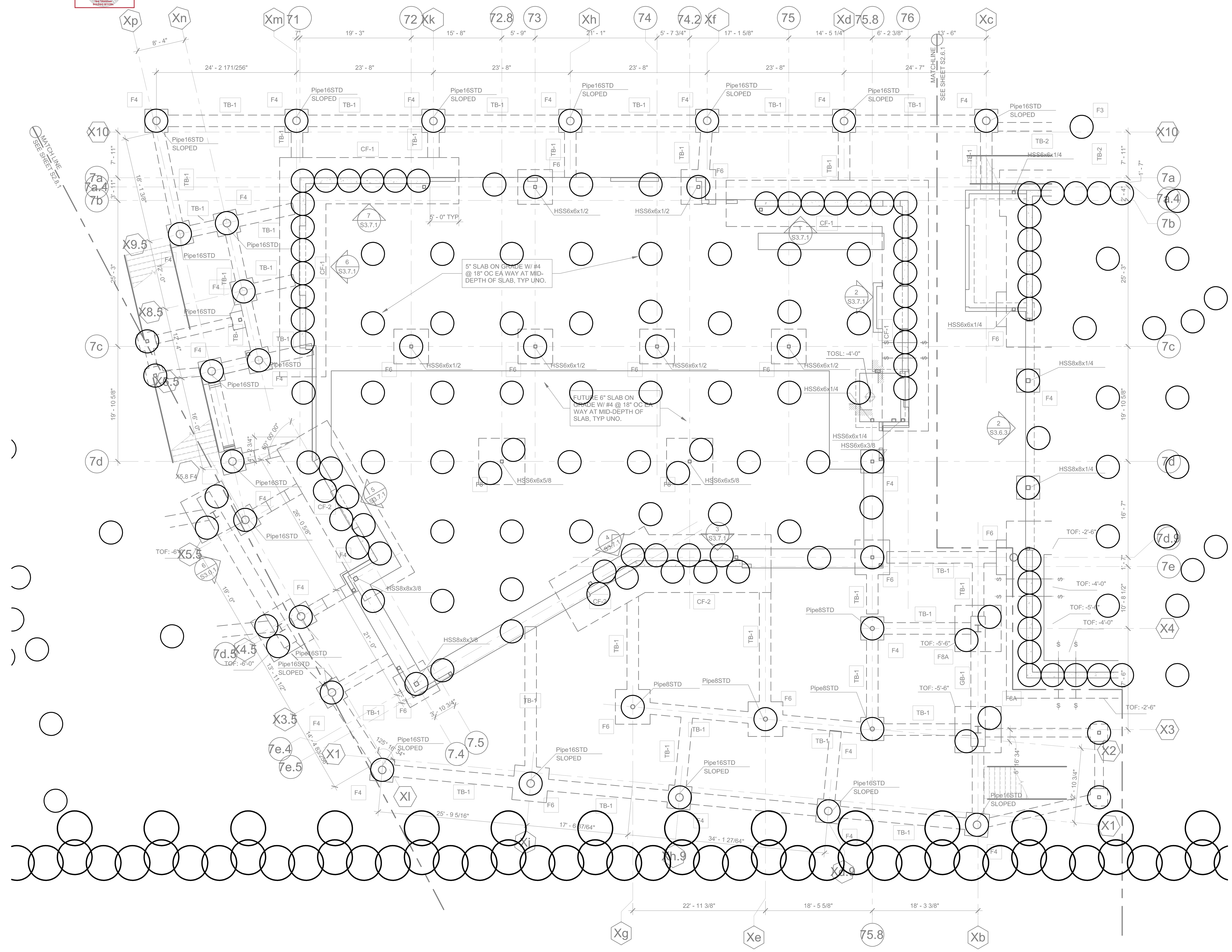

DSM COLUMN LAYOUT – BUILDING 7
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 7

PROJECT NO. –	SHEET NUMBER:
DATE: 05/27/2021	GI-4.3
SCALE: AS SHOWN	

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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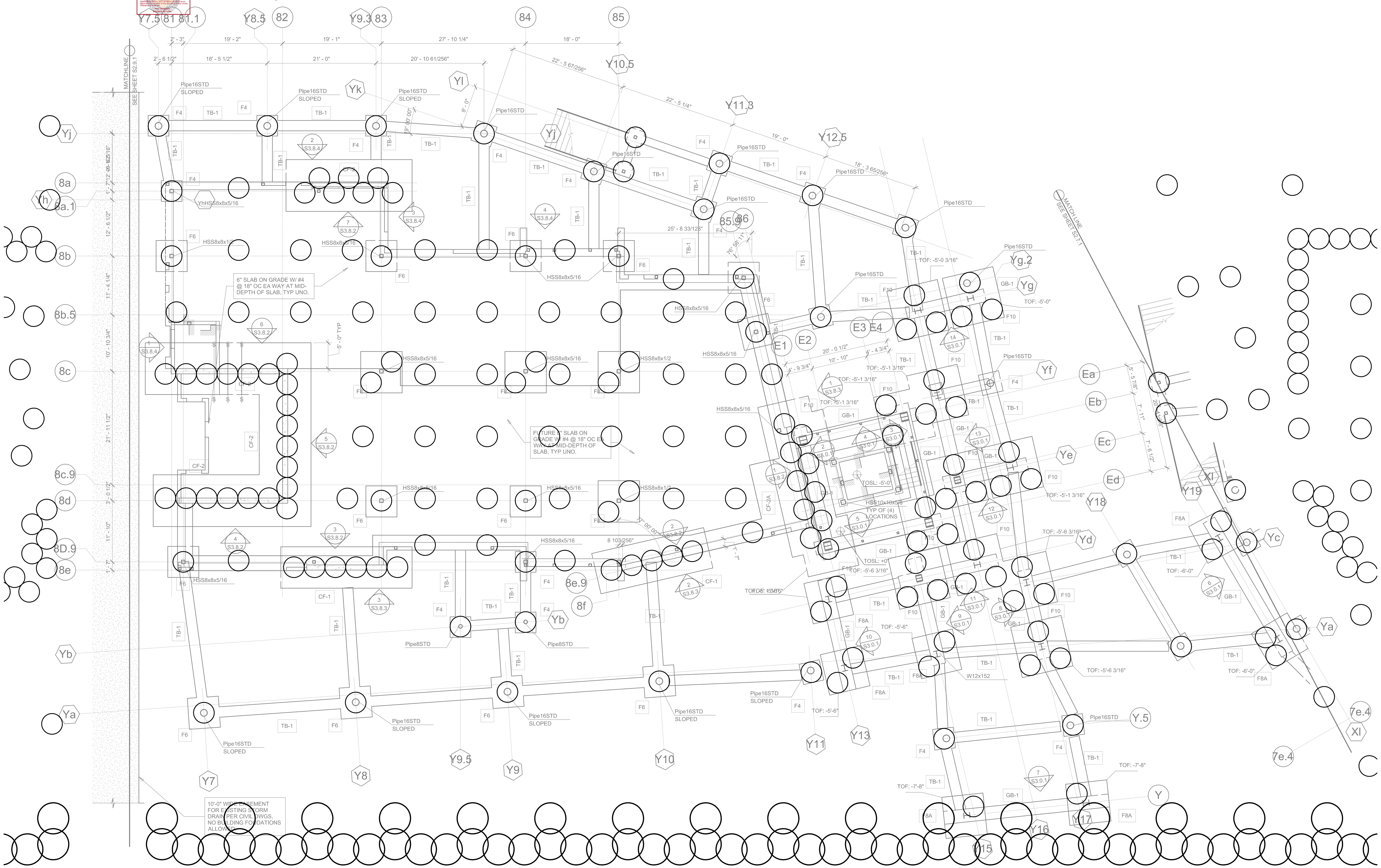

DSM COLUMN LAYOUT – BUILDING 8
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

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PROJECT:

GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 8

PROJECT NO. –
DATE: 05/27/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.4

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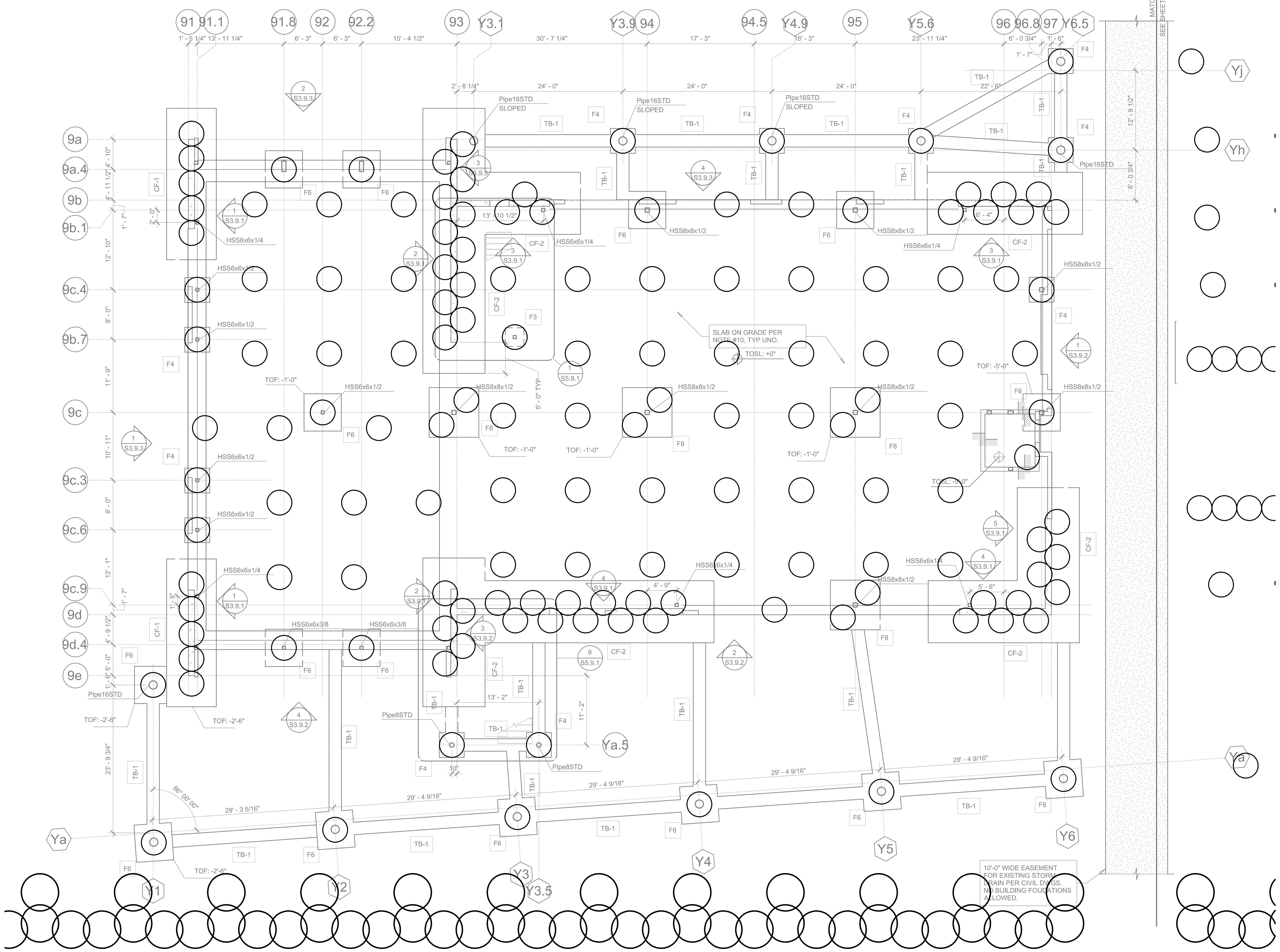

DSM COLUMN LAYOUT – BUILDING 9
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 9

PROJECT NO. –
DATE: 05/27/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.5

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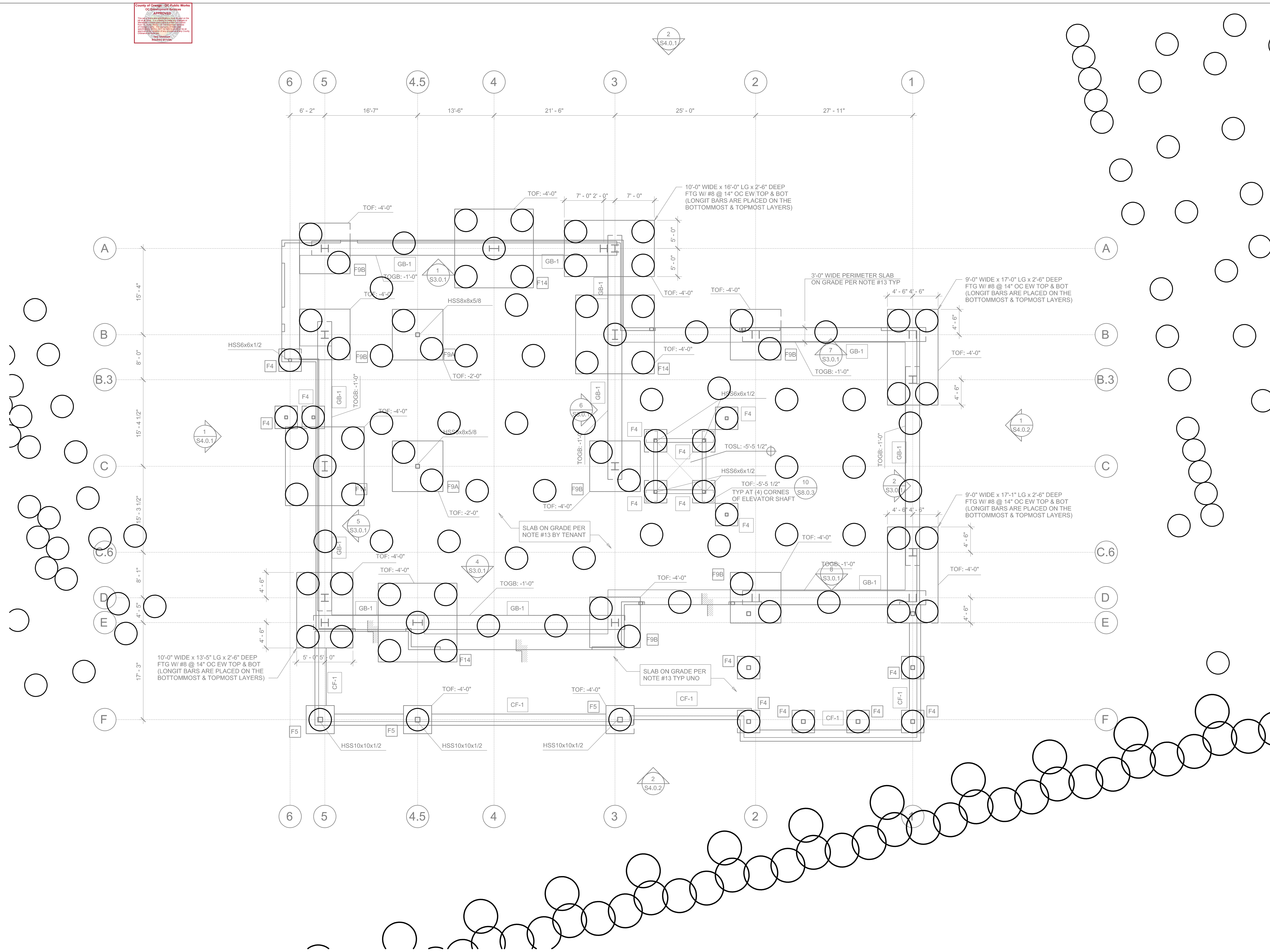

DSM COLUMN LAYOUT – BUILDING 10

SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:

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PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 10

PROJECT NO. –

SHEET NUMBER: GI-4.6

DATE: 05/27/2021

SCALE: AS SHOWN

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
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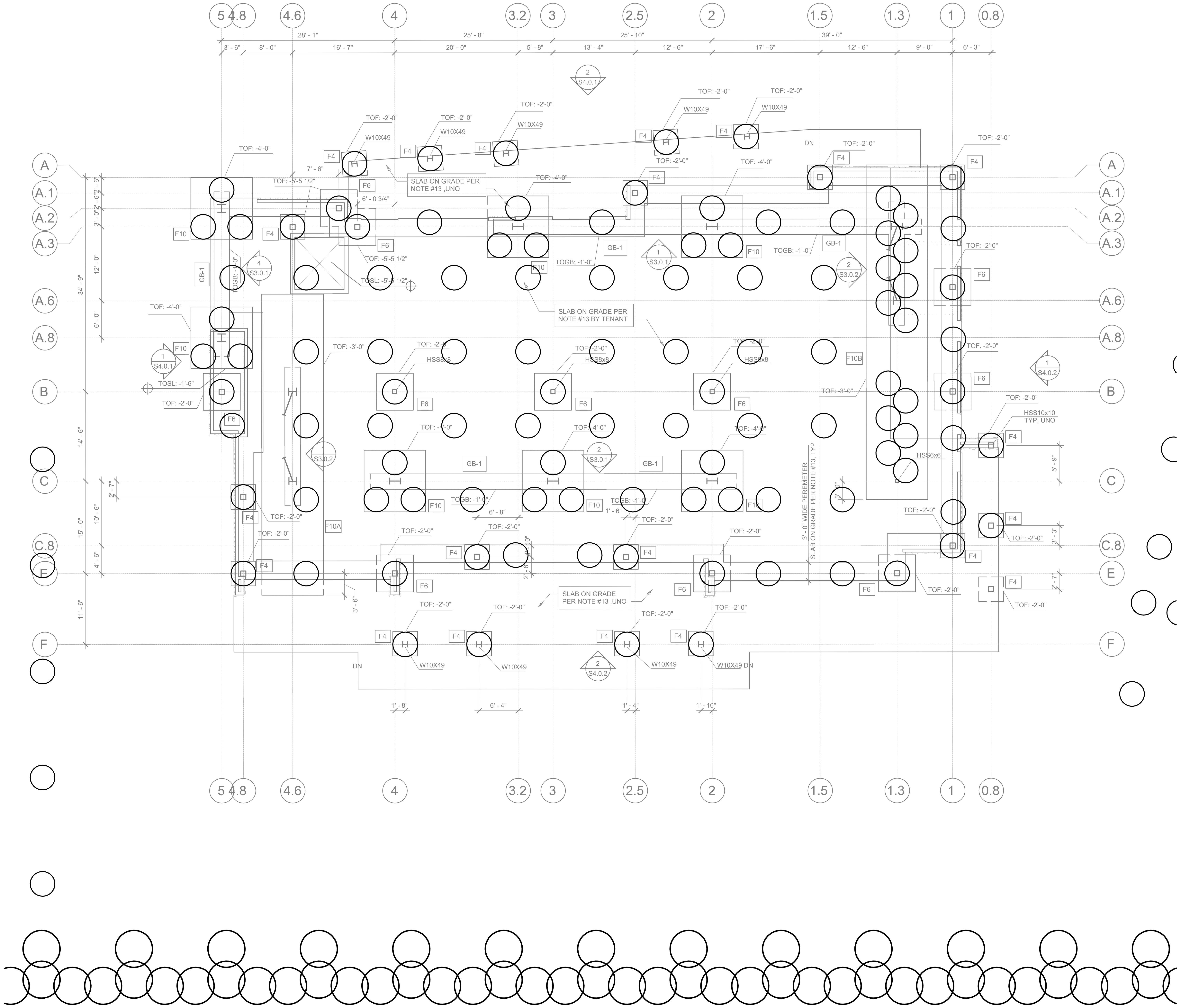

DSM COLUMN LAYOUT – BUILDING 11
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 11

PROJECT NO. –	SHEET NUMBER:
DATE: 05/27/2021	GI-4.7
SCALE: AS SHOWN	

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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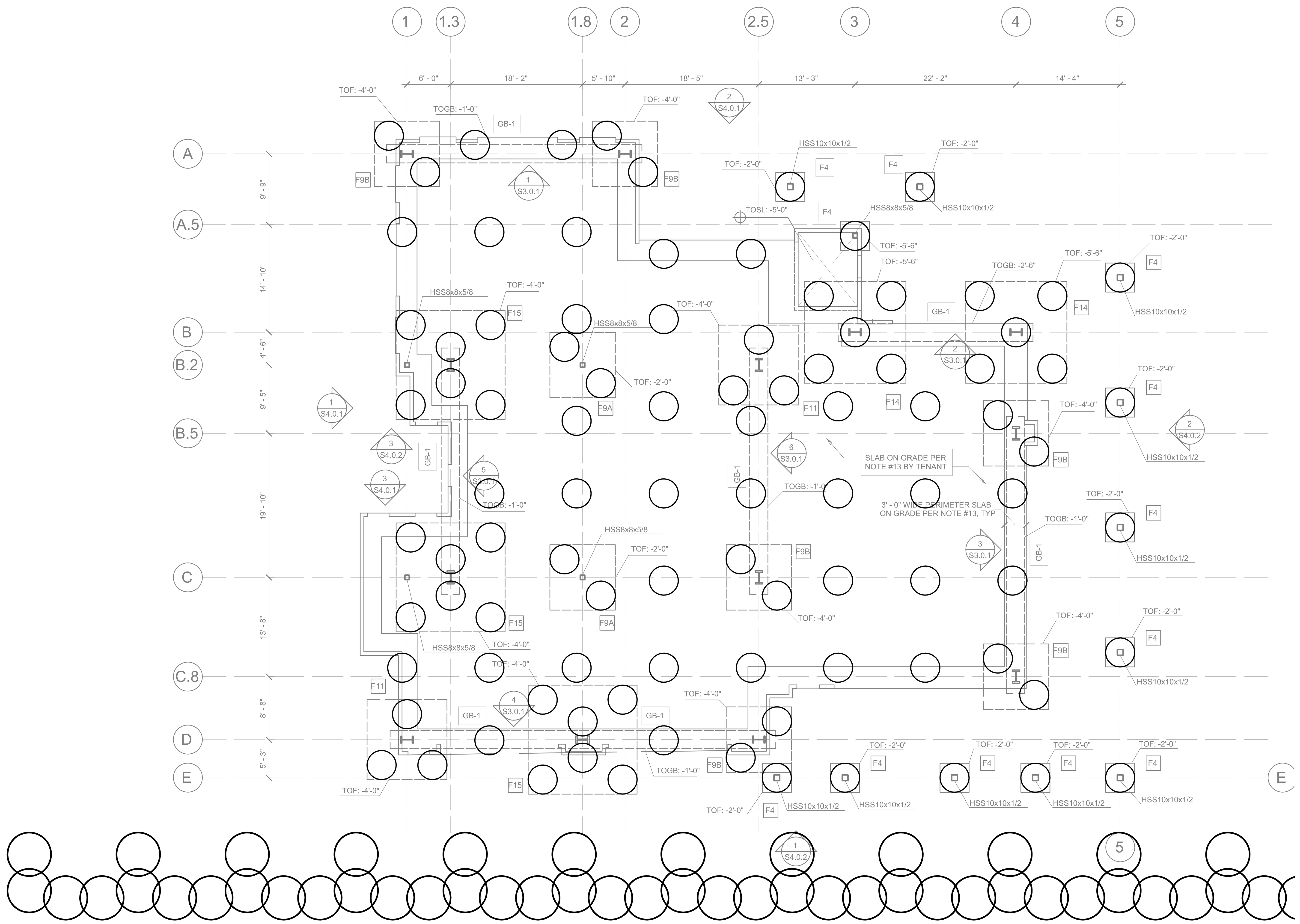

DSM COLUMN LAYOUT – BUILDING 12
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 4/12/2021 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 12

PROJECT NO.	SHEET NUMBER:
–	GI-4.8
DATE: 05/27/2021	
SCALE: AS SHOWN	

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

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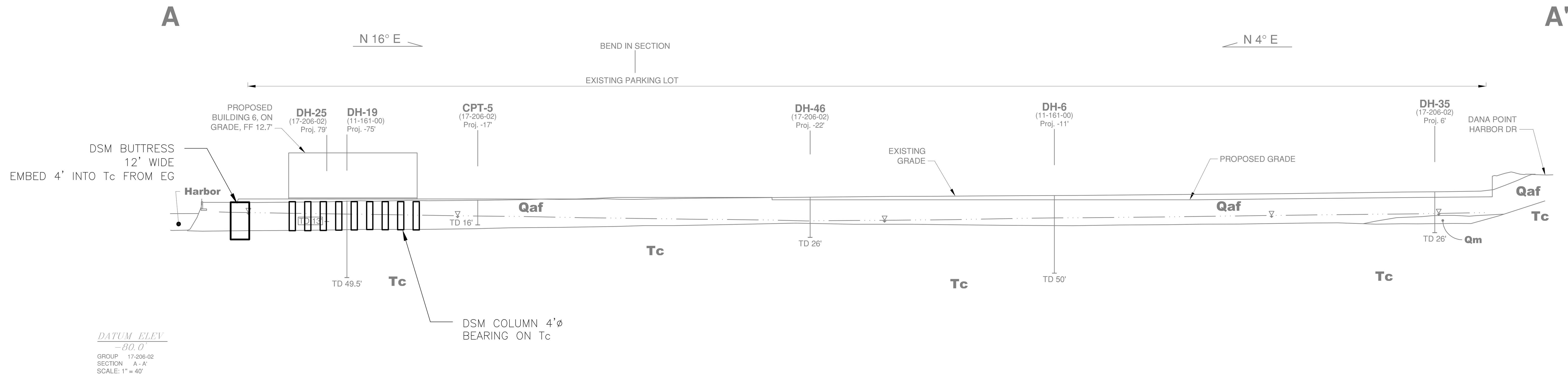
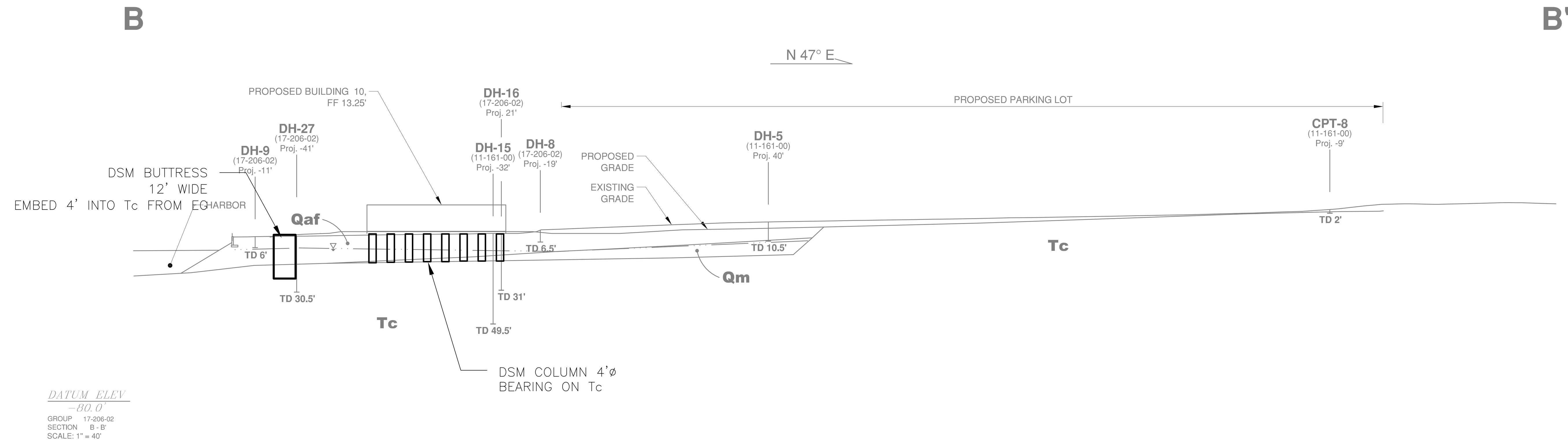
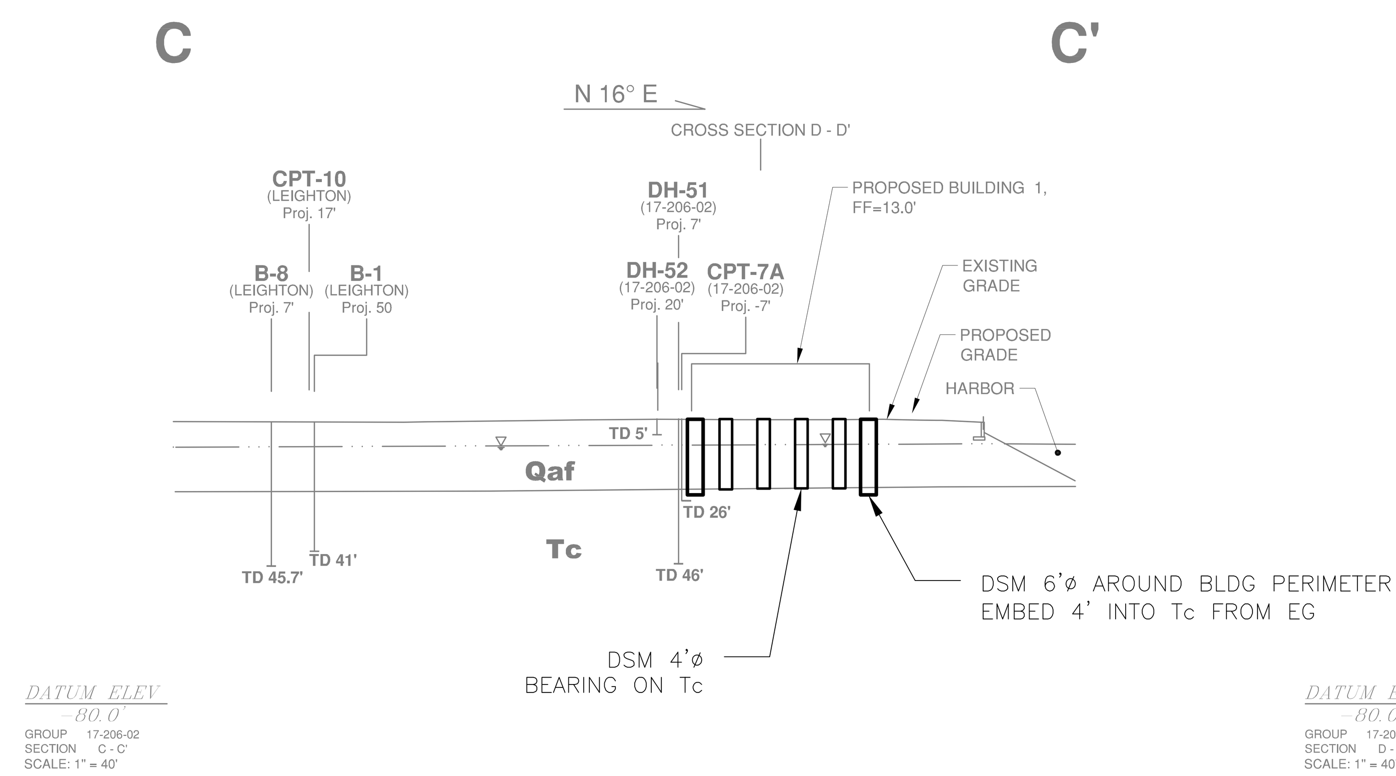
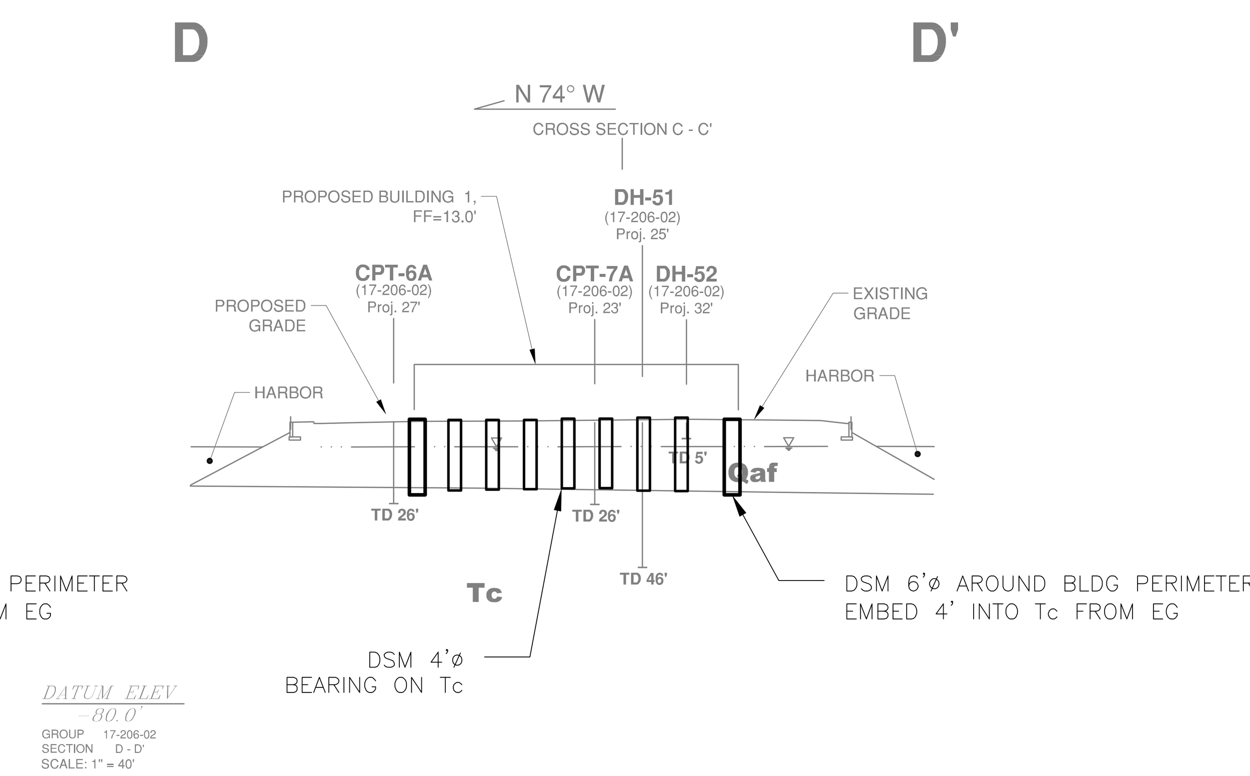
BUILDING OFFICIAL









ADVANCED GEOSOLUTIONS Inc.

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Lake Forest, CA 92630
Phone (310) 796-9000 | Fax (310) 796-9001
www.advgeosolutions.com

REVISIONS

NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

GEOTECHNICAL SECTIONS

PROJECT NO. –

SHEET NUMBER: GI-5

DATE: 05/27/2021

SCALE: AS SHOWN

S:\Leads\Dana Point Harbor (L19-1748)\AGI Takeoff\AGI_Sheet_DSM.dwg

APPENDIX B1

Pseudostatic Slope Stability Analysis

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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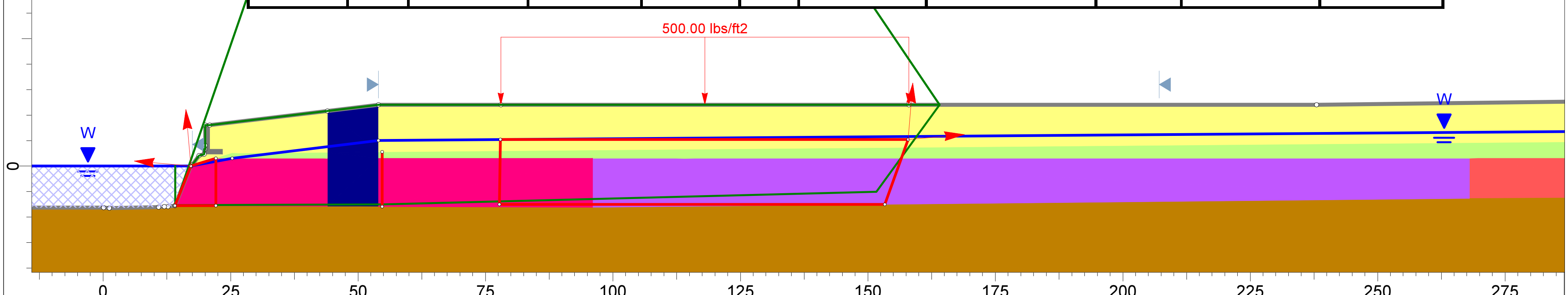
1.023

0.26

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Tensile Strength (psf)
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Automatically Calculated	0
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Automatically Calculated	0
Tc		125	Mohr-Coulomb	695	34			Water Surface	Automatically Calculated	
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Automatically Calculated	
Liquefied 1		125	Vertical Stress Ratio			0.17	0	Water Surface	Automatically Calculated	0
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Automatically Calculated	0
Liquefied 3		125	Vertical Stress Ratio			0.5	0	Water Surface	Automatically Calculated	0
DSM		125	Mohr-Coulomb	7200	0			Water Surface	Automatically Calculated	



Project	Dana Point Harbor		
Group	DSM_10ft	Scenario	kh=0.26 Block Search
Drawn By	TT	Company	AGI
Date		File Name	Section_Arev.slmd

SLIDEINTERPRET 9.012

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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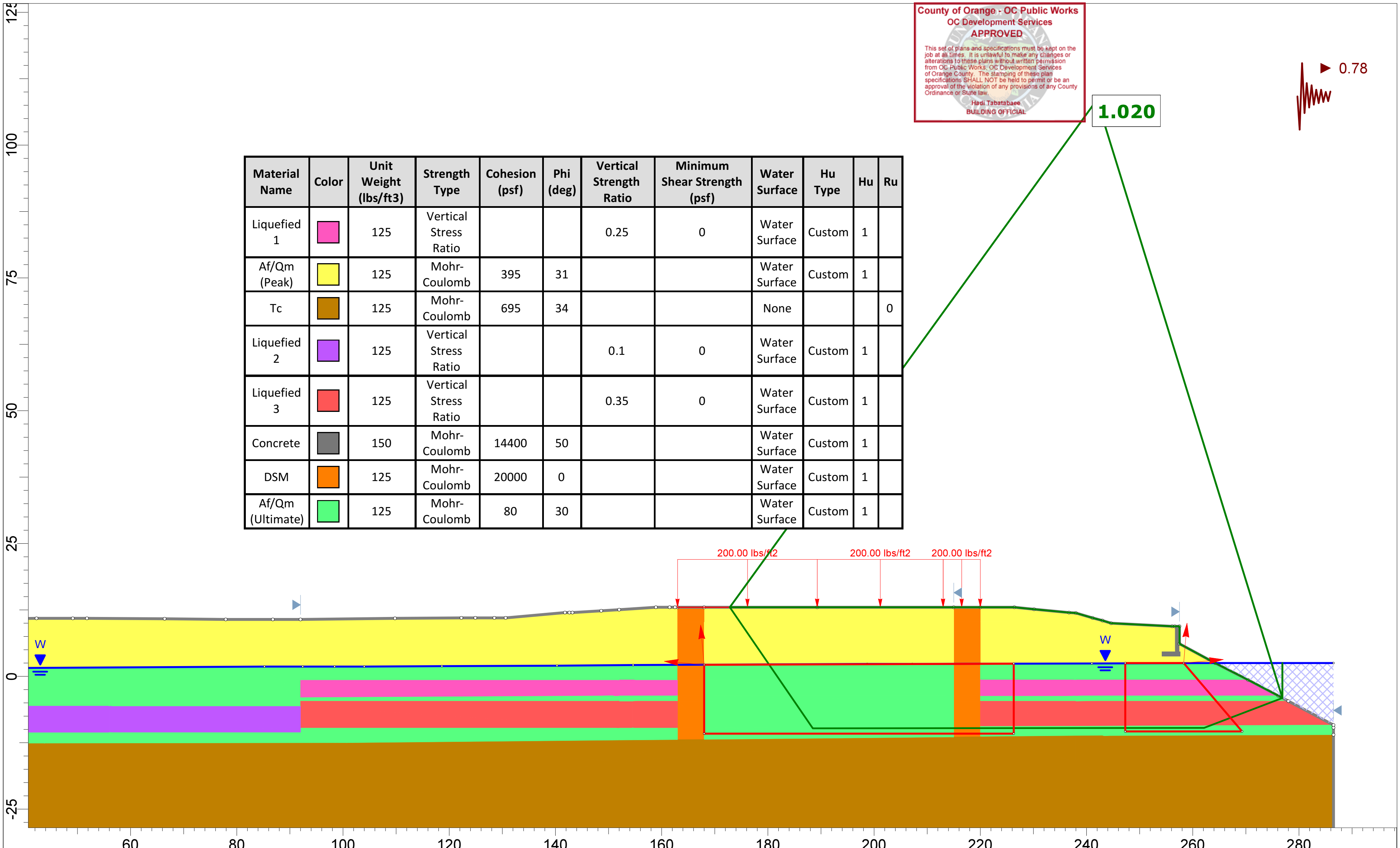

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu	Ru
Liquefied 1		125	Vertical Stress Ratio			0.25	0	Water Surface	Custom	1	
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1	
Tc		125	Mohr-Coulomb	695	34			None			0
Liquefied 2		125	Vertical Stress Ratio			0.1	0	Water Surface	Custom	1	
Liquefied 3		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1	
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1	
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1	
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1	

AGI™

SLIDEINTERPRET 9.012

Project	Dana Point Harbor		
Group	Group 1	*Scenario*	kh=0.78 Block Search
Drawn By	TT	*Company*	AGI
Date		*File Name*	Section_C.slmd

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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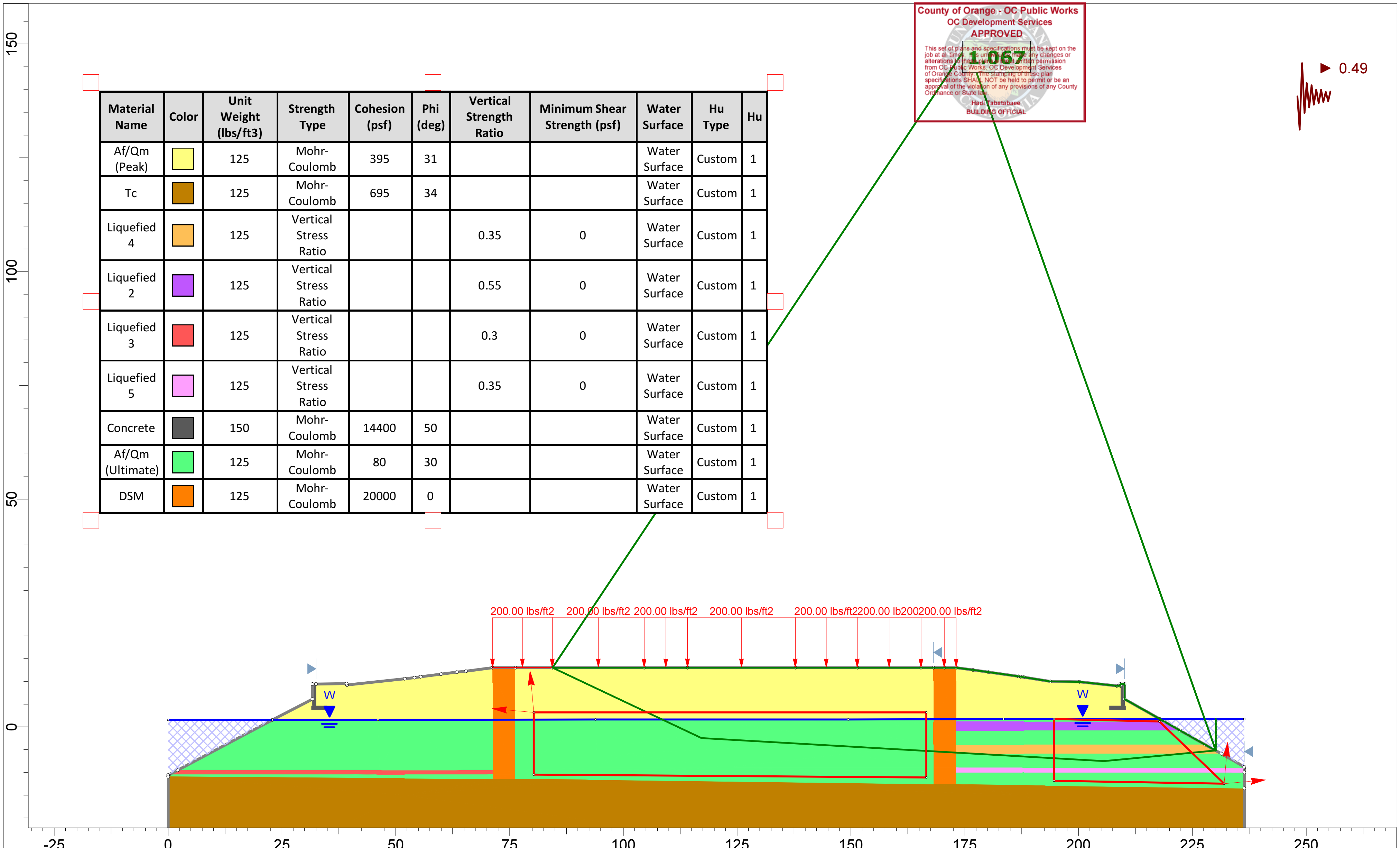
Hadi Tabatabaee
BUILDING OFFICIAL

1.067

0.49

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Af/Qm (Peak)		125	Mohr-Coulomb	395	31			Water Surface	Custom	1
Tc		125	Mohr-Coulomb	695	34			Water Surface	Custom	1
Liquefied 4		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Liquefied 2		125	Vertical Stress Ratio			0.55	0	Water Surface	Custom	1
Liquefied 3		125	Vertical Stress Ratio			0.3	0	Water Surface	Custom	1
Liquefied 5		125	Vertical Stress Ratio			0.35	0	Water Surface	Custom	1
Concrete		150	Mohr-Coulomb	14400	50			Water Surface	Custom	1
Af/Qm (Ultimate)		125	Mohr-Coulomb	80	30			Water Surface	Custom	1
DSM		125	Mohr-Coulomb	20000	0			Water Surface	Custom	1



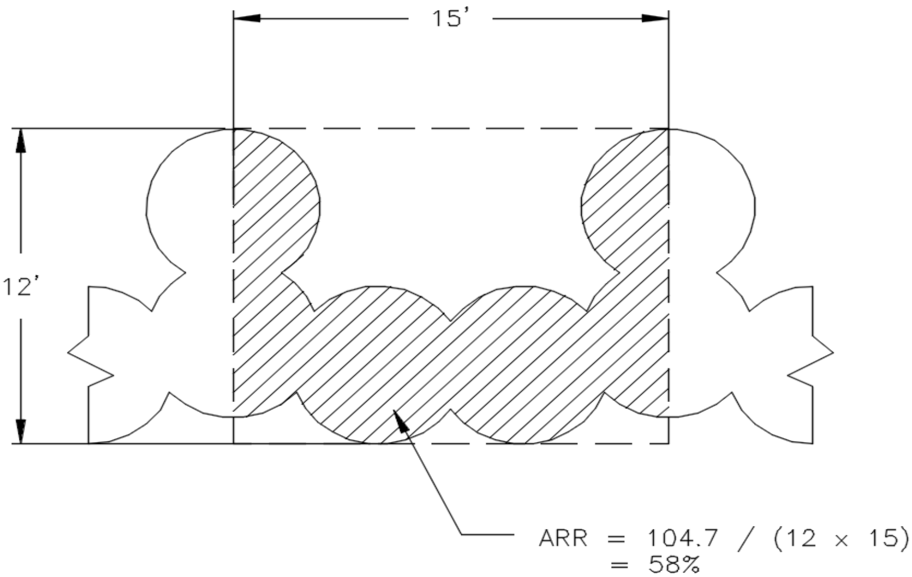
AGI™	Project	Dana Point Harbor	
	Group: Group 1	Scenario: kh=0.5 Block Search	
	Drawn By: TT	Company: AGI	
SLIDEINTERPRET 9.012	Date: 4/15/2021	File Name: Section_D.slmd	

APPENDIX B2

Composite Shear Strength of DSM Buttress

Determine composite shear strength of DSM buttress for use in pseudostatic slope stability anlysis
Lateral stread buttress

Geometry:



Input values:

ARR =	58%		Area replacement ratio
q_DSM28 =	150	psi	Design compressive strength of DSM at 28 days
fc =	2		Curing factor (long term)

Calculations:

q_DSM =	300	psi	Long term compressive strength of DSM for seismic condition
s_DSM =	150	psi	Shear strength of DSM = 1/2 compressive strength
=	21600	psf	
s_comp =	12528	psf	Composite shear strenght = s_DSM x ARR (Neglect shear strength of native soils)

Select conservative value of **7200 psf** to ensure strain compatibility

APPENDIX B3

Post-Improvement Slope Lateral Deformation

Seismic Displacement Calculation

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	**0.67**	g
Earthquake magnitude	M	**6.9**	
Spectral acceleration at 1 sec	S1	**0.45**	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	**0.26**	g
Correlated displacement in soils - West US region	d	**1.4**	inches

Seismic Displacement Calculation

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	0.67	g
Earthquake magnitude	M	6.9	
Spectral acceleration at 1 sec	S1	0.45	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1)+2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1-k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	0.49	g
Correlated displacement in soils - West US region	d	**0.1**	inches

Seismic Displacement Calculation

Reference: NCHRP 611

Inputs

PGA modified for site class	k_max	**0.67**	g
Earthquake magnitude	M	**6.9**	
Spectral acceleration at 1 sec	S1	**0.45**	g

Calculated

$$\ln(\mathrm{PGV}) = 3.97 + 0.94\ln(S_1) + 0.013\left(\ln(S_1) + 2.93\right)^2 + 0.063M \qquad (5\text{-}9)$$

Peak ground velocity	PGV	41.0	cm/s
		16.1	in/s

WUS-Soil:

$$\log(d) = -1.56 - 0.72\log(k_y/k_{\max}) + 3.21\log(1 - k_y/k_{\max}) - 0.87\log(k_{\max}) + 1.62\log(\mathrm{PGV}) \qquad (5\text{-}5)$$

Yield acceration from pseudo static analysis	k_y	**0.78**	g
Correlated displacement in soils - West US region	d	**0.0**	inches

APPENDIX B4

Internal Stability Analysis

DSM Internal Stability Design Calculations - Per FHWA (2013)

Input Parameters		
DSM Panel height (H_dm)=	24	ft
DSM Panel Width (B)=	12	ft
Panel Effective Width (b)=	5.2	ft
Chord Length (c)=	3.3	ft
s_shear=	15	ft
Replacement Ratio (a_s,shear) =	0.347	
Panel Bottom Ele. =	-12	ft
G.W. Ele. =	5	ft
Soil below DSM panel tip:		
Cohesion (C_m) =	695	psf
Friction angle (Phi_m)=	34	deg
Effective Unit Weight=	62.6	pcf
Soil above DSM panel tip:		
Effective Unit Weight=	62.6	pcf
DSM Strength (28 days) =	150	psi
DSM Strength (1 year) =	300	psi
DSM Panel Unit Weight=	125	pcf
Lateral Seismic Coefficient (k_h) =	0.19	g
P_ae =	23,959	lbs/ft
h_a=	8.0	ft
P_p (Rankin or Coulomb Methods)=	31,411	lbs/ft
h_p=	2.5	ft
Va=	7,188	lbs/ft
Vp=	9,423	lbs/ft

Force Calculations		
Panel Weight (W)=	36000	lbs/ft
Buoyancy Force (U)=	12,730	lbs/ft
Inertial Load on Panel (Fa)=	6840	lbs/ft
T=	22528	lbs/ft
N=	33,764	lbs/ft
N'=	21,035	lbs/ft
x_N=	3.17	ft
x_N'=	1.46	ft

Combined Overturning and bearing capacity failure		
q_toe=	**24,438**	psf
N'c=	**42.2**	
N'q=	**29.4**	
N'_gamma (Vesic 1975)=	**41.1**	
q_all =	**80,218**	psf
Is Demand < Allowable?	**DESIGN OK**	

Crushing of DSM Panel at the outside toe		
q_toe=	**24,438**	psf
fv=	**0.95**	
Fc=	**1.3**	
S_dm	21600	psf
Vertical Eff. Pressure at the toe ele	**1689**	psf
q_all =	**32,414**	psf
Is Demand < Allowable?	**DESIGN OK**	

Racking Failure Mode		
T_v=	**905**	psf
fv=	**0.95**	
Fv=	**1.3**	
Tv_all=	**3,494**	psf
Is Demand < Allowable?	**DESIGN OK**	

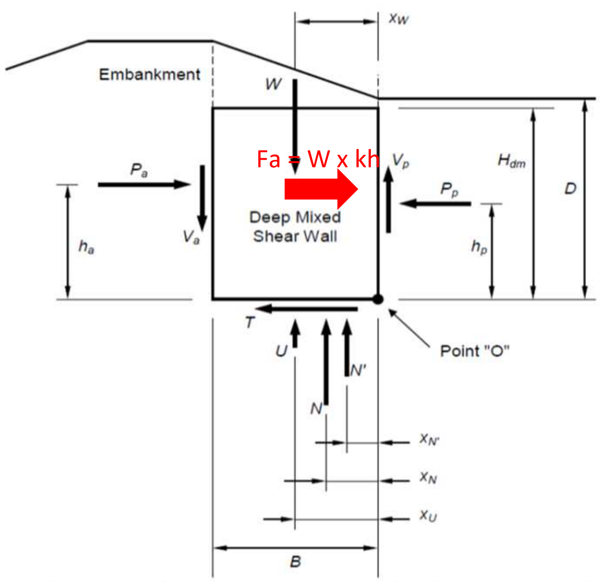


Figure 51. Illustration. Definition sketch for combined overturning and bearing calculations.

Check internal shear

Shear force	46000	lbs/ft	(Given)
Panel spacing	15	ft	
DSM section area per panel	104.7	sf	(Per 15' of length, and including continuous front row)
DSM compressive strength	150	psi	
Available shear strength	75	psi	
Shear stress	46	psi	
Factor of savefy	1.64		OK

APPENDIX C1

DSM Column Structural Capacity

Structural Capacity of 4ft dia. DSM column - Static Condition

Column Diameter=	**4.0**	
F.S.=	**1.5**	
UCS, 28-day strength (psi)=	**150**	
Curing Factor (fc) =	**1.00**	28-day strength
Confining Pressure effects =	**1**	
UCS, 90-day strength (psi)=	**150**	
Allowable pressure (psf)	14400	
Allowable load (kips)	181.0	
Max. Demand - ASD Level (kips)	**180**	
Is Capacity >= Demand?	Yes	

Structural Capacity of 4ft dia. DSM column - Post Liquefaction

Column Diameter=	**4.0**	
F.S.=	**1.3**	
UCS, 28-day strength (psi)=	**150**	
Curing Factor (fc) =	**2.00**	365-day strength
Confining Pressure effects =	**1**	
UCS, 365-day strength (psi)=	**300**	
Allowable pressure (psf)	33231	
Allowable load (kips)	417.6	
Max. Demand - ASD Level (kips)	**308**	including 128k downdrag
Is Capacity >= Demand?	Yes	

APPENDIX C2

DSM Column Geotechnical Capacity

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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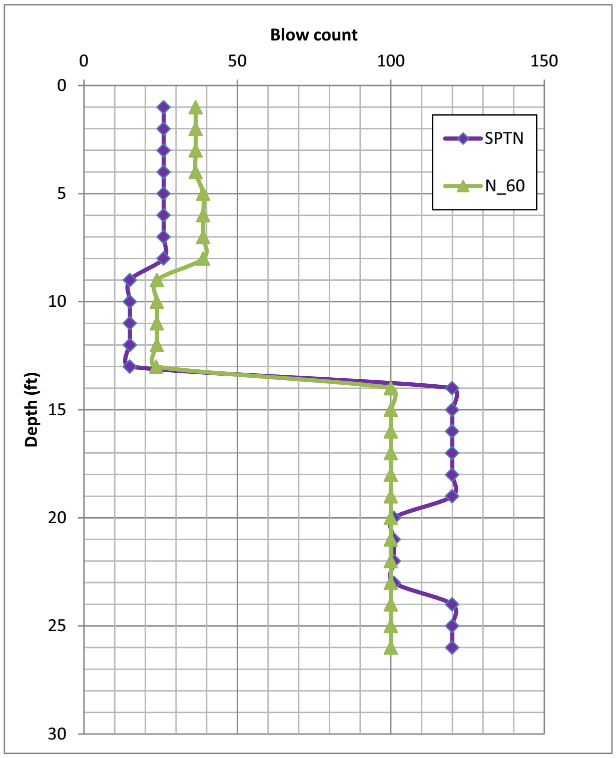
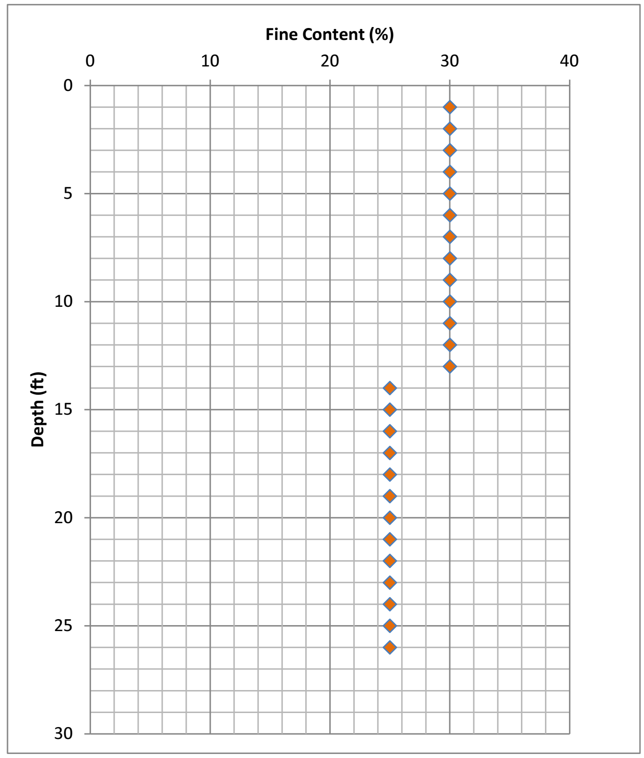
Hadi Tabatabaee
BUILDING OFFICIAL

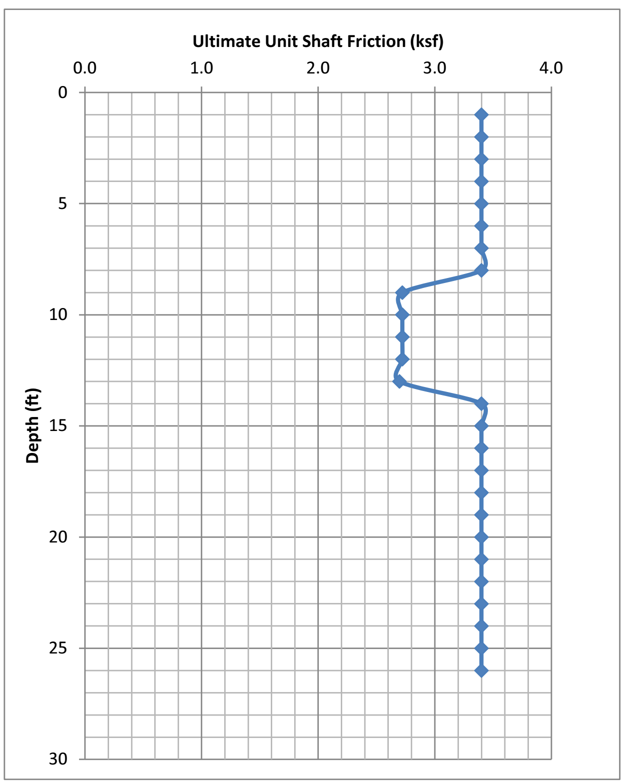
DSM GEOTECHNICAL CAPACITY

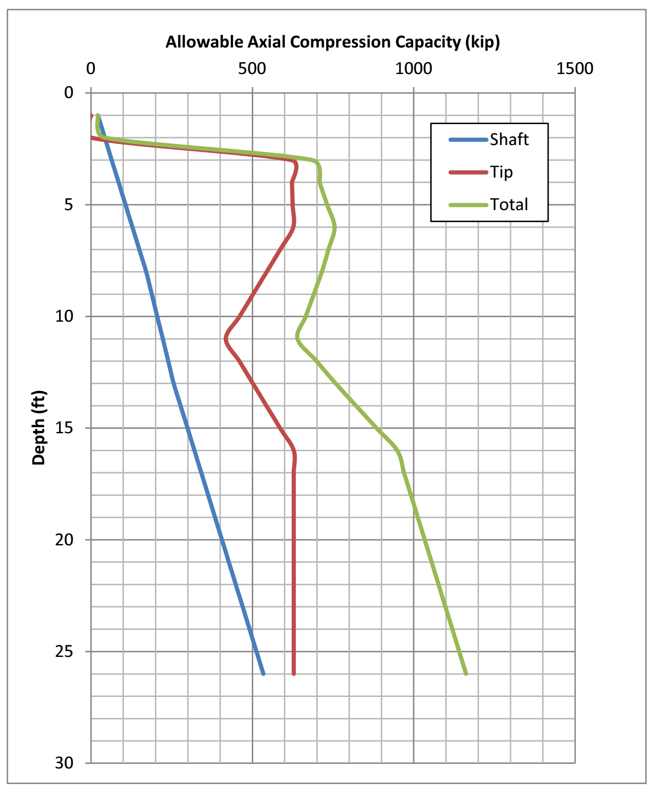
PROJECT INFORMATION Version 1.0

Project Name: Dana Point Date 01/08/21
Borehole Number: (11-161-00) DH-17
Project Number: N/A
Drawing ref:
Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

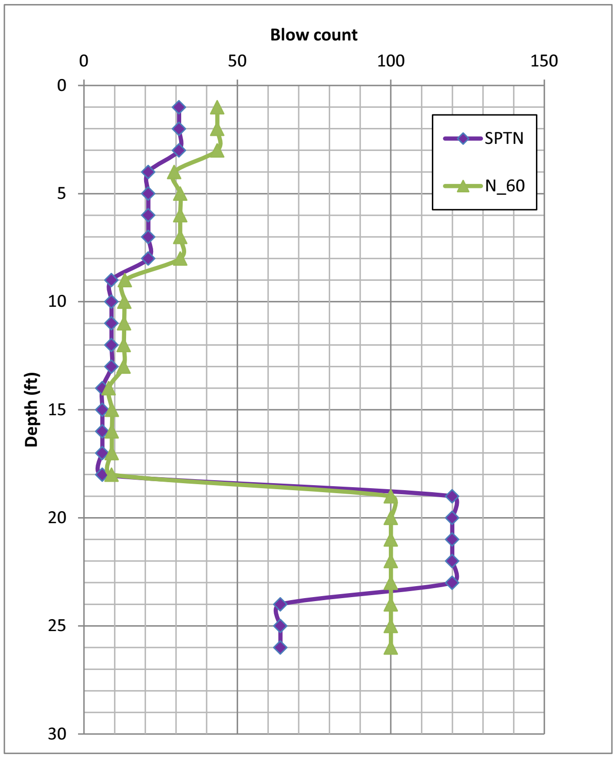
Date 01/08/21

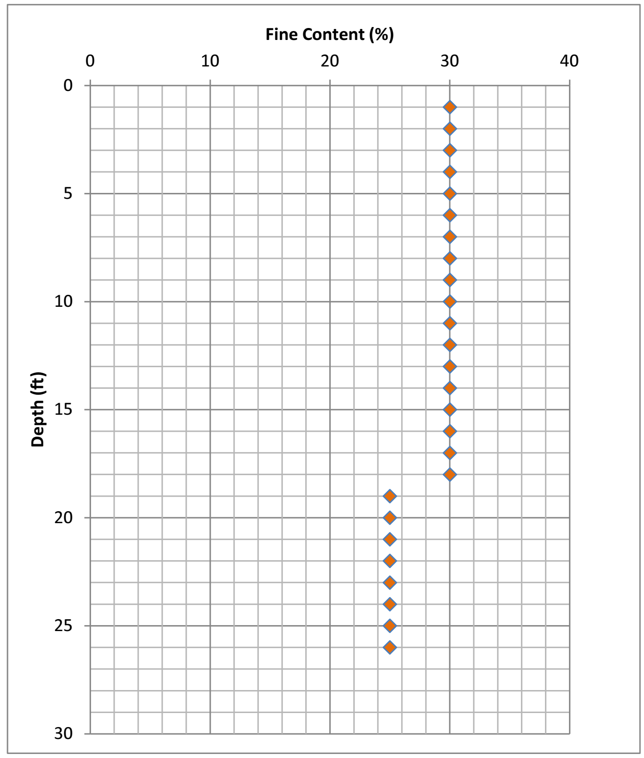
Borehole Number: (11-161-00) DH-19

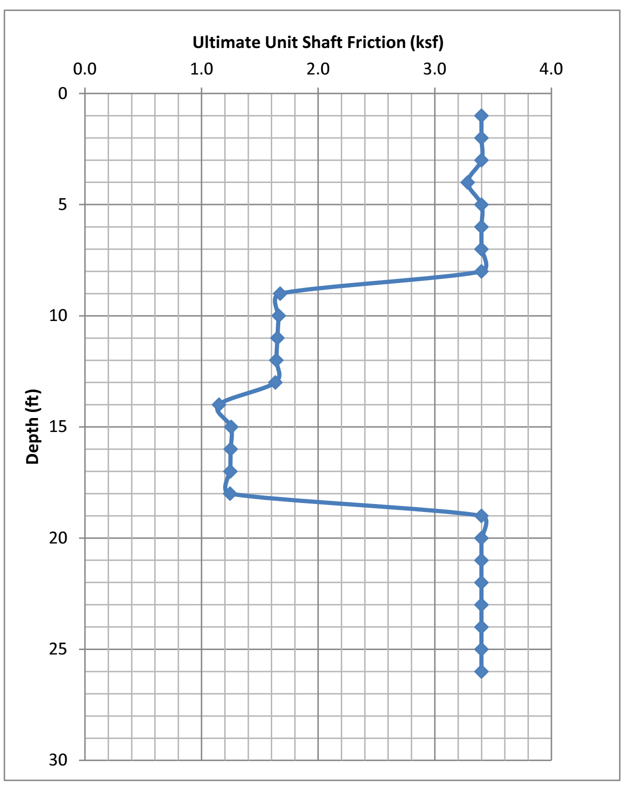
Project Number: N/A

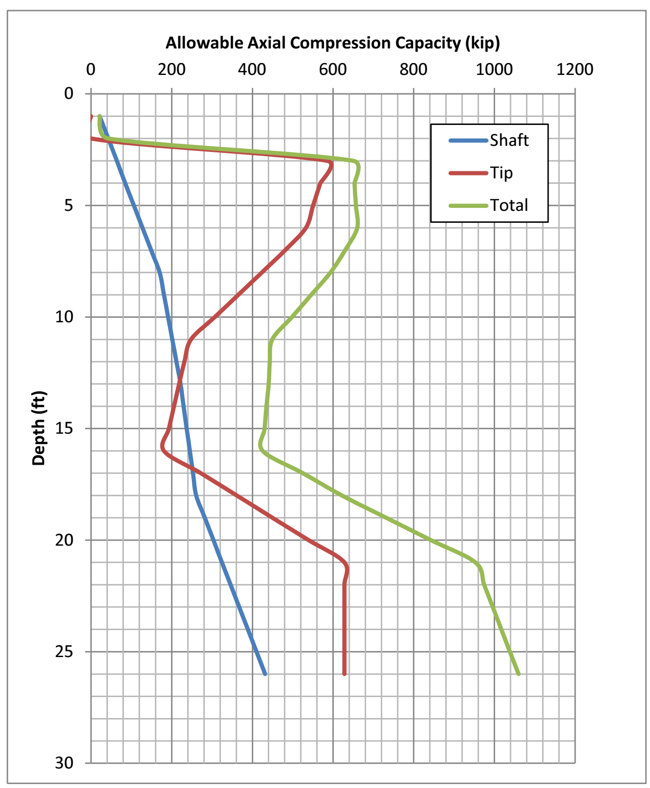
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

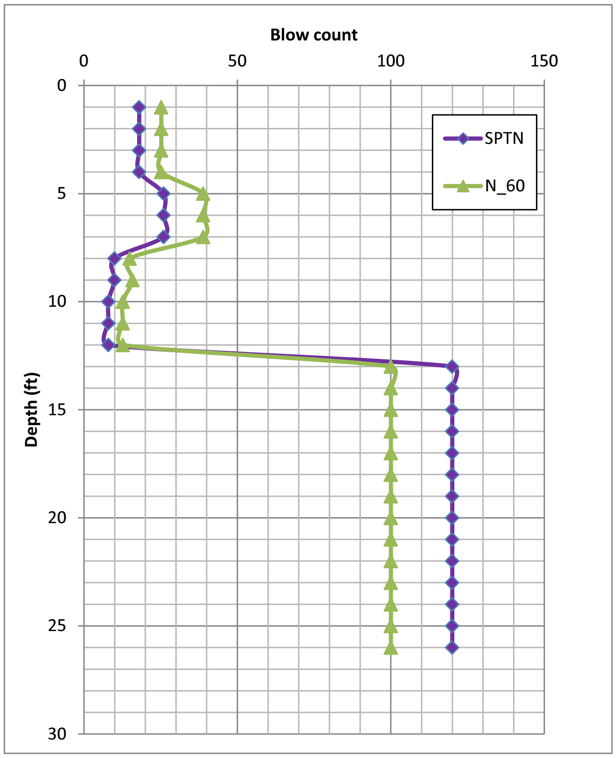
Date 01/08/21

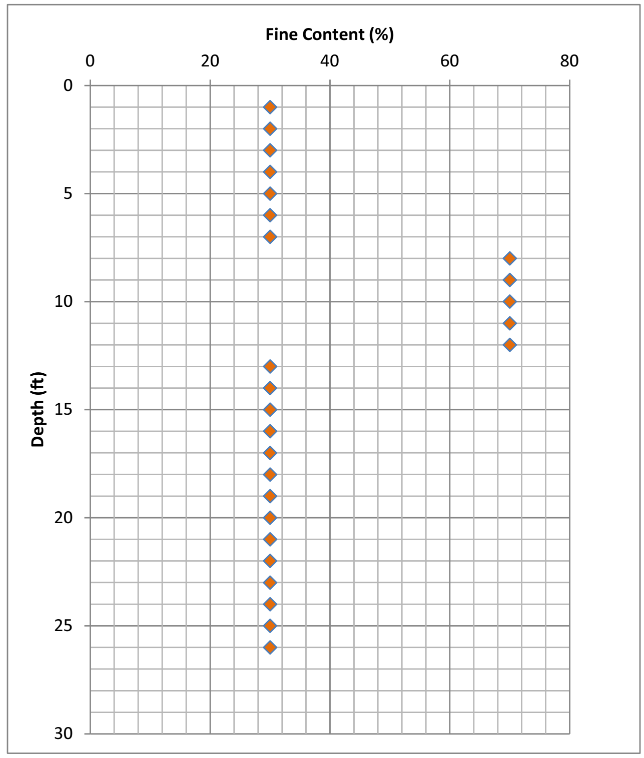
Borehole Number: (17-206-02) DH-25

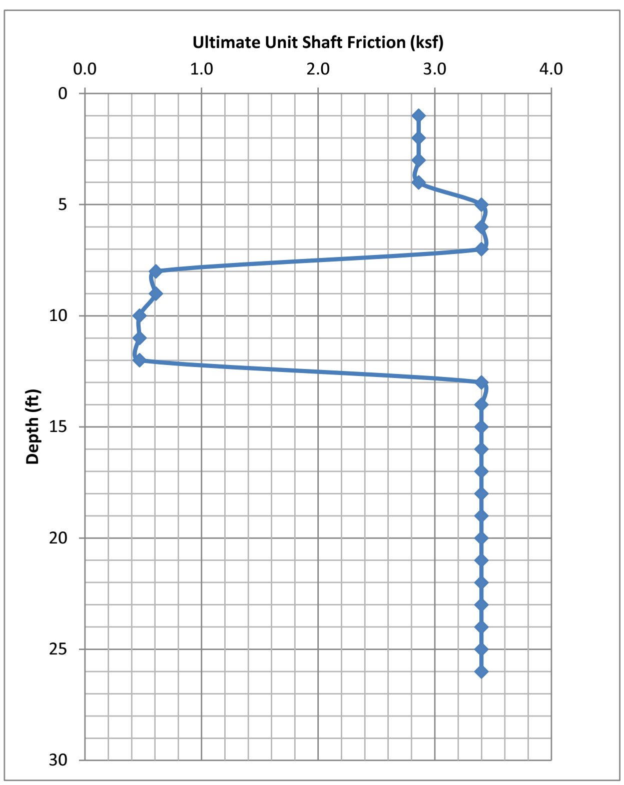
Project Number: N/A

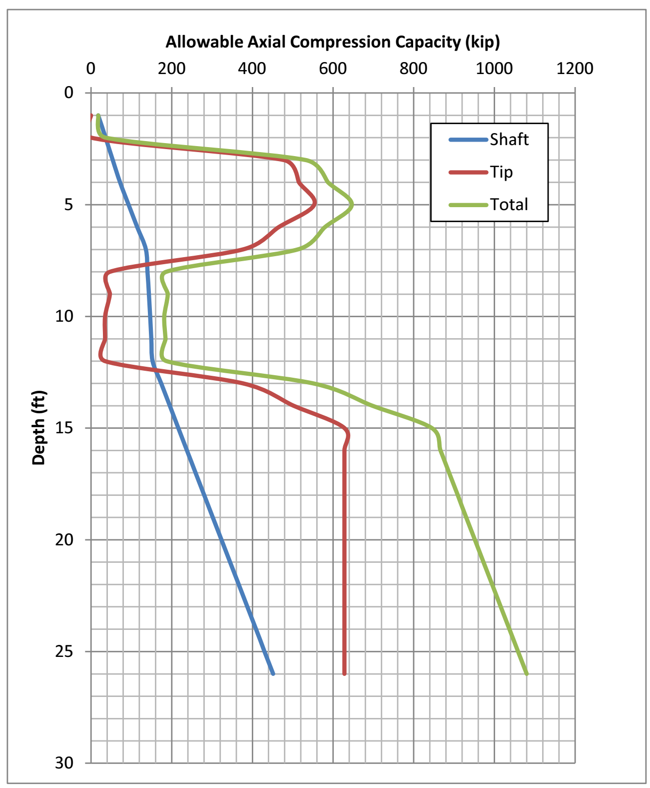
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

DSM GEOTECHNICAL CAPACITY

PROJECT INFORMATION

Version 1.0

Project Name: Dana Point

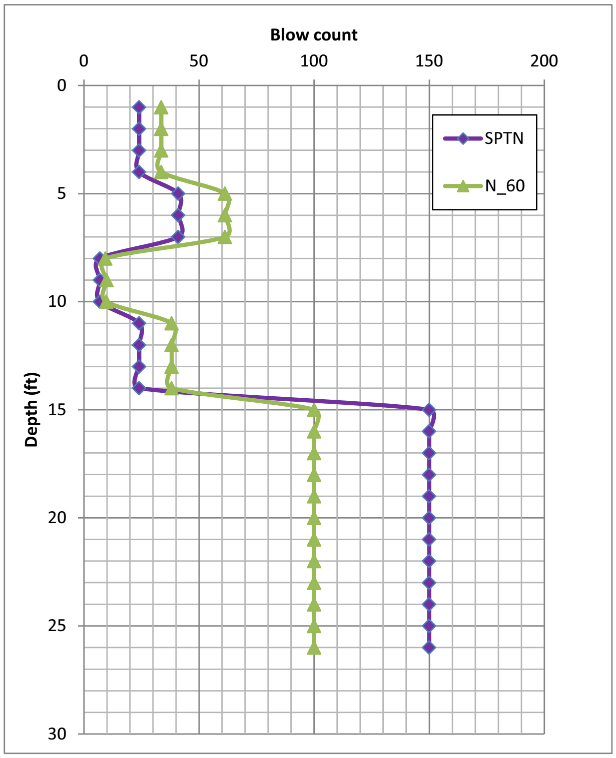
Date 01/08/21

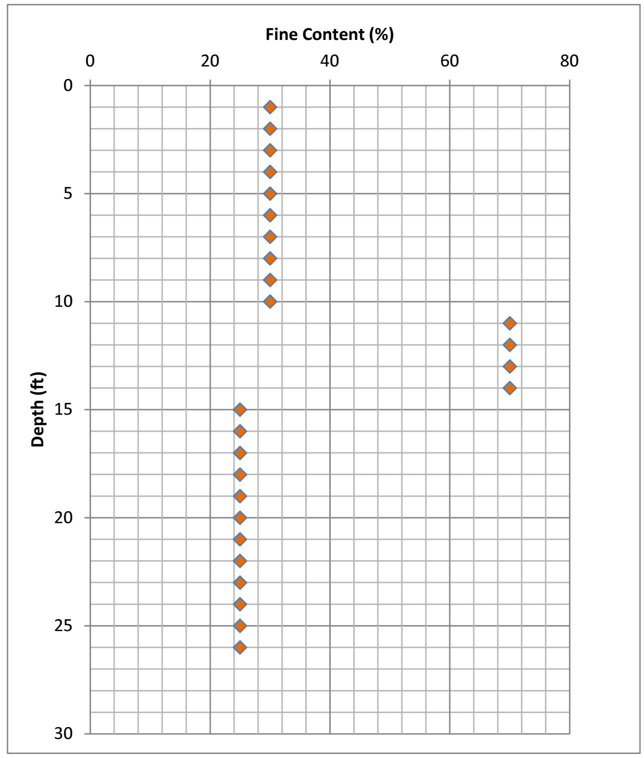
Borehole Number: (17-206-02) DH-26

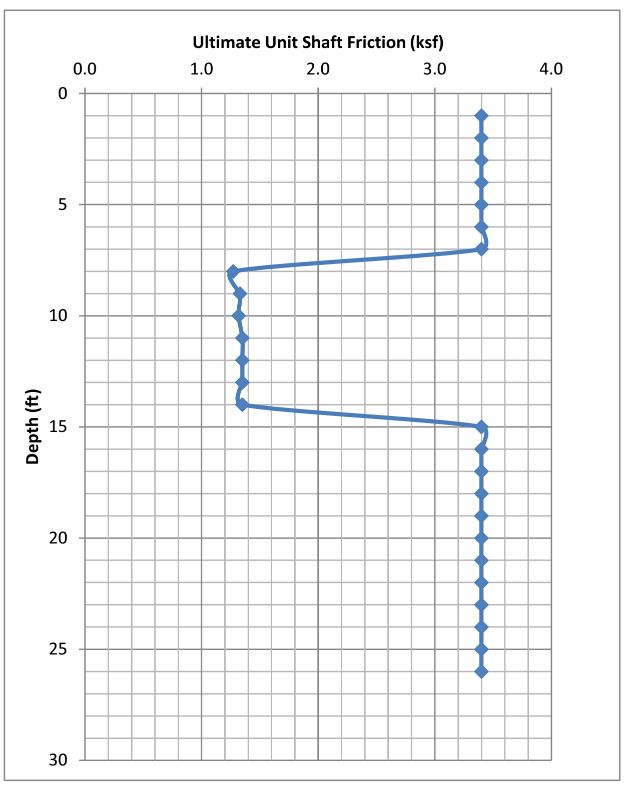
Project Number: N/A

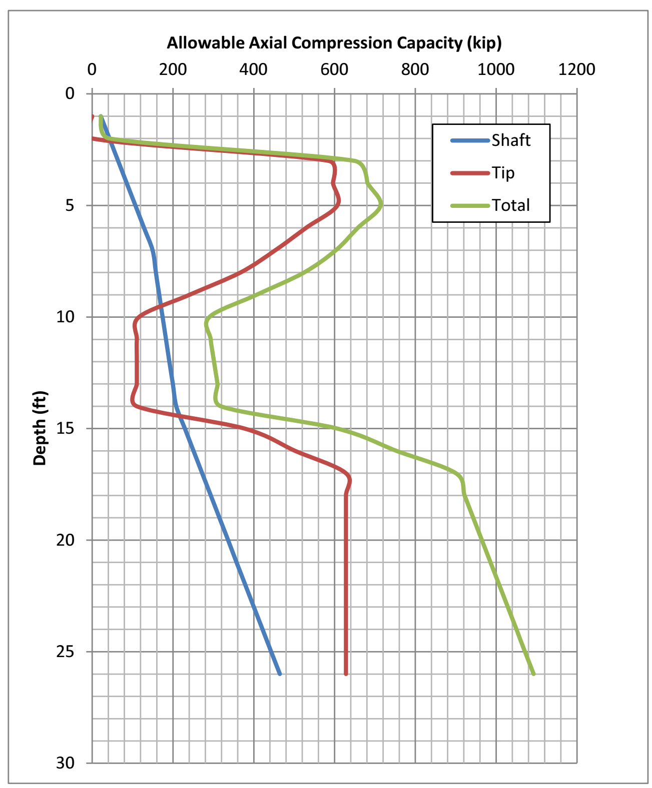
Drawing ref:

Calculation By: **Thomas Tran** Reviewed By: **Justin Martos**









APPENDIX C3

DSM Column Settlement

Tzpile Analysis Information

Project Summary

File Name DPH DSM 4ft.rspile
File Version 0.000

Project Title Dana Point Harbor
Analysis DSM 4ft
Date Created 10/25/2018, 8:32:35 AM

Results

Axial Force vs Settlement

Pile Head Axial Force (lbs)	Pile Head Settlement (in)	Pile Toe Axial Force (lbs)	Pile Toe Settlement (in)
200000.00	0.48	81394.78	0.02

Axial Displacement, Axial Force

Axial Displacement, Axial Force

Soil Layer #	Pile Depth (ft)	Axial Displacement (in)	Axial Force (lbs)
1	-0.00	0.477455	200000.0000
1	0.20	0.47156	199985.3497
1	0.40	0.465667	199941.3987
1	0.60	0.459775	199868.1472
1	0.80	0.453886	199765.5950
1	1.00	0.448	199633.7422
1	1.20	0.442119	199472.5887
1	1.40	0.436242	199282.1347
1	1.60	0.430372	199062.3800
1	1.80	0.424509	198813.3247
1	2.00	0.418653	198534.9687
1	2.20	0.412806	198227.3122
1	2.40	0.406969	197890.3550
1	2.60	0.401142	197524.0973
1	2.80	0.395326	197128.5389
1	3.00	0.389522	196703.6799
1	3.20	0.383732	196249.5203
1	3.40	0.377955	195766.0602
1	3.60	0.372192	195253.2994
1	3.80	0.366446	194711.2381
1	4.00	0.360715	194139.8762
1	4.20	0.355002	193539.2138
1	4.40	0.349307	192909.2508
1	4.60	0.343631	192249.9873
1	4.80	0.337975	191561.4233
1	5.00	0.33234	190843.5588
1	5.20	0.326726	190096.3938
1	5.40	0.321135	189319.9283

1	5.60	0.315567	188514.1624
1	5.80	0.310023	187679.0960
1	6.00	0.304504	186814.7292
1	6.20	0.299011	185921.0621
1	6.40	0.293545	184998.0946
1	6.60	0.288107	184045.8267
1	6.80	0.282697	183064.2586
1	7.00	0.277316	182053.3901
1	7.20	0.271966	181013.2215
1	7.40	0.266647	179943.7526
1	7.60	0.26136	178844.9835
1	7.80	0.256105	177716.9143
1	8.00	0.250884	176559.5450
1	8.20	0.245698	175372.8756
1	8.40	0.240547	174156.9062
1	8.60	0.235432	172911.6369
1	8.80	0.230355	171637.0676
1	9.00	0.225316	170333.1984
1	9.20	0.220315	169000.0293
1	9.40	0.215354	167637.5605
1	9.60	0.210434	166245.7920
1	9.80	0.205555	164824.7237
1	10.00	0.200718	163374.3559
1	10.20	0.195925	161894.6885
1	10.40	0.191176	160385.7216
1	10.60	0.186471	158847.4553
1	10.80	0.181813	157279.8895
1	11.00	0.177201	155683.0245
1	11.20	0.172636	154056.8603
1	11.40	0.16812	152401.3968
1	11.60	0.163653	150716.6343
1	11.80	0.159236	149002.5728
1	12.00	0.15487	147259.2123
1	12.20	0.150556	145486.5530
1	12.40	0.146295	143684.5949
1	12.60	0.142087	141853.3380
1	12.80	0.137934	139992.7826
1	13.00	0.133835	138102.9286
1	13.20	0.129793	136183.7761
1	13.40	0.125808	134235.3253
1	13.60	0.121881	132257.5762
1	13.80	0.118013	130250.5289
1	14.00	0.114204	128214.1836
1	14.20	0.110455	126148.5402
1	14.40	0.106768	124053.5989
1	14.60	0.103143	121929.3598
1	14.80	0.0995814	119775.8230
1	15.00	0.0960827	117640.7133
1	15.20	0.0926462	115553.6424
1	15.40	0.0892705	113515.2631
1	15.60	0.0859542	111526.2072
1	15.80	0.0826957	109587.0866
1	16.00	0.0794937	107698.4964
1	16.20	0.0763466	105861.0163

1	16.40	0.0732528	104075.2131
1	16.60	0.0702109	102341.6430
1	16.80	0.0672194	100660.8534
1	17.00	0.0642766	99033.3853
1	17.20	0.0613809	97459.7756
1	17.40	0.0585309	95940.5593
1	17.60	0.0557248	94476.2717
1	17.80	0.052961	93067.4507
1	18.00	0.050238	91714.6390
1	18.20	0.047554	90418.3870
1	18.40	0.0449073	89179.2542
1	18.60	0.0422963	87997.8125
1	18.80	0.0397193	86874.6482
1	19.00	0.0371745	85810.3646
1	19.20	0.0346602	84805.5842
1	19.40	0.0321747	83860.9519
1	19.60	0.029716	82977.1370
1	19.80	0.0272826	82154.8359

General Properties

Pile Loading

Load Case #	Axial Load (lbs)
1	200000.00

Axial Soil Loading

Soil Displacement (in)	Sliding Depth (ft)
0.0000000	0.00

Pile Properties

Property	Value
Name	DSM 4ft
Pile Type:	Cylindrical
Material Type:	Elastic
Young's Modulus (psf)	6480000.00
Diameter (ft)	4.00

Soil Layer Properties

Layers

Layer Name	Layer Type	Thickness (ft)
Soil Layer 1	API Sand	20.00
Soil Layer 2	API Sand	30.00

Soil Layer 1

Property	Value
Soil Type	Sand
Thickness (ft)	20.00
Unit Weight (lbs/ft3)	125.00
Friction Angle (deg)	30.00
Coefficient of Lateral Earth Pressure	1.00
Bearing Capacity Factor	12.00
Maximum Unit Skin Friction (psf)	1400.00
Maximum End Bearing Resistance (psf)	60000.00

Soil Layer 2

Property	Value
Soil Type	Sand
Thickness (ft)	30.00
Unit Weight (lbs/ft3)	125.00
Friction Angle (deg)	34.00
Coefficient of Lateral Earth Pressure	1.00
Bearing Capacity Factor	40.00
Maximum Unit Skin Friction (psf)	2000.00
Maximum End Bearing Resistance (psf)	200000.00

APPENDIX D

Liquefaction-induced Downdrag Force Calculation

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Downdrag Calculations per AASHTO LRFD Bridge Design (2012) - Drilled Shafts

Notes:

1. Please enter the required inputs shown in blue.
2. This spreadsheet should be used for drilled shafts, only.
3. The formulations are based on povisions of AASHTO LRFD Bridge Design, 2012 - Section 10.8.
4. Per section 10.8.3.5.2, Beta method is used for cohesionless material , where N60 is average SPT blow count corrected only for hammer efficiency.
5. Put zero values for Su and N60 if not applicable.
6. Units are all Imperial. The macro must be modified for metric units.
7. Do not add any row or column to this spreadsheet.
8. The spreadsheet is formulated up to row No. 6000.

Input Parameters

Pile Diameter =	4	ft
Wall thickness	24.0	inch Use D/2 for concrete piles
Elastic Young's Modulus =	12960.0	ksf
Depth where FF settlement is 0.4" =	19.0	ft
Column Depth =	20.0	ft
Ground Water Table Depth =	10.0	ft

Click below to run analysis

Calculate Downdrag Force & the Resulting Pile Elastic Compression

Outputs

Negative Friction (Downdrag) =	128.7	kips
Pile Elastic Compression=	0.02	inch
Ultimate Positive Friction =	12.6	kips
Ultimate End Bearing =	706.5	kips

Input Parameters							Calculation Results							
Depth (ft)	Liquefiable?	(Su_liq)/sigma'	Cohesive Material- Su (psf)	Cohesionless Material - N60 (blows/ft)	Is the soil gravelly sand or gravel?	Unit Weight (pcf)	Sigma_v' (psf)	alpha	Beta	Moblized Friction (psf)	Average Mob. Friction (psf)	Negative Friction, i.e., downdrag (kips)	Positive Friction (kips)	Cumulative Comp. due to downdrag load (inch)
0.00	No		0.0	20.0	No	125.0	0.00	0.00	0.00	0.00	0.00	0.00		0.00
1.00	No		0.0	20	No	125.0	125.00	0.00	1.40	175.57	87.78	1.10		0.00
2.00	No		0.0	20	No	125.0	250.00	0.00	1.33	333.66	254.62	4.30		0.00
3.00	No		0.0	20	No	125.0	375.00	0.00	1.29	482.45	408.06	9.43		0.00
4.00	No		0.0	20	No	125.0	500.00	0.00	1.25	623.72	553.09	16.38		0.00
5.00	No		0.0	20	No	125.0	625.00	0.00	1.21	758.51	691.12	25.07		0.00
6.00	No		0.0	20	No	125.0	750.00	0.00	1.18	887.55	823.03	35.41		0.00
7.00	No		0.0	20	No	125.0	875.00	0.00	1.16	1011.34	949.44	47.34		0.00
8.00	No		0.0	20	No	125.0	1000.00	0.00	1.13	1130.29	1070.81	60.80		0.00
9.00	No		0.0	20	No	125.0	1125.00	0.00	1.11	1244.71	1187.50	75.72		0.01
10.00	No		0.0	20	No	125.0	1250.00	0.00	1.08	1354.88	1299.79	92.05		0.01
11.00	Yes	0.17	0.0	0.0	No	125.0	1312.60	-	-	223.14	789.01	101.97		0.01
12.00	Yes	0.17	0.0	0.0	No	125.0	1375.20	-	-	233.78	228.46	104.84		0.01
13.00	Yes	0.17	0.0	0.0	No	125.0	1437.80	-	-	244.43	239.11	107.84		0.01
14.00	Yes	0.17	0.0	0.0	No	125.0	1500.40	-	-	255.07	249.75	110.98		0.01
15.00	Yes	0.17	0.0	0.0	No	125.0	1563.00	-	-	265.71	260.39	114.25		0.01
16.00	Yes	0.17	0.0	0.0	No	125.0	1625.60	-	-	276.35	271.03	117.66		0.01
17.00	Yes	0.17	0.0	0.0	No	125.0	1688.20	-	-	286.99	281.67	121.20		0.01
18.00	Yes	0.17	0.0	0.0	No	125.0	1750.80	-	-	297.64	292.32	124.87		0.01
19.00	Yes	0.17	0.0	0.0	No	125.0	1813.40	-	-	308.28	302.96	128.68		0.01
20.00	No		0.0	120.0	No	125.0	1876.00	0.00	0.90	1695.63	1001.96		12.59	
21.00	No		0.0	120.0	No	125.0	1938.60	0.00	0.89	1722.95	1709.29			
22.00	No		0.0	120.0	No	125.0	2001.20	0.00	0.87	1749.11	1736.03			
23.00	No		0.0	120.0	No	125.0	2063.80	0.00	0.86	1774.12	1761.62			
24.00	No		0.0	120.0	No	125.0	2126.40	0.00	0.85	1798.01	1786.06			
25.00	No		0.0	120.0	No	125.0	2189.00	0.00	0.83	1820.78	1809.39			
26.00	No		0.0	120.0	No	125.0	2251.60	0.00	0.82	1842.45	1831.61			
27.00	No		0.0	120.0	No	125.0	2314.20	0.00	0.81	1863.04	1852.74			

APPENDIX E

PLAXIS Analysis of LTP Section

Static and seismic performance of the proposed LTP system under slab load of 300 psf was evaluated using the finite element computer program PLAXIS, 2D. The geometry of the FE modal was composed of two-dimensional (2D) plane-strain model of:

a. 4ft diameter DSM columns at 12ftx12ft spacing and 20ft deep;
b. Three (3) layers of 12" thick cement-treated fill with UCS=200psi;
c. Soil layers from the ground information collected from CPTs and borings.

The effective width of the DSM columns were taken as 1.05 ft in order to account for the three-dimensional effects in the 2D plain-strain model. Equivalent secant elastic parameters and shear strength of the native soils were obtained from the site investigation data. Table A below presents the input soil parameters.

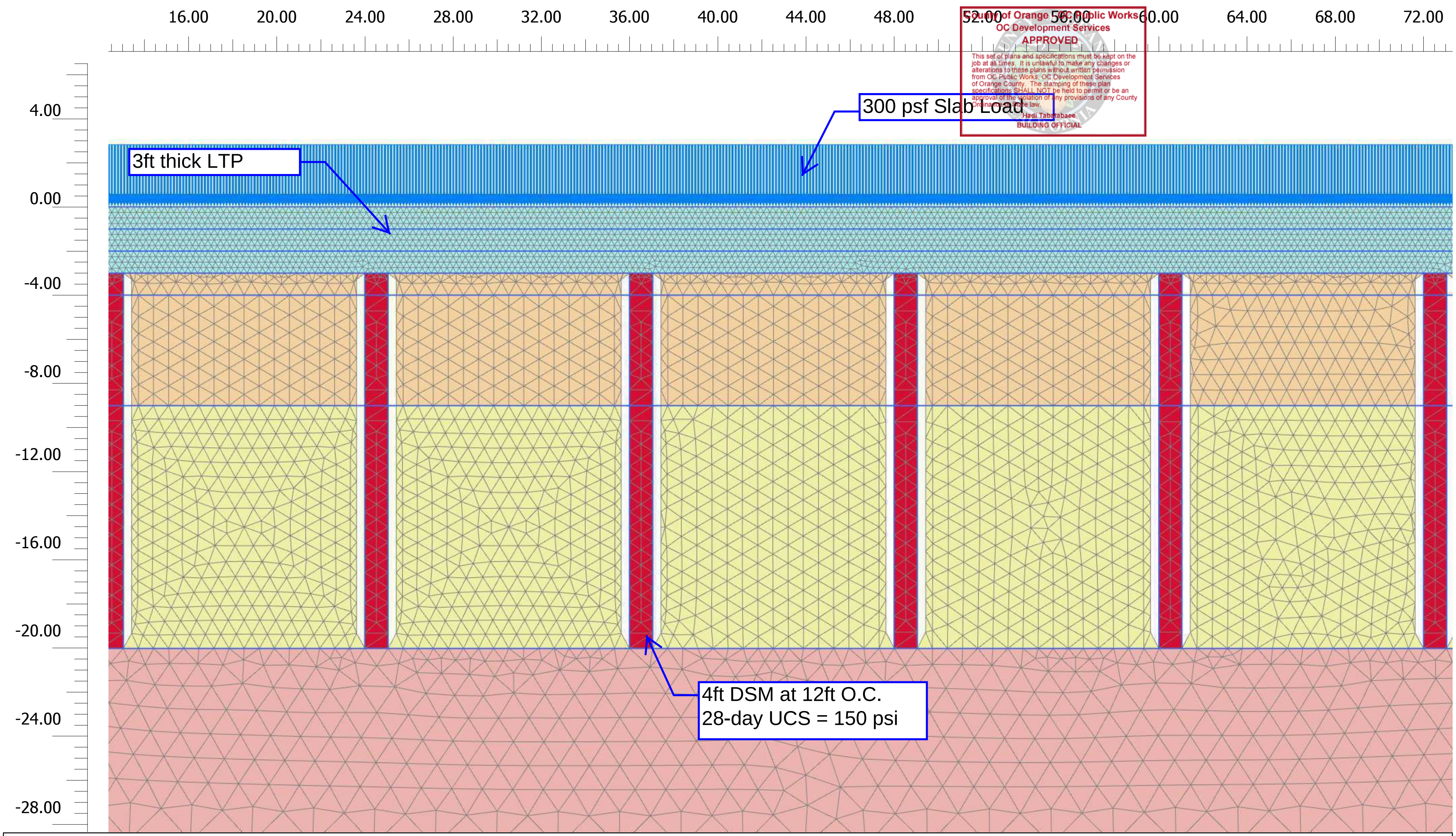
Table A. Input Soil Properties for PLAXIS analysis.

Depth (ft)	Soil Type	Static Condition		Liquefied Condition	
		Secant Young's Modulus (ksf)	Shear Strength	Secant Young's Modulus (ksf)	Shear Strength
0 to 9	Af/Qm	400	Phi = 31, c = 395 psf	-	-
9 to 20	Af/Qm (below GWT)	400	Phi = 30, c = 80 psf	100	Phi = 5.7 deg
Below 20	Tc	3000	Phi = 34, c = 695 psf	-	-
-	LTP (UCS, 28day=200 psi)	7200	14400 psf	14400 (365 day UCS)	28800 psf (365 day UCS)
-	CDSM (UCS, 28day=150 psi)	6480	10800 psf	12960 (365 day UCS)	21600 psf (365 day UCS)

The main goal of the analysis was to ensure that the deformations are in a tolerable ranges and LTP system did not show any signs of failure in tension and compression under the slab load during static and seismic loadings. Geometry of the model, deformations and stresses are presented in the following pages.

Output Version 20.1.0.98

LTP Model - Static Loading Condition



Connectivity plot

AGI	*Project description* DPH LTP Design		*Date* 4/11/2021
	Project filename LTP_Design_Static	*Step* 124	*Company* Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Deformation Contours - Static Loading Condition

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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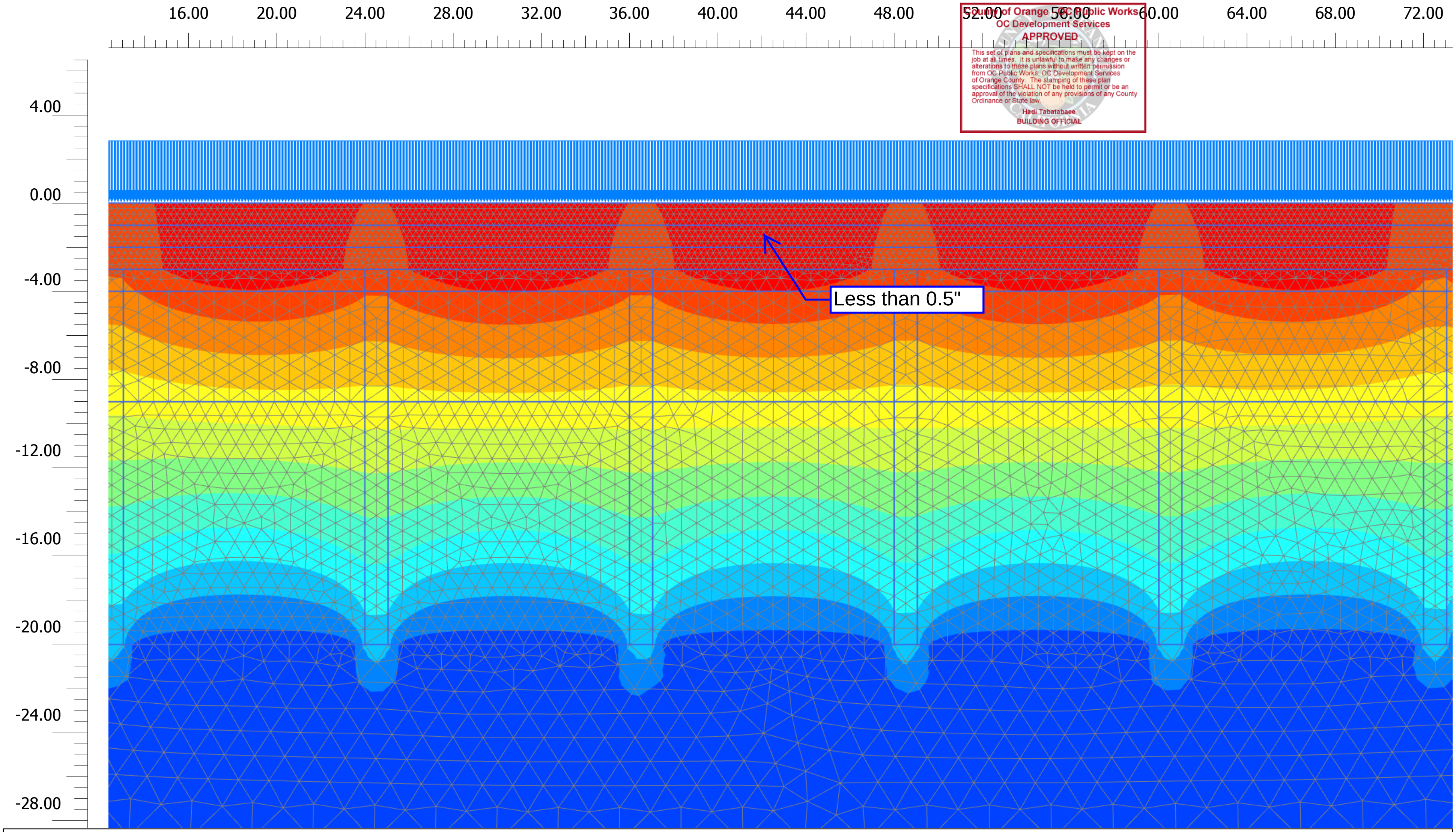


Total displacements u_y (scaled up 200 times)

Maximum value = 0.000 ft (Element 13635 at Node 14266)

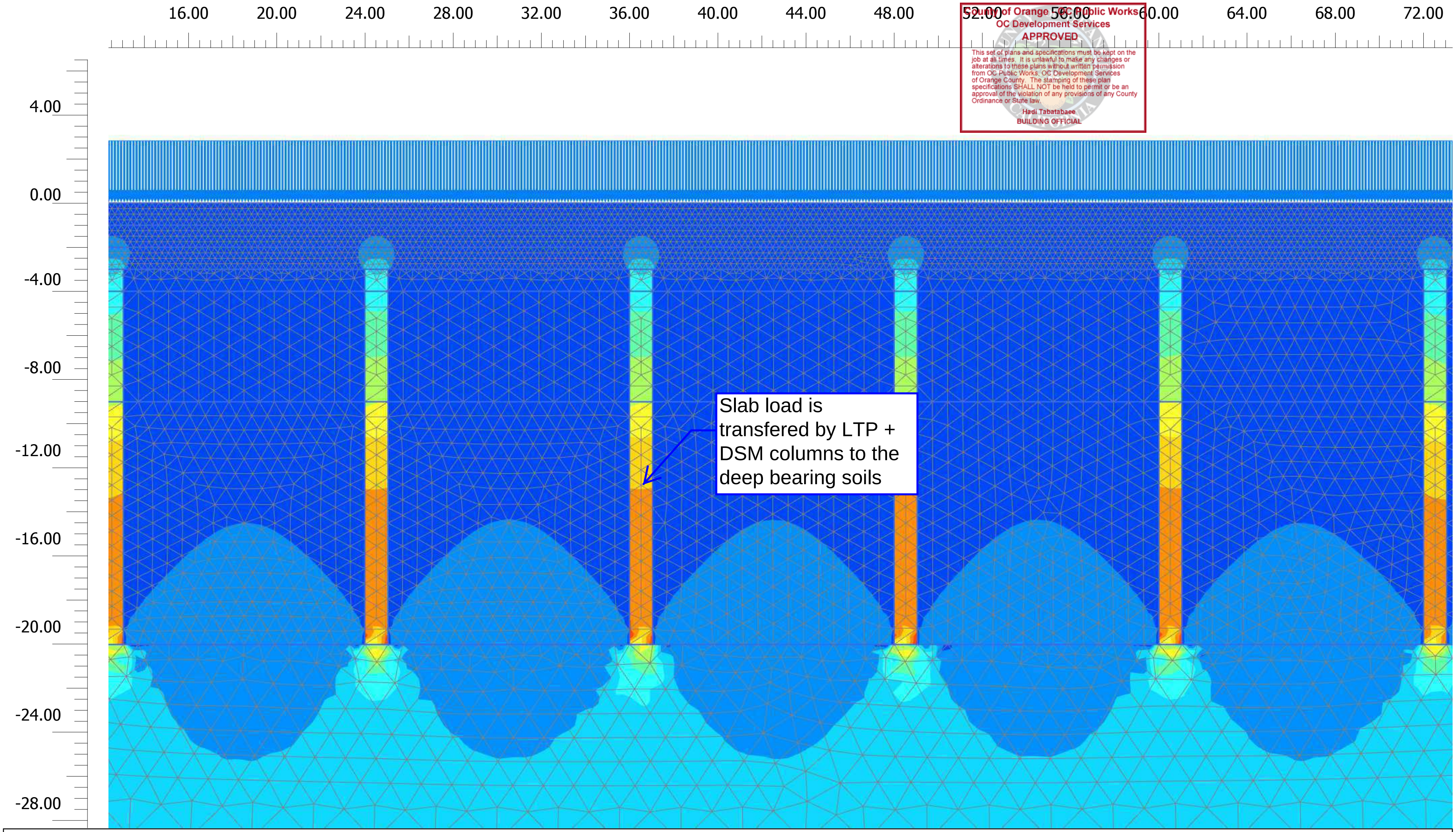
Minimum value = -0.01189 ft (Element 220 at Node 2397)

Project description		Date
DPH LTP Design		4/11/2021

Project filename	Step	Company
LTP_Design_Static	124	Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Vertical Stress Contours - Static Loading Condition



Cartesian effective stress σ'_{yy} (scaled up 0.200×10^{-3} times)

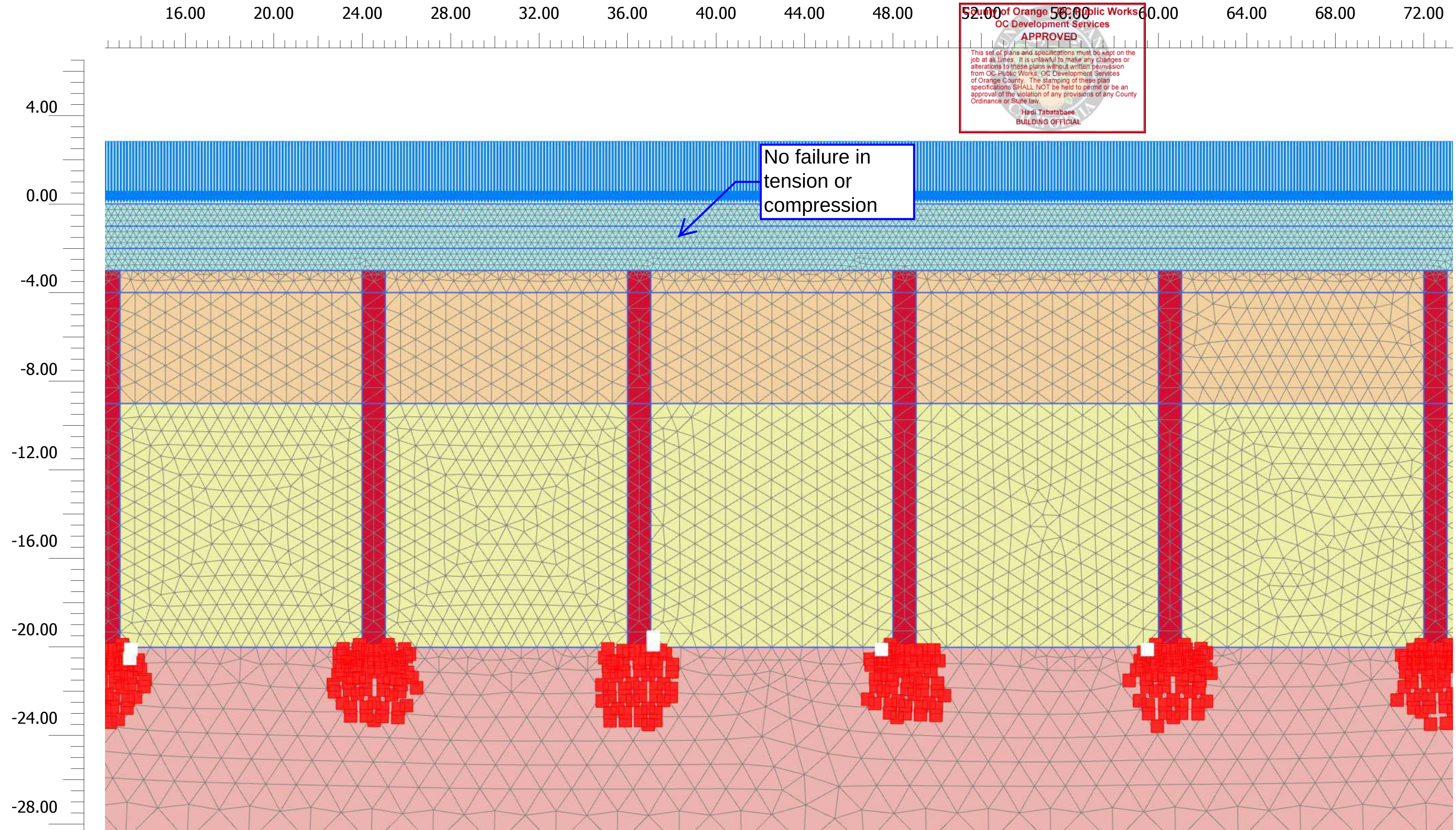
Maximum value = 287.2 lbf/ft² (Element 14799 at Node 18824)

Minimum value = -10.47×10^{3} lbf/ft² (Element 12027 at Node 19297)

AGI	Project description: DPH LTP Design			Date: 4/11/2021
	Project filename: LTP_Design_Static	Step: 124	Company: Advanced Geosolutions Inc (AGI)	

Output Version 20.1.0.98

Potential Failures within LTP - Static Loading Condition



Plastic points (scaled up 0.00 times)

Failure point

Tension cut-off point

Project description	DPH LTP Design		*Date* 4/11/2021
Project filename LTP_Design_Static	*Step* 124	*Company* Advanced Geosolutions Inc (AGI)	

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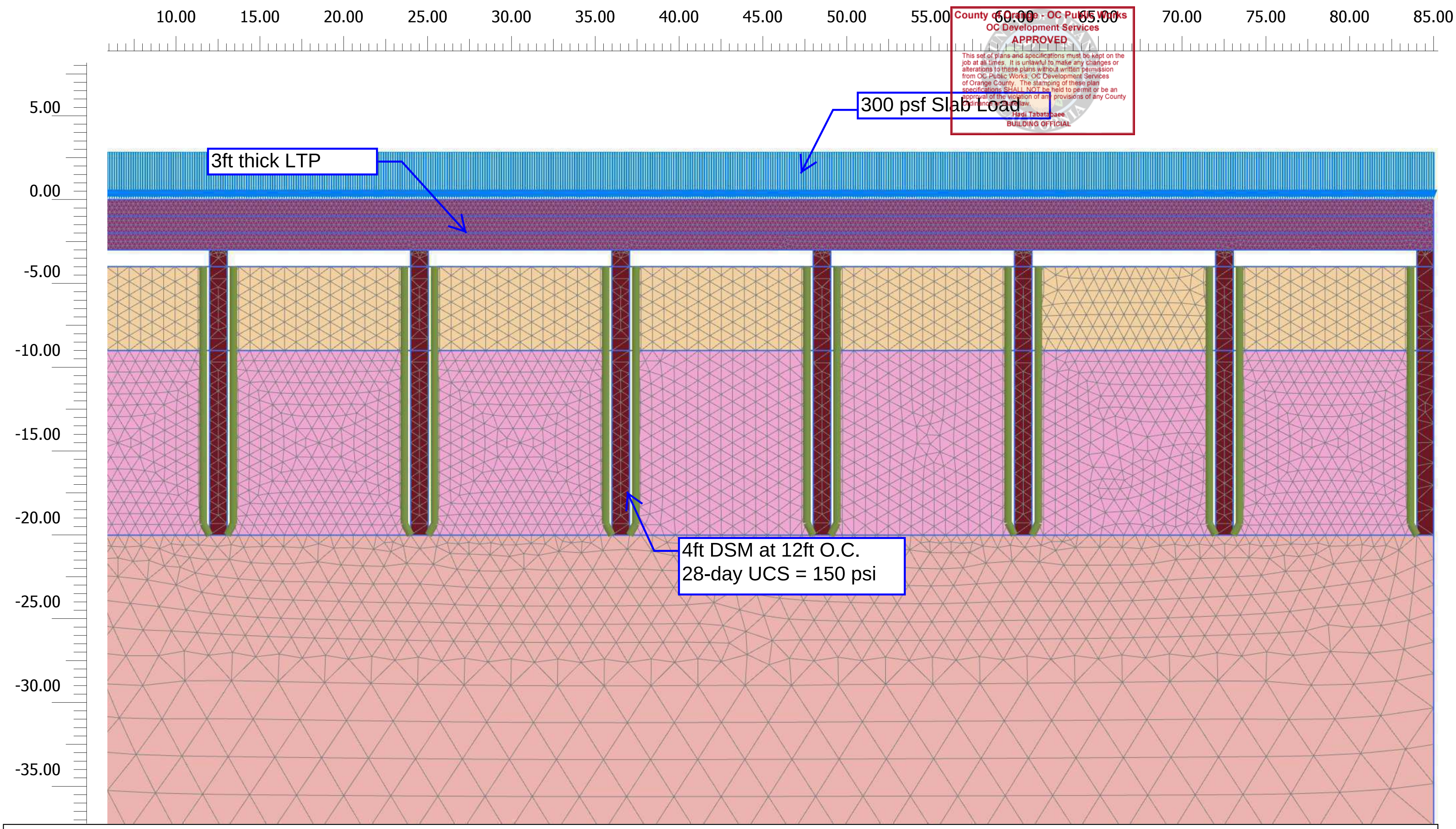
Output Version 20.1.0.98

LTP Model - Seismic Loading Condition

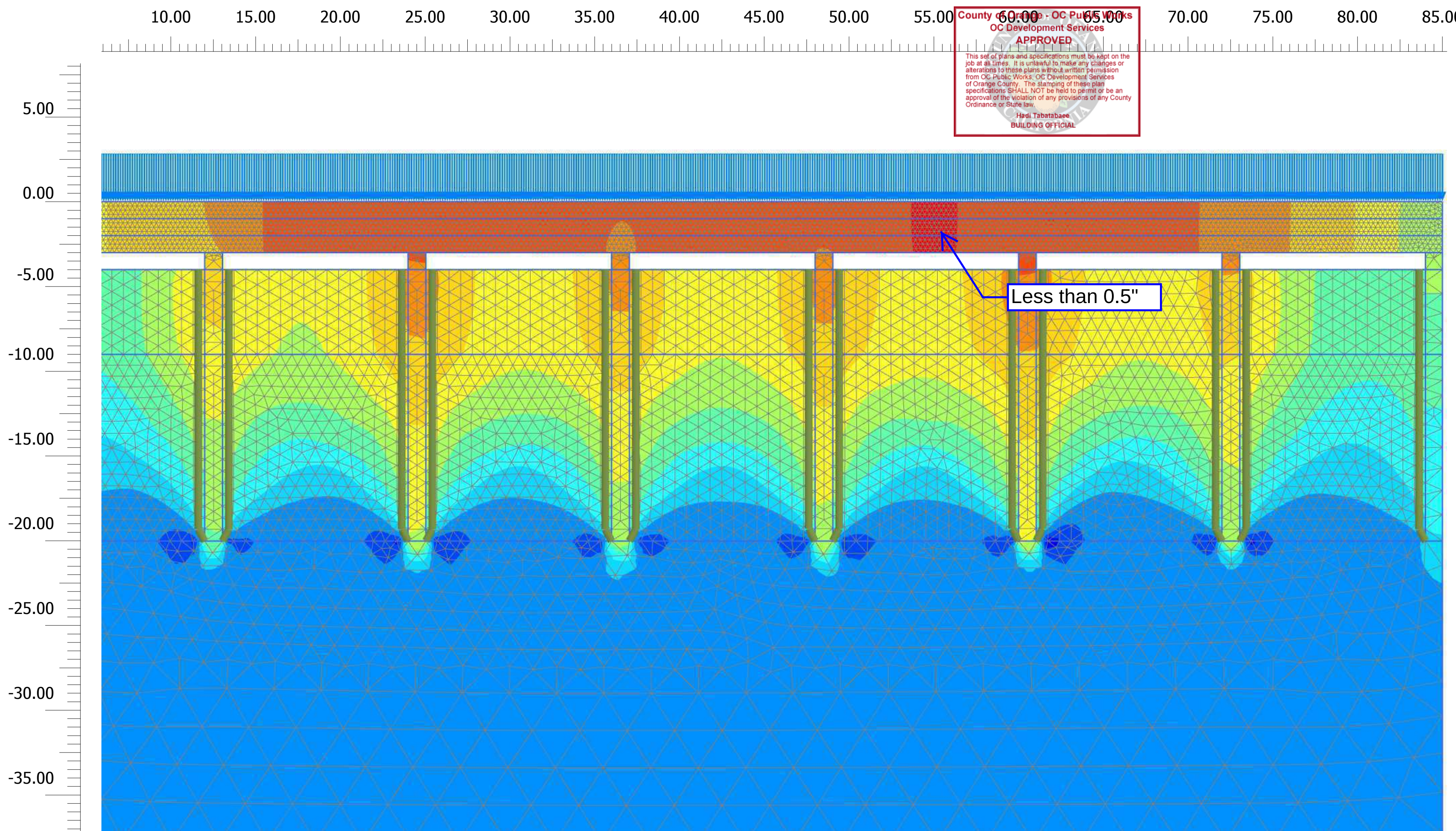


Connectivity plot

AGI	*Project description* DPH LTP Design		*Date* 4/11/2021
	Project filename LTP_Design_Seismic	*Step* 192	*Company* Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Deformation Contours - Seismic Loading Condition



Total displacements u_y (scaled up 100 times)

Maximum value = $3.638*10^{-3}$ ft (Element 12726 at Node 22739)

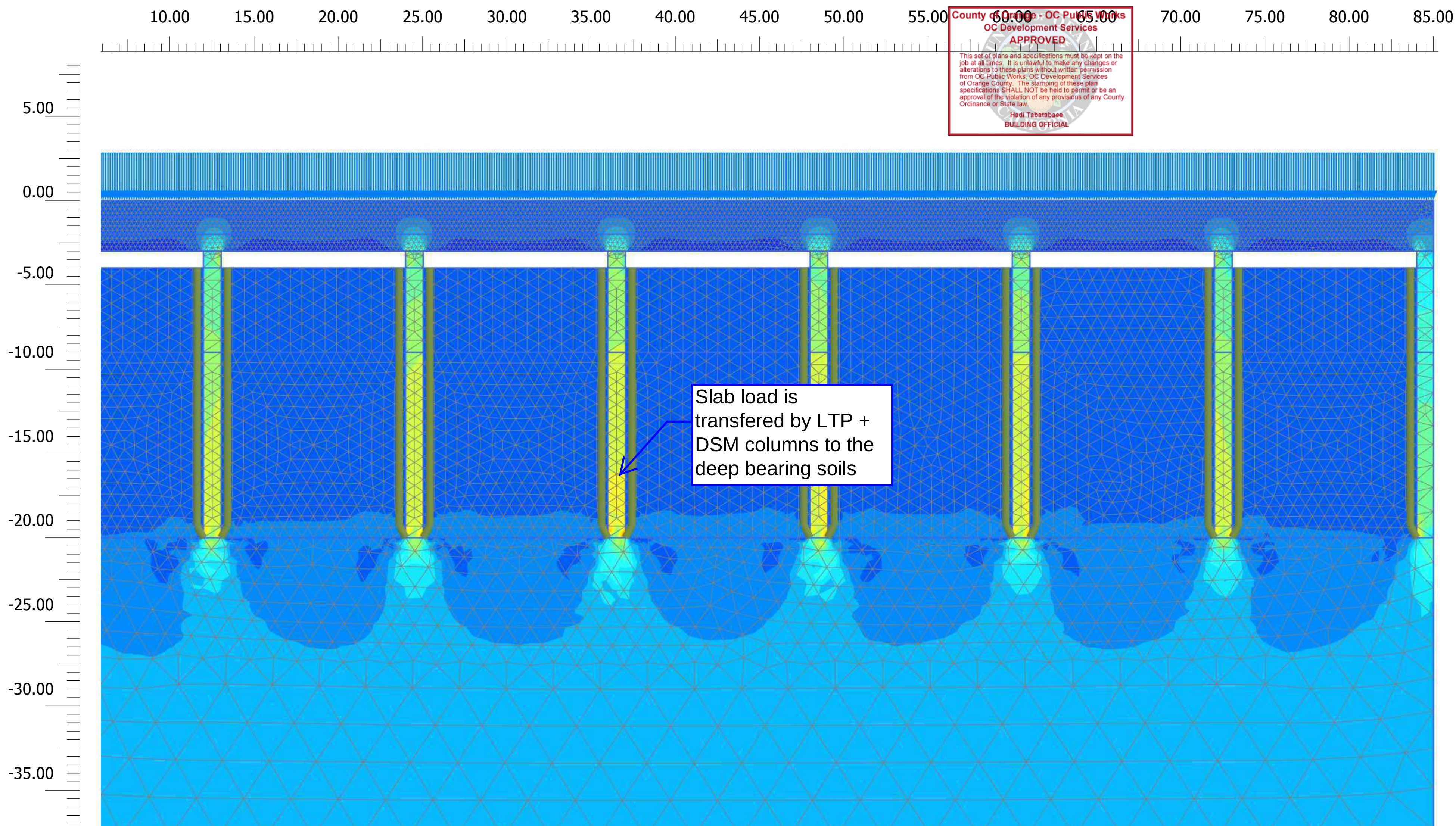
Minimum value = -0.01813 ft (Element 385 at Node 18873)

Project description			Date
DPH LTP Design			4/11/2021
Project filename	**Step**	**Company**	
LTP_Design_Seismic	192	Advanced Geosolutions Inc (AGI)	

AGI™

Output Version 20.1.0.98

Vertical Stress Contours - Seismic Loading Condition



Cartesian effective stress σ'_{yy} (scaled up 0.200×10^{-3} times)

Maximum value = 1246 lbf/ft² (Element 6346 at Node 29371)

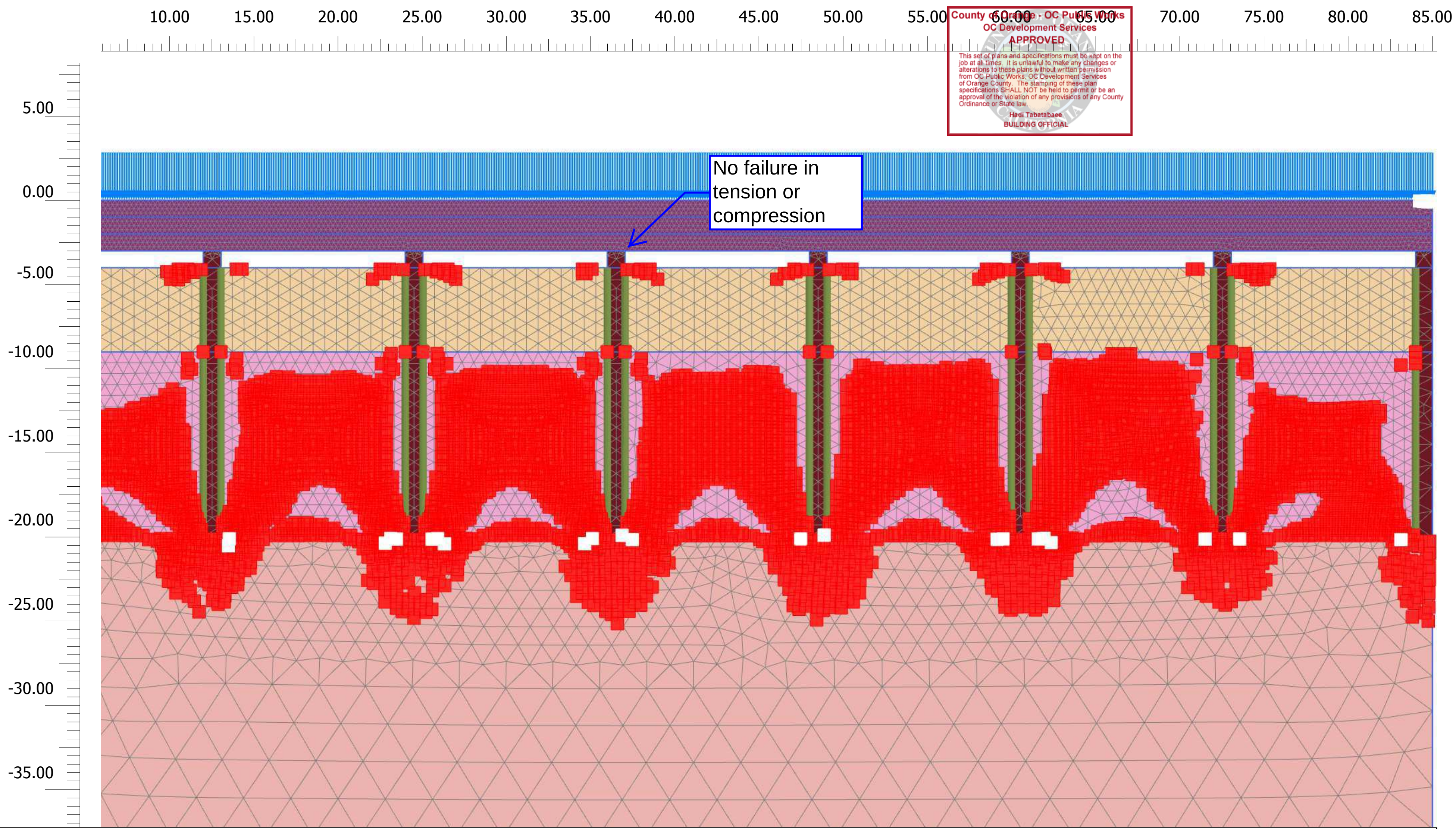
Minimum value = -15.50×10^{3} lbf/ft² (Element 8067 at Node 27896)

Project description	Date
DPH LTP Design	4/11/2021

Project filename	Step	Company
LTP_Design_Seismic	192	Advanced Geosolutions Inc (AGI)

Output Version 20.1.0.98

Potential Failures within LTP - Seismic Loading Condition



Plastic points (scaled up 0.00 times)

Failure point   Tension cut-off point

AGI	Project description DPH LTP Design		Date 4/11/2021
	Project filename LTP_Design_Seismic	Step 192	Company Advanced Geosolutions Inc (AGI)

Geotechnical Investigation Report, Volumes 1, 2, and 3, Dana Point Harbor Revitalization: Buildings 1 through 12, Commercial Component, City of Dana Point, California

Prepared For
DANA POINT HARBOR PARTNERS, LLC
c/o BURNHAM-WARD PROPERTIES

GMU

Geotechnical Investigation Report, Volumes 1, 2, and 3, Dana Point Harbor Revitalization: Buildings 1 through 12, Commercial Component, City of Dana Point, California

Prepared For
DANA POINT HARBOR PARTNERS, LLC
c/o BURNHAM-WARD PROPERTIES

May 27, 2021

GMU Project No. 17-206-02

23241 Arroyo Vista
Rancho Santa Margarita | CA 92688
949.888.6513 | FX: 949.888.1380 | www.gmugeo.com

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TRANSMITTAL

DANA POINT HARBOR PARTNERS, LLC
c/o BURNHAM-WARD PROPERTIES
1100 Newport Center Drive, Suite 200
Newport Beach, CA 92660

DATE: May 27, 2021

PROJECT: 17-206-02

ATTENTION: Mr. Bryon Ward, President

SUBJECT: Geotechnical Investigation Report, Volumes 1, 2, and 3,
Dana Point Harbor Revitalization:
Buildings 1 through 12, Commercial Component,
City of Dana Point, California

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Advanced GeoSolutions, Inc.
Attn: Mr. Justin Martos (electronic copy)

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PURPOSE

This report presents the results of our geotechnical investigation for the "Commercial Component" of the Dana Point Harbor Revitalization Project. The purpose of our investigation was to develop geotechnical recommendations pertaining to site grading and the design and construction of the proposed buildings and other site improvements (i.e., roadways, parking lots, trash enclosures, site walls, exterior concrete flatwork, miscellaneous site structures, etc.) Our investigation included performing laboratory testing, data analysis, and geotechnical engineering evaluation, and developing recommendations for geotechnical hazard mitigation and proposed building and improvement areas.

PROPOSED IMPROVEMENTS

The Commercial Component of the Dana Point Harbor Revitalization Project encompasses the retail and restaurant buildings. It is our understanding that the proposed development on the land side of the existing sea wall will consist of constructing eight (8) new retail/office/surf museum/restaurant buildings (Buildings 1, and 6-12), and renovating five (5) existing retail/restaurant buildings (Buildings 2-4, 5A, and 5B), along with a new parking area, landscape site structures, landscaping, small retaining walls, flatwork, and other appurtenant structures. We understand that the renovation of Buildings 2-4, 5A and 5B will generally consist of remodeling the existing buildings with new doors and windows and, on some of the buildings, removing interior walls to reconfigure their layout.

Plate 2 of this report shows the location of the structures. We understand from our review of the project precise grading plans prepared by TAIT Engineering that the grades for the new buildings will be raised by approximately 1 to 3 feet. The ocean side revitalization, consisting of boat slips, boater facilities, dry boat storage, day-boat parking, and launch ramp areas, as well as a proposed hotel area west of the Commercial Component, will be performed by others under a separate permit.

SITE LOCATION AND DESCRIPTION

The subject site is bounded by Dana Point Harbor Drive, the planned realignment of Golden Lantern, and the proposed parking structure and existing parking lot on the north, the existing boat launch ramp and Embarcadero Marina area on the east (which will be the future Dry Stack Storage Component site), the existing Casita Place and the existing Marina Inn on the west (which will be part of the future Hotel Component site), and the existing sea wall and harbor on the south (see Plate 1 – Location Map). The existing sea wall on the south or "ocean side" of the site is a "Quay" wall which consists of slightly battered, cantilevered, reinforced-concrete gravity wall constructed directly above 1.5:1 (horizontal to vertical) slopes. The slopes below the sea wall are comprised of riprap, with a concrete lining covering the ocean side riprap slope.

The majority of the site is relatively flat and drains by sheet flow towards the south to existing storm drain catch basins. However, there is an up to 16-foot-high, 2:1 (horizontal to vertical) slope along the north side of the site below Dana Point Harbor Drive, and an up to 14-foot-high, 2:1 (horizontal to vertical) slope along the west side of the site below Golden Lantern. The elevations of the flat portion of the site range from approximately 13.5 feet above mean sea level (msl) in the northern portion, to approximately 11 feet above msl in the southern portion. The site contains several existing buildings, with most of the site covered by either asphalt pavement or concrete flatwork, with some planters and landscape areas planted with flowers, groundcover, shrubs, and occasional trees.

BACKGROUND HISTORY AND PREVIOUS REPORTS

In order to research the site's history and geologic conditions, we reviewed published geologic maps and reports, previous geotechnical reports by other geotechnical consultants for the subject site and entire harbor area, and a previous report for the existing sea walls.

Based on our research, Dana Point Harbor is located within a cove (Dana Cove) that is bordered on the north by cliffs or bluffs that are approximately 100 to 200 feet high, and on the west by a hard, resistant promontory of land known as The Headlands. Prior to the construction of the harbor, the cove was bordered by a rocky shoreline along the base of the cliffs. However, due to the protection provided by The Headlands, a sandy shore was able to form toward San Juan Creek.

Dana Point Harbor was constructed in the late 1960s and early 1970s by the County of Orange and the United States Army Corps of Engineers. It is our understanding that the harbor was constructed by excavating the native soils after the cove was dewatered through the construction of a coffer dam. The construction of the coffer dam included the installation of sheet piling and the placement of fill in a wet condition. The harbor was then dewatered and the water basins were excavated to maximum depths of approximately 10 to 12 feet below sea level with the exception of local areas within the northern portion of the harbor where hard bedrock materials were encountered. Artificial fill was then placed in a relatively dry condition up to existing grades, and the sea walls, boat ramps, docks, and buildings were then constructed. In addition, a riprap breakwater was constructed along the south side of the harbor to protect it from wave action.

In order to provide access to the harbor, the shoreline cliffs were cut back to construct Dana Point Harbor Drive and Street of the Golden Lantern. These slopes were cut to gradients ranging from 1:1 (horizontal to vertical) to 2:1, depending on their geologic structure and material type.

An evaluation of the existing sea walls was performed by Bluewater Design Group in December of 2003. Their evaluation indicated that most of the existing sea walls are "Quay" walls which consist of slightly battered, cantilevered, reinforced-concrete gravity walls constructed directly above 1.5:1 (horizontal to vertical) slopes composed of riprap. The harbor side of the slope is covered by concrete panels. The extent of the riprap on the non-harbor side is unknown; however, it is anticipated that it consists of a 1.5:1 (horizontal to vertical) slope composed of riprap with no concrete lining. As a result, the Quay wall footings are supported on either rock riprap or shallow fills placed on top of the riprap. The walls are not embedded into the ground and thus rely on their own weight, the weight of the soil over the heel, and the friction between the bottom of the footings and the underlying soil or riprap to prevent overturning and resist sliding forces. Most of the Quay walls are 5 feet in height; however, some local sections are 9 feet in height. The report by Bluewater Design Group also indicated that the north and south sides of the public boat launch ramp are supported by conventional cantilever retaining walls that range from 2 to 15 feet in height with footings founded into fill materials.

AERIAL PHOTOGRAPHY REVIEW

An aerial photo review of 20 sets of stereo-paired air photos spanning from 1952 through 1999 was performed for the subject site in order to assess historical land use and site development. (aerial photos were provided by Continental Aerial Photo). Photos taken prior to development of the harbor area show an undeveloped cliff bordered by a rocky shoreline and a relatively natural cove. In 1967, two jetties were constructed on the east and west sides of the cove. By 1970, the alteration of the cove into a man-made harbor was nearing completion and the roadways had been graded. The photos indicate that Dana Point Harbor Drive and the northerly areas of the harbor (generally parking lot and boat storage) are likely underlain by bedrock from the cut operation of the shoreline cliff. By 1975, the harbor appears to be essentially in its current condition with the existing buildings and paved areas. Photos reviewed after 1975 show no significant changes to the area.

SUBSURFACE EXPLORATION

GMU conducted a recent subsurface exploration program to evaluate the soil conditions within the project and surrounding areas. The recent subsurface explorations performed by GMU consisted of the following:

- Twenty eight (28) hollow-stem-auger exploratory drill holes by GMU to a maximum depth of 50 feet below the existing ground surface in order to determine site-specific subsurface geologic and groundwater conditions and to obtain bulk and drive samples for geotechnical testing.
- Seven (7) CPT soundings by GMU to a maximum depth of 26 feet below the existing ground surface.

The drill holes were logged by our Staff Geologist and samples were collected and transported to our facility for observation and testing. The drill holes and CPT locations are shown on Plate 2 – Composite Geotechnical Map. Drill hole logs are contained in Appendix A and CPT reports are presented in Appendix A-3.

Additionally, we have utilized previous geotechnical exploration data that was performed by GMU and by others. The previous drill hole logs by GMU are presented within Appendix A-1.; previous drill hole logs by others are presented within Appendix A-2; and previous CPT data performed by others are presented within Appendix A-4.

GEOLOGIC FINDINGS

GENERAL GEOLOGY AND SUBSURFACE CONDITIONS

Regional Geology

Published geologic maps indicate that prior to development, the site consisted of a natural cove that was protected by a hard, resistant promontory of land to the west known as The Headlands. The cove was bordered by a rocky shoreline along the base of steep sea cliffs. The sea cliffs are comprised of marine sedimentary rocks of the Capistrano Formation that are capped by marine and non-marine terrace deposits. The base of the sea cliffs was mantled by talus deposits and local deposits of artificial fill while the bottom of the cove was covered by marine deposits. The harbor was constructed by dewatering the cove, partially excavating the native soils along the base of the cliffs and within the cove, and then replacing the excavated materials as compacted fill and creating cut slopes to create roadways to the harbor.

Site-Specific Conditions

The subject site, including the proposed commercial buildings and other site improvements, are within the cove area of the harbor and is underlain by artificial fills, marine deposits, and bedrock of the Capistrano Formation. These materials are described in more detail in subsequent sections of this report.

Artificial Fill (Qaf)

The artificial fill materials within the site originated from both the marine deposits and bedrock within the cove, and the talus deposits and bedrock materials along the base of the sea cliffs. As a result of the fill materials being comprised of a variety of different geologic units, the fill materials are highly variable and consist of frequently alternating layers of clayey sands, silty sands, sands, sandy clays, and sandy silts with gravel, isolated cobbles, and some scattered rock fragments greater than 6 inches in diameter. In general, the granular sand materials were found to be medium dense to dense while the fine-grained clay and silt materials were found to be predominantly firm to very firm. In addition, our laboratory testing indicates that the fill materials have varying degrees of compressibility and hydro-collapse.

Marine Deposits (Qm)

The marine deposit materials within the site are comprised of materials typically deposited in beach and submarine environments and, where encountered, generally consist of wet, medium dense, silty sands to sands. Marine deposits were encountered underlying the artificial fill within six of our current drill holes (DH-26, DH-29, DH-34, DH-35, DH-46, and DH-51).

Capistrano Formation (Tc)

Capistrano Formation bedrock was encountered below the fill and/or marine deposits in all our deeper drill holes and in all our CPT soundings. The bedrock was observed to consist predominantly 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.

GROUNDWATER

Groundwater is present at shallow depths below the subject site. Review of the Seismic Hazard Zone Report for the Dana Point Quadrangle indicates that the historic high groundwater level is 5 feet below the existing grade at the project site. In our recent and previous subsurface explorations, groundwater was encountered at depths ranging from 5 to 16 feet below the existing grade. Groundwater levels were measured utilizing a measuring tape or groundwater sounder within the boring during drilling; however, for this investigation, drill holes were not left open for extended periods of time to allow the groundwater to reach equilibrium within the drill holes. In order to determine more accurate groundwater levels, laboratory testing was performed on samples collected during drilling in order to obtain the in-situ saturation levels of the onsite soils. The groundwater levels indicated on the drill hole logs are based on field observations combined with results from our laboratory testing. The groundwater levels shown on the cross sections represent a rough conservative average of the groundwater levels shown on the boring logs and represent a best-fit geologic model.

To aid in the designing of the underground utilities and provide estimated groundwater levels that may be encountered by contractors, the groundwater levels shown on the cross sections were adjusted to account for average high tide conditions. These "estimated high tide" groundwater levels are shown on Plate 5. It should be noted that these groundwater levels should be used with caution as they do not account for King Tides, Maximum High Tides, and effects due to climate change.

The following table summarizes groundwater levels at the site:

Groundwater Levels Summary

Groundwater Condition	Basis	Use	Reference/ Value
Average groundwater levels	Groundwater levels encountered during exploration and adjusted for saturation and geologic model	General	Boring logs, Plates 2 & 3
Groundwater levels adjusted for daily high tides	Average groundwater levels adjusted for daily high tides	Underground utility design and likely high tide levels that may be encountered by contractors	Plate 5
Groundwater levels to be used for liquefaction and lateral spreading analyses	Boring logs, Plates 2 & 3, CGS Historic High GW Level	Geotechnical engineering design (i.e., liquefaction, lateral spreading, etc.)	5' bgs

Any construction extending below the depths shown on Plate 5 may encounter saturated conditions. Consequently, appropriate construction precautions should be utilized (i.e., deeper excavations for utility lines, etc.).

It should be further noted that the estimated groundwater levels represent our best interpretation of the information available at the time of this report. Consequently, actual groundwater levels at the time of construction may differ from the estimates presented in this report. It is up to the contractor to determine the groundwater levels at the time of construction. **The contractor is strongly encouraged to directly determine groundwater levels immediately prior to construction. The installation of a piezometer, which can be measured through tidal cycles, should be considered by the contractor.**

GEOLOGIC HAZARDS

FAULTING AND SEISMICITY

The site is not located within a published Alquist-Priolo Earthquake Fault Zone, and no known active faults are shown on current geologic maps as crossing the site. The nearest known active fault is the offshore segment of the Newport-Inglewood fault, which is located approximately 2.5 miles southwest of the site and is capable of generating a maximum earthquake magnitude (M_w) of 7.5. The site is also located 9.5 miles from the San Joaquin Hills Blind Thrust, which is capable of generating a maximum earthquake magnitude (M_w) of 7.1.

The site has been subject to local earthquakes including the 1933 Long Beach Earthquake with a 6.4 magnitude, and the 1997 Northridge Earthquake with a 6.7 magnitude. An earthquake search indicated that approximately 37 earthquakes with magnitudes greater than 5 occurred within a 100-kilometer (~ 62 miles) radius from the site within the past 200 years. Given the proximity of the site to these and numerous other active and potentially active faults, the site will likely be subject to earthquake ground motions in the future.

LIQUEFACTION

The site is located within a zone of required investigation for liquefaction as shown on the Seismic Hazard Zone Map for the Dana Point Quadrangle (CGS, 2001). Consequently, and also based on the conditions encountered in the subsurface explorations for this project, the site may be subject to seismic settlement and lateral spreading related to liquefaction. Liquefaction, seismic settlement, and lateral spreading were quantitively analyzed as part of this investigation, with the results discussed under the "Geotechnical Engineering Findings and Analyses" section of this report (Page 9).

LANDSLIDES

Based on our review of available geologic maps, literature, topographic maps, aerial photographs, and our subsurface evaluation, no landslides or related features underlie the site; however, an earthquake-induced landslide is mapped near the proposed development within the existing bluffs where surficial instability and cracking may occur. However, based on the distance between the bluffs and the project site, there is no potential for landslides to impact the proposed development.

TSUNAMI, SEICHE, AND FLOODING

Tsunamis

Tsunamis or seismic sea waves that have affected coastal Southern California are generally produced by submarine fault rupture. Historical records indicate that the coast from San Pedro to Newport Bay, has been affected by six significant tsunamis since 1868 (Vasily Tito, National Oceanographic and Atmospheric Administration, Personal Communication, June 1998). The largest waves were on the order of 6 to 8 feet. The most extensive recent damage occurred in harbor areas such as Los Angeles (Alaska - 1964, Chile - 1960).

Legg et al. (2004) investigated the tsunami hazard associated with the Catalina fault offshore of Southern California. They simulated tsunamis based on co-seismic deformation of the sea floor and estimated that coastal run-up values are 5 to 13 feet, although run-up could exceed 23 feet depending upon amplification due to bathymetry and coastal configuration. Large earthquakes on the Catalina fault are relatively infrequent, with recurrence intervals of several hundred to thousands of years (Legg et al., 2004).

<u>Tsunami Inundation Maps</u>

In 2009, the California Emergency Management Agency, California Geological Survey, and University of Southern California partnered in an effort to create tsunami inundation maps for California. The tsunami inundation maps were generated through a modeling process that utilizes the Method of Splitting Tsunamis (MOST). This computational program models tsunami evolution and inundation based on bathymetry and topography. The modeling also utilizes a variety of tsunami source events, including "realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides" (California Emergency Management Agency et al., 2009). Using the source, bathymetry, and topography, the tsunami modeling yields a maximum inundation line. It is important to note that the published map does not represent inundation from a single event, but rather is the result of combining inundation lines from multiple source events. Therefore, the entire inundation region will likely not be inundated during a single tsunami event (California Emergency Management Agency et al., 2009).

The Tsunami Inundation Map states that the "tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only." Furthermore, the map conveys that it is not intended for regulatory purposes. With respect to probability, the map states that it contains "no information about the probability of any tsunami affecting any area within a specific period of time."

A Tsunami Inundation Map for Emergency Planning was published for the Dana Point Quadrangle (California Emergency Management Agency et al., 2009). It is critical to note three points: (1) the map is only intended for emergency planning and evacuation planning; (2) the map does not convey any information with respect to probability or timing of tsunami events; and (3) the inundation line is a conservative combination of multiple source events.

Tsunami Hazard Assessment

As shown on the attached Plate 4 – Tsunami Inundation Map, the proposed site is located within a tsunami inundation area. Therefore, it should be anticipated that the site will be directly affected by a tsunami. Although the probability and severity of tsunami inundation in the lowland areas cannot be estimated based on current available information, tsunami evaluation performed by others suggests that tsunami waves could potentially impact and scour the new building foundations during a tsunami event. This potential tsunami scour and foundation loss of strength were considered in the foundation recommendations developed for the site.

Seiches

The potential for the site to be adversely impacted by earthquake-induced seiches is considered to be high due to the presence of significant enclosed bodies of water located in the vicinity of the site.

Flooding

According to the County of Orange FEMA Flood Insurance Rate Map, the site is located within "Zone X", an area of 0.2% annual chance flood, 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and protected by levees from 1% annual chance flood. The potential for the site to be adversely impacted by significant flooding is considered low.

GEOTECHNICAL ENGINEERING FINDINGS AND ANALYSES

LIQUEFACTION ANALYSES

Seismic Input

Based on 2019 CBC requirements, the peak ground acceleration (PGA_M) for the Maximum Considered Earthquake (MCE) event was used for the liquefaction evaluation. The PGA_M of 0.66g and a mean magnitude of 6.8 were considered for this study.

Liquefaction Evaluation and Seismic Settlement

The site is located within a zone of required investigation for liquefaction as shown on the Seismic Hazard Zone Map for the Dana Point Quadrangle (CGS, 2001).

Liquefaction analyses were performed based on the 2019 CBC and ASCE 7-16 criteria. A historic high groundwater depth of 5 feet was used in the analysis.

Given that CPT results provide a more reliable, accurate and continuous database from which to calculate liquefaction magnitude (i.e., relative to SPT-based analyses), our liquefaction analyses is based on CPT soundings. A liquefaction evaluation was performed on each CPT by means of CLiq, v.2.3.1.15 software and the Robertson (2009) methodology and are presented in Appendix D. Liquefaction analyses based on Standard Penetration Test (SPT) blowcounts were also performed as a cross-check. The SPT-based analysis provided a settlement estimate that was consistent with the results of the CPT analysis.

Based on our seismic settlement analysis and review of overall soil conditions, the earthquake-induced (EQ-induced) settlement is estimated to be 0.75 inch for the MCE event. A differential EQ-induced settlement of 0.5 inch over a span of 40 feet should be prudently considered in the design of the structures.

LATERAL SPREAD ANALYSES

Lateral Spreading and Cyclic Mobility

The proposed development is located within the vicinity of the existing sea wall and harbor where free face geometry and localized areas of shallow liquefiable soils exist. As a result, lateral spread analyses were performed to determine the potential of flow failure to occur during the MCE event. The lateral displacement was analyzed utilizing Cross Sections A-A’, C-C’, and D-D’ for the MCE seismic loading.

Our evaluation included evaluating the stability of each section, post-earthquake, using the residual shear strength of the potentially liquefiable soils, estimating the yield acceleration for the section, and assessing the seismic deformations under liquefied condition which may be considered as an upper bound for the seismic deformations. Slope/W 2020 software was used for the slope stability analysis. Bray and Travasarou (2000) and Rathja and Antonakos (2011) procedures were used for evaluating the seismic displacements.

Our analyses revealed that the post-earthquake slope stability safety factors are less than 1.0 with the liquefied residual shear strengths, indicating a very high potential for earthquake-induced flow failure. Additionally, based on our post-earthquake deformation analyses, the lateral spread deformation was calculated to be greater than 90 inches on average, thus indicating that ground mitigation is required to reduce lateral deformations to levels compatible with the proposed foundation design.

Based on our analyses and findings, numerous lateral spread remediation schemes were evaluated. The most viable remediation scheme consisted of the placement of a Deep Soil Mixing (DSM) buttress between proposed Buildings 6-12 and the existing sea wall, as well as placing the building foundations on DSM piles. In the case of Building 1, the DSM buttress was integrated into the piles below the building due to lack of space for a buttress. More details of the design are contained in subsequent sections of this report.

We note that the DSM columns are designed to provide lateral support for improvements that are located inside the DSM buttress mitigation zone in the event that lateral spreading occurs. Consequently, non-structural improvements such as hardscape and utilities, including the portion of the sea wall seaward of the DSM buttress, are prone to lateral spreading and potential damage.

SOIL EXPANSION

The expansion potential of the surficial soils mantling the site (i.e., the artificial fills that will impact the proposed improvements) are highly variable, ranging from very low to medium. Consequently, the design of the exterior hardscape features should consider a medium expansion potential.

SOIL CORROSION

Corrosion

Based on the test results for pH, soluble chlorides, sulfate, and minimum resistivity of the site soils obtained during our subsurface investigation, the on-site soils should be considered to have:

- A moderate sulfate content or “S1” sulfate exposure to concrete per ACI 318, Table 19.3.1.1. This should be utilized for all concrete above the groundwater table shown on Plate 5.
- A low minimum resistivity indicating conditions that are severely corrosive to ferrous metals.
- A moderate to high chloride content (corrosive to severely corrosive to ferrous metals).

The results of the laboratory chemical tests performed within the site are included in Appendix B.

Concrete Structures Exposed to Seawater

Due to the close proximity of the proposed improvements to the existing harbor and the potential for groundwater fluctuation, we anticipate that some concrete may be in contact with seawater and thus may be exposed to seawater chlorides. Therefore, concrete exposure of W1 and C2 in accordance with ACI 19.3.1.1 should be expected and considered in the concrete design for any concrete structures that may be deep enough to encounter groundwater as determined from Plate 5 (i.e., concrete storm drain pipe, etc.)

STATIC SETTLEMENT / COMPRESSIBLITY

Buildings

Static settlement will be induced by the introduction of new building loads. The underlying artificial fill and marine deposit soils encountered are moderately to slightly compressible under static loading. However, the geotechnical engineering characteristics of the underlying surficial soils are highly variable. Given this variability, and in order to: 1) minimize lateral spreading, 2) minimize foundation scour during a tsunami event, and 3) provide a uniform support of new building foundations, it was determined that DSM columns along with soil cement Load Transfer Platform (LTP) would provide an adequate support for the new buildings.

Given that the foundations will bear onto DSM columns, building foundation settlements will be minimal. Additionally, since the interior concrete slabs will bear on soil cement LTP which is designed to span between the DSM columns below the foundations, settlements are also expected to be minimal. However, local vertical seismic settlements that exceed the estimated values could occur during a maximum considered earthquake, inducing minor building slab distress.

Detailed settlement estimations for the building foundations were performed by Advanced GeoSolutions, Inc. (AGI) and are contained in their design submittal (submitted under separate cover). GMU has reviewed AGI's settlement analysis and confirmed that it is in general conformance with the recommendations provided in this report. The magnitude of the total and differential settlements are provided within the "Geotechnical Slab and Foundation Recommendations" section of this report (Page 24).

PRELIMINARY INFILTRATION TESTING

Seventeen (17) preliminary infiltration tests were performed in general conformance with the County of Orange Technical Guidance Document (TGD). The drill holes, shown on the attached Plate 2 – Composite Geotechnical Map, were excavated to depths of approximately 3.25 to 7.0 feet below the existing grade using a hollow-stem-auger drill rig. The calculated unfactored raw observed infiltration rates are presented in the following table.

Infiltration Rates Results Summary

Drill Hole	Depth Below Finish Grade (feet)	Unfactored Raw Observed Infiltration Rates (inches/hour) *
GMU 17-206-02		
DH-5	5.0	0.04
DH-7	5.0	0.05
DH-8	5.0	0.03
DH-9	5.0	0.03
DH-10	5.0	0.07
DH-13	5.0	0.29
DH-14	5.0	0.10
DH-17	5.0	1.19
DH-18	5.0	0.28
DH-19	4.0	0.01
DH-20	5.0	0.07
DH-21	5.0	0.10
DH-22	5.0	0.24
DH-23	5.0	0.11
DH-24	5.0	0.05
GMU 11-161-00		
DH-10	3.25	0.35
DH-22	7.0	0.04

**Rates do not incorporate a factor of safety.*

The results of the infiltration testing indicate that the unfactored raw observed infiltration rates range from 0.01 to 1.19 inches per hour, with an average unfactored infiltration rate of 0.18 inch per hour. ***Thus, we conclude that infiltration rates for the entire site do not meet the minimum requirement of 0.3 inch/hour when a minimum factor of safety of 2 is applied per the County of Orange TGD manual.*** The preliminary infiltration test hole locations are shown on the attached Composite Geotechnical Map, Plate 2. The results of the infiltration testing are contained in Appendix C of this report.

EXCAVATION CHARACTERISTICS

The artificial fill soils and bedrock materials underlying the site can be easily excavated with conventional grading equipment such as dozers, loaders, excavators, and backhoes. We expect that excavation of new utility trenches can be accomplished utilizing conventional trenching machines and backhoes. Furthermore, groundwater may be encountered (see Plate 5).

CONCLUSIONS

Based on the geologic and geotechnical findings, it is our opinion that the proposed development is feasible and practical from a geotechnical standpoint if accomplished in accordance with the County of Orange grading and building requirements and the recommendations presented herein. It is also the opinion of GMU Geotechnical that the proposed grading and construction will not adversely affect the geologic stability of adjoining properties provided grading and construction are performed in accordance with the recommendations provided in this report. A summary of conclusions is as follows:

1. The project area is not underlain by any known active faults. Seismic structure design should be in accordance with the 2019 CBC based on ASCE 7-16.

2. As described in detail in the “Groundwater” section of this report (Page 5), groundwater may be as high as 5 feet bgs and is anticipated to impact construction of the DSM columns and excavations for deep utility lines; however, it is not anticipated to impact corrective grading. Plate 5 – Design Groundwater Level Plan, was developed to provide a guide to determining the depth to groundwater for construction.

3. The potential for lateral spreading is considered very high within the limits of the proposed development. Therefore, mitigation for lateral spreading utilizing DSM columns will be required.

4. The site will be subject to low magnitude seismic settlement, therefore settlements should be incorporated into the structure design.

5. The proposed Buildings 1, and 6 through 12 foundations may be subject to significant differential static settlements due to compression resulting from the fill variability. Therefore, ground improvement consisting of DSM columns for direct support of shallow foundations is recommended.

6. The proposed Buildings 2 through 5 renovation may be supported on a conventional slab-on-grade foundation system that is compatible with the existing foundations and slabs.

7. The near-surface site soils are anticipated to have a low to medium expansion potential (EIs 19 to 84) based on our recent laboratory test results and local experience.

8. Given the fill variability and potential disturbance from the demolition of existing structures, corrective grading will be required in all areas of the site – i.e., below building areas and landscape areas.

9. Corrosion testing indicates that the on-site soils have a moderate sulfate exposure level and are corrosive to buried ferrous metals and reinforcing steel. In addition, concrete structures below the groundwater table may be exposed to seawater, thus requiring special recommendations. Consequently, restriction on the type of cement, water to cement ratio, and compressive strength is required per ACI 318. Additionally, any metal exposed to the soil will need protection.

10. Based on the above Conclusion Items 3 through 9, the following remediation measures will be required: 1) corrective grading beneath the entire site, 2) a DSM column buttress along the sea wall in conjunction with DSM columns below Buildings 6-12 to minimize lateral spreading to 3 inches or less (Note: for Building 1, the DSM buttress was integrated into the DSMs below the building), 3) DSM columns below Buildings 1 and 6 through 12 foundations, 4) a 3-foot layer of cement-treated LTP within Buildings 1 and 6 through 12 pads to span the artificial fill between DSM columns for slab support, and 5) use of a conventional foundation system for the renovation of Buildings 2 through 5.

11. Based on our infiltration testing, infiltration of water into the subsurface soils is deemed not feasible in accordance with the County of Orange TGD manual.

RECOMMENDATIONS

REQUIRED GEOTECHNICAL MITIGATION SUMMARY

The following summarizes the required geotechnical mitigation for the site improvements:

- Lateral Spread Mitigation
    - A buttress of DSM columns will be required between the sea wall and Buildings 6 through 12. The DSM buttress will be set back 20 feet from the sea wall to minimize the potential for encountering existing riprap. Given that a conventional foundation and slab-on-grade foundation system was selected, the DSMs will be designed to reduce lateral spread deformations to 3 inches or less.
    - For Building 1, the DSM buttress was integrated into the design of the DSM columns below the building.

- Buildings 1, and 6 through 12
    - Foundations are to be supported on DSM columns due to:1) fill variability and related differential movements (both expansion and settlement), 2) seismic settlement, 3) lateral spread, and 4) tsunami scour.
    - Slab-on-grade to be supported on a Load Transfer Platform consisting of a 3-foot section of cement-treated soil designed to span between the DSM columns.

- Buildings 2 through 5A and 5B
    - Conventional shallow foundation system.
    - Removed and recompacted or slurry fill below the foundations.

- Flatwork, Pavements, Site Improvements
    - Supported by removed and recompacted engineered fill.

The following summarizes the construction sequence of the required geotechnical mitigation:

- Construction of DSM columns for the buttress and Buildings 1, and 6 through 12.
- Corrective grading of the entire site.
- Raise grades to final grade elevation (i.e., 1-3 feet above existing grades) and construction of the LTP beneath Buildings 1, and 6 through 12.
- Construction of buildings and improvements.

SITE PREPARATION

Following demolition, all significant organic material such as weeds, brush, tree branches, or roots, or construction debris such as old irrigation lines, asphalt concrete, and other decomposable material should be removed prior to the start of the construction of the DSM columns. No rock or broken concrete greater than 6 inches in diameter should be utilized in the fills.

LATERAL SPREADING MITIGATION

As discussed previously, the DSM columns are designed to reduce the lateral spread deformation to 3 inches or less in order to eliminate the need for tying of the building foundation elements in all directions in accordance with ASCE 7-16. Design of the DSM columns is provided by AGI and was reviewed by GMU and found to be in general conformance with the recommendations provided in this report. In general, the DSM buttress columns that are planned in front of Buildings 6-12 and behind the sea wall will be 6 feet in diameter, will extend a minimum of 4 feet into competent bedrock, and will be overlapped to create a continuous 12-foot-wide buttress. The buttress is planned to be set back a minimum of 20 feet from the back of the existing sea wall in order to minimize encountering the existing riprap that is supporting the sea wall; however, it should be noted that the extent of the existing riprap is currently unknown, and isolated areas of riprap may be encountered within the 20-foot zone. As previously discussed, the DSM buttress columns below Building 1 will be integrated into the DSM columns below the building (see next section). Additionally, in order to relieve hydrostatic pressure, slot-cut trenches are planned at approximately 15-foot on-center as shown on AGI's ground improvement plans.

A copy of AGI's ground improvement plans and specifications are attached as Appendix G of this report.

BUILDINGS SUPPORTED BY DSM

In addition to the DSM columns that are planned within the buttress zone behind the existing sea wall, DSM columns are also planned to support the proposed Buildings 1, and 6 through 12. The DSM columns for Buildings 6 through 12 are planned to be 4 feet in diameter and will be embedded 12 inches into bedrock or refusal, whichever occurs first. For Building 1, the DSMs below the building will consist of: 1) an outer row of 6-foot-diameter DSMs at the perimeter of the building, and 2) interior 4-foot-diameter DSM columns. All DSM columns for Building 1 will be embedded 12 inches into bedrock.

The building DSM columns design provided by AGS is presented as Appendix G of this report.

GRADING

General

The following recommendations pertain to any required grading associated with the proposed improvements and corrective grading needed to support the proposed improvements. All site preparation and grading should be performed in accordance with the County of Orange grading code requirements and the recommendations presented in this report.

Corrective Grading

In all areas of the site, corrective grading should consist of removal and recompaction of 2 feet below the existing ground surface. More detailed recommendations are contained below to ensure that all required corrective grading is performed for each type of improvement. However, it is envisioned that the blanket 2-foot removal will create the necessary corrective grading for all structures. Detailed recommendations for the soil cement LTP are also provided below.

<u>Buildings 1, and 6 through 12 Pads (Existing Grade Treatment)</u>

Corrective grading for the Building 1, and 6 through 12 pads, including the construction of the Load Transfer Platform (LTP) should be performed in accordance with the following recommendations:

- The subgrade within the proposed building pads should be excavated to a depth of 2 feet below the existing grade prior to raising of the grade. The excavation should extend laterally a minimum of 2 feet outside the edge of the buildings envelope.
- The bottom of the over-excavation should then be scarified to a depth of at least 8 inches, moisture conditioned to least 2% above optimum moisture content, and recompacted to at least 92% relative compaction.

- Following the approval of the over-excavation bottom by a representative of GMU, the onsite material mixed with the design cement content may be used as fill material to achieve the planned LTP elevation (i.e., minimum of 3 feet).
- The LTP construction should be performed in accordance with the general recommendations provided in the next section.
- Building pads that require additional fill to achieve the design grade (fill over the LTP), the onsite soil may be used as fill, provided that it is moisture conditioned to 2% above optimum moisture content and compacted to achieve 92% relative compaction.
- Fill paced above the LTP and supporting the new slabs should be tested by GMU to confirm that the expansion index (EI) of the material is less than 50.

Buildings 1, 6-12 Pads (Load Transfer Platform)

After the completion of the corrective grading, a 3-foot section of cement-treated LTP should be constructed in accordance with the following recommendations:

- The LTP, consisting of a soil-cement mixture, shall be placed over the properly recompacted subgrade.
- The minimum thickness of the LTP shall be 3 feet and extend to the edge of the building foundations envelope.
- The 3-foot-thick section of soil-cement shall be constructed in 3 lifts, with each lift having a compacted thickness of no more than 12 inches.
- A mix design shall be performed by the contractor to determine the required amount of cement for the section to achieve a 28-day unconfined compressive strength of 200 psi.
    - Based on the soil types encountered during our subsurface investigation, we anticipate that 6 percent cement can be used for bidding purposes.
    - Final mix design and cement content shall be provided by the contractor prior to performing the work and should be reviewed by GMU.
- The cement shall be dry mixed using a pulverizer. Homogenous mixing of the cement is crucial and requires proper equipment to achieve.
- Following dry mixing, perform a second mixing process with the introduction of water to hydrate the cement, if additional moisture is needed. The moisture content of the mixture must be approximately 1% to 3% above optimum moisture content. From the time the initial addition of water occurs, the material should be fully mixed (dry and wet) and compacted within 2.5 hours or less.
- Compaction of each lift of soil-cement should be performed using a large sheepsfoot compactor. Each lift of cement-treated soil shall be compacted to at least 92% of the maximum dry density as determined by ASTM D 1557.

- The surface of the treated material should wetted at least three times daily (possibly more depending on weather) to maintain a moist surface condition and promote proper curing.
- For at least 24 hours after completion of compaction, heavy traffic on the surface should be minimized to the maximum extent possible, and heavy construction equipment traffic should be completely avoided to prevent breakdown of the treated material prior to the curing process being complete. After 24 hours, the surface should be proof-rolled and checked for yielding under heavy rubber-tire vehicle loads (such as a fully-loaded water truck). If the surface indicates signs of yielding or instability, an additional 24 hours of curing time should be implemented, again minimizing heavy traffic loading.

Please refer to the attached Plate 7 for details of the typical DSM and LTP installation.

<u>Buildings 2 – 5A & 5B Foundation / Slab-On-Grade</u>

Based on our understanding that minor improvements such as construction of new interior and exterior walls with new footings and slab-on-grade may take place within the existing Buildings 2 through 5, we recommend that any new footings and slab-on-grade be supported on engineered fill in accordance with the following recommendations:

- The new footings/slab-on-grade should be excavated to a depth of 2 feet below the bottom of footing or bottom of slab.
- The bottom of the over-excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to least 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- Following the approval of the over-excavation bottom by a representative of GMU, the onsite material may be used as fill material to achieve the planned foundation bottom elevation.
- The fill material should be placed in 6- to 8-inch-thick lifts, moisture conditioned to 2% above optimum moisture content, and compacted to achieve 92% relative compaction.

As an alternative to the removal and recompaction of the onsite soils, particularly for new footing areas, the excavated 2 feet of soil may be replaced with a 2 sack sand-cement slurry.

<u>Grading of All Areas Outside Building Footprints (Landscape and Hardscape Areas):</u>

- Corrective grading in all areas outside Buildings 6 through 12 will consist of the removal and recompaction of 2 feet bgs.
- Local areas of deeper removal and recompaction may be required based on the requirements for: 1) miscellaneous site appurtenant structures/site retaining walls, 2) vehicular pavement, and 3) flatwork/hardscape/pedestrian pavers (see next sections).

- **Fills to bring the landscape areas up to grade shall not consist of spoils from the DSMs or LTP as this could create long-term perched water problems.**

Miscellaneous Site Appurtenant Structures / Site Retaining Walls

Grading recommendations for miscellaneous site appurtenant structures and site retaining walls should consist of the following:

- The foundations for appurtenant structures should be over-excavated to a depth of at least 24 inches below the bottom of the foundations.
- The bottom of the over-excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to least 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- Following the approval of the over-excavation bottom by a representative of GMU, the onsite material may be used as fill material to achieve the planned foundation bottom elevation.
- The fill material should be placed in 6- to 8-inch-thick lifts, moisture conditioned to 2% above optimum moisture content, and compacted to achieve 92% relative compaction.

Vehicular Pavement

Grading recommendations for the new vehicular pavement areas should consist of the following:

- The vehicular pavement section should be over-excavated to a depth of at least 12 inches below the bottom of the pavement section (i.e., 12 inches below the bottom of the aggregate base).
- The bottom of the over-excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to least 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- Following the approval of the over-excavation bottom by a representative of GMU, the onsite material may be used as fill material to achieve the planned subgrade elevation. Spoil generated by the construction of the DSMs or LTP may also be used to bring the subgrade up to the bottom of the structural pavement section.
- The fill material should be placed in 6- to- 8-inch-thick lifts, moisture conditioned to at least 2% above optimum moisture content, and compacted to achieve 92% relative compaction.

Flatwork/Hardscape/Pedestrian Pavers

Grading recommendations for the new concrete flatwork/hardscape/pedestrian pavers areas should consist of the following:

- The flatwork/hardscape/pedestrian pavers section should be over-excavated to a depth of at least 12 inches below the bottom of the pavers sections (i.e., 12 inches below the bottom of the aggregate base).
- The bottom of the over-excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to least 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- Following the approval of the over-excavation bottom by a representative of GMU, the onsite material may be used as fill material to achieve the planned subgrade elevation.
- The fill material should be placed in 6- to- 8-inch-thick lifts, moisture conditioned to at least 2% above optimum moisture content, and compacted to achieve 92% relative compaction.
- The flatwork sections should be placed on either a 4-inch-thick layer of crushed miscellaneous base (CMB), crushed aggregate base (CAB), or imported granular material with an EI of 50 or less. To bring the flatwork grade up to within 4 inches of the bottom of the flatwork, spoils from the DSMs or LTP construction may be used, provided that the material is moisture conditioned to 2% above optimum moisture content and compacted to achieve 92% relative compaction.

Additional Grading Recommendations

If existing loose fill materials are found to be disturbed to depths greater than the proposed remedial grading, the depth of excavation, scarification, and re-compaction should be increased accordingly in local areas as recommended by GMU. GMU will need to provide site-specific recommendations based on their observations in the field.

Dewatering

Groundwater is not anticipated to be encountered during corrective grading. However, groundwater should be anticipated during installation of deeper utilities and should be pumped from utility trenches prior to placement of slurry. Final evaluation as to the need for and type of dewatering should be made by the contractor immediately prior to grading. It is recommended that groundwater monitoring be performed prior to the start of construction.

Volume Change

In order to aid in planning for the anticipated grading, we estimate that the change in volume of on-site disturbed surficial fills that are excavated and placed as new compacted fill at an average relative compaction of 92% will result in volume losses ranging from approximately 5% to 10%. For rough planning purposes only, an average volume loss of 7.5% may be assumed.

GRADING AND APPROVAL PROCEDURES

Based on discussions with the County of Orange, facilitated by the Geotechnical Reviewer Mr. Ryan Rose, the grading will be processed under a single precise grading permit. However, individual building pad releases will be granted on a per-pad basis upon completion of the following items for each building pad:

- Demolition
- Installation of Deep Soil Mixing (DSM) columns within the building pad
- All corrective grading – i.e., minimum 2' bgs
- Construction of the cement-treated Load Transfer Platform (LTP) within the building pad.

To release each pad, a grading pad release letter will be prepared by GMU and submitted to the County of Orange. Subject to approval by the County of Orange, each pad can be incrementally released for trenching related to foundation construction. A building permit will need to be obtained prior to foundation construction. In addition, it should be noted that the final grading permit will not be signed off until all the precise grading is complete outside the building pads for all of the buildings (i.e., utility trench backfill, surface drainage, etc.)

TEMPORARY EXCAVATIONS

Temporary excavations for demolition, earthwork, footings, and utility trenches are expected. We anticipate that unsurcharged excavations with vertical side slopes less than or equal to 4 feet high will generally be stable; however, all temporary excavations should be observed by the contractor (primary responsibility) as well as a representative of GMU to verify the soil types and identify special conditions. Our preliminary recommendations for temporary excavations are as follows:

- OSHA Soil Types for Excavation Requirements:
    - Artificial Fill: Type C
    - Bedrock: Type B
- Additional Recommendations:
    - The tops of the excavations should be barricaded so that vehicles and storage loads do not encroach within 10 feet of the excavations. A greater setback may be necessary for heavy vehicles, such as concrete trucks and cranes. GMU should be advised of such heavy vehicle loadings so that specific setback requirements can be established.
    - If the temporary construction excavations are to be maintained during the rainy season, berms are recommended to be graded along the tops of the excavations in

order to prevent runoff water from entering the excavation and eroding the slope faces.

- There is a potential for caving and collapse of sidewalls for excavations performed below groundwater. Proper lateral support and/or shoring should be implemented by the contractor based on the conditions exposed and as evaluated by GMU.

Our temporary excavation recommendations are provided only as **minimum** guidelines. All work associated with temporary excavations should meet the minimal safety requirements as set forth by CAL-OSHA. **Temporary slope construction, maintenance, and safety are the responsibility of the contractor.**

Although not anticipated, shoring may be required where the sides of the excavation cannot be sloped to the requirements provided in this report or as required by OSHA for the given soil types. Shoring design (if required) should be based on our geotechnical maps, cross sections, boring logs, and laboratory testing provided in this report. Shoring design performed by others should be reviewed by this office.

STRUCTURE SEISMIC DESIGN

Site-specific seismic design parameters were determined using the USGS computer program ASCE 7 Hazard Tool. The site coordinates used in the analysis were 33.46085° North Latitude and 117.69342° West Longitude. Based on our field exploration and the site soil profile, the site is designated as Site Class C. Seismic design coefficients based on ASCE 7-16 and the 2019 CBC are listed in table below.

2019 CBC and ASCE 7-16 Seismic Design Parameters

Seismic Item	Design Values[(a)]	ASCE 7-16 or 2019 CBC Reference
Site Class based on soil profile (ASCE 7-16 Table 20.3-1)	C	ASCE 7-16 Table 20.3-1
Short Period Spectral Acceleration S_s	1.266	CBC Figures 1613.2.1 (1-8)
1-sec. Period Spectral Acceleration S_1	0.455	CBC Figures 1613.2.1 (1-8)
Site Coefficient F_a (2019 CBC Table 1613.2.3(1))	1.2	CBC Table 1613.2.3 (1)
Site Coefficient F_v (2019 CBC Table 1613.2.3(2))	1.5	CBC Table 1613.2.3 (2)
Short Period MCE* Spectral Acceleration S_{MS} $S_{MS} = F_a S_s$	1.519	CBC Equation 16-36
1-sec. Period MCE Spectral Acceleration S_{M1} $S_{M1} = F_v S_1$	0.682	CBC Equation 16-37
Short Period Design Spectral Acceleration S_{DS} $S_{DS} = 2/3S_{Ms}$	1.012	CBC Equation 16-38
1-sec. Period Design Spectral Acceleration S_{D1} $S_{D1} = 2/3S_{M1}$	0.455	CBC Equation 16-39
MCE[(b)] Peak Ground Acceleration (PGA)	0.555	ASCE 7-16 Figures 22-9 to 22-13
Site Coefficient F_{PGA} (ASCE 7-16 Table 11.8-1)	1.2	ASCE 7-16 Table 11.8-1
Modified MCE[(b)] Peak Ground Acceleration (PGA_M)	0.666	ASCE 7-16 Equation 11.8-1
Seismic Design Category	D	ASCE 7-16 Tables 11.6.1 and 11.6.2

It should be recognized that much of Southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2019 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

COMMERCIAL BUILDINGS 1 AND 6-12 DESIGN RECOMMENDATIONS

Geotechnical Slab and Foundation Recommendations

<u>General</u>

Buildings 1 and 6 through 12 should founded on conventional foundations supported on DSM columns and a slab-on-grade supported on a blanket of cement-treated Load Transfer Platform (LTP). Please refer to the detail presented on the attached Plate 7 for DSM and LTP installation.

<u>Slab Design</u>

- Slab Support
  - Minimum 3-foot-thick section of cement-treated LTP or onsite soil underlain by 3-foot section of LTP. See previous "Corrective Grading" section (Page 17).
    - Subgrade compaction
      - 92% relative compaction
      - 1-3% over optimum moisture content for soil-cement mixture. 2% over optimum for onsite soil.
- Slab Type
  - Conventional
    - The minimum slab thickness and reinforcement provided below considers that the onsite soil consist of medium expansive soil and that the LTP will provide uniform support for the proposed slab.
  - Minimum Thickness
    - 5 inches
    - Final thickness to be determined by the structural engineer
  - Minimum Reinforcement
    - #4 bars at 16 inches o.c.
    - Final reinforcement to be specified by the structural engineer
- Moisture Retarder/Barrier
  - 15-mil Stegowrap or equivalent installed in strict compliance with the manufacture's recommendations.

Foundation Design

- Footing Type
  - Conventional spread and continuous footings
- Footing Support – DSM
  - DSM columns extended into bedrock
  - Minimum 12 inches into bedrock or refusal, whichever occurs first, as verified under the observation or supervision of a Certified Engineering Geologist
  - Note: Groundwater should be anticipated during the deep soil mixing process. See Plate 5.
- Minimum Footing Size
  - Minimum dimensions
    - Width: 24 inches
    - Depth: 24 inches below lowest adjacent grade
- Allowable Bearing Value
  - 5,000 psf
  - As determined by AGI in their design document submitted under separate cover.
  - This value may be increased by 1/3 for short-term loadings such as seismic and wind.
- Preliminary Settlement Estimate
  - DSM
    - Static Total: 1 inch
    - Static Differential: 0.5 inch over a span of 40 feet
    - See AGI design submittal
  - Seismic Settlement
    - Total: 0.75 inch
    - Differential: 0.5 inch over a span of 40 feet
- Passive Resistance and Preliminary Friction Coefficient
  - Passive resistance: 300 psf/ft (engineered fill)
    - Disregard upper 6 inches
    - Maximum allowable of 3,000 psf
  - Friction coefficient: 0.35
  - 1/3 increase for temporary loads such as wind or seismic
- Concrete (Foundation and Slab)*
  - Type: II/V
  - Maximum water/cement ratio: 0.50
  - Minimum compressive strength of 4,000 psi

*See "**Structural Concrete**" section of this report (Page 29).

COMMERCIAL BUILDINGS 2-5A and 5B DESIGN RECOMMENDATIONS

We understand that some of the buildings identified as Buildings 2 through 5 will be remodeled by removing and re-configuring some of the interior and exterior walls. As part of this remodel, new footings and re-construction of existing slab-on-grades are expected. Recommendations for new footings and slab-on-grade are presented below.

<u>Slab Design</u>

- Slab Support
  - Minimum 2-foot removal and recompaction
    - Subgrade compaction
      - 92% relative compaction
      - 2% over optimum moisture content
- Slab Type
  - Conventional
    - The minimum slab thickness and reinforcement provided below considers that the onsite soil consist of medium expansive soil and that the LTP will provide uniform support for the proposed slab.
  - Minimum Thickness
    - 5 inches
    - Final thickness to be determined by the structural engineer
  - Minimum Reinforcement
    - #4 bars at 18 inches o.c.
    - Final reinforcement to be specified by the structural engineer
- Moisture Retarder/Barrier
  - 15-mil Stegowrap or equivalent installed in strict compliance with the manufacturer's recommendations.

<u>Foundation Design</u>

- Footing Type
  - Conventional spread and continuous footings
- Footing Support – 2 feet of engineered fill
  - May consist of 2 feet of compacted onsite soil or
  - 2 feet of 2 sack sand cement slurry
- Minimum Footing Size
  - Minimum dimensions
    - Width: 18 inches
    - Depth: 24 inches below lowest adjacent grade

- Allowable Bearing Value
  - 2,500 psf
  - This value may be increased by 1/3 for short-term loadings such as seismic and wind
- Settlement Estimate
  - Static Total: 1 inch
  - Static Differential: 0.5 inch over a span of 40 feet
- Passive Resistance and Preliminary Friction Coefficient:
  - Passive resistance: 300 psf/ft (engineered fill)
    - Disregard upper 6 inches
    - Maximum allowable of 3,000 psf
  - Friction coefficient: 0.35
  - 1/3 increase for temporary loads such as wind or seismic
- Concrete (Foundation and Slab)*
    - Type: II/V
    - Maximum water/cement ratio: 0.50
    - Minimum compressive strength of 4,000 psi

*See "**Structural Concrete**" section of this report (Page 29).

NON-BUILDING MISCELLANEOUS STRUCTURES DESIGN RECOMMENDATIONS

The following recommendations pertain to non-building foundations supported on 2 feet of engineered fill in accordance with "Corrective Grading" section (Page 17). The design parameters presented below may be used for foundation structural design.

- Bearing Material
  - 2 feet of engineered fill
- Minimum Footing Size
  - Width: 18 inches
  - Depth: 24 inches embedment below lowest adjacent soil grade (depth)
- Allowable Bearing Capacity: 2,000 psf for the minimum footing size given above.
  - Above value may be increased by 1/3 for short-term loading such as wind or seismic
- Lateral Foundation Resistance
  - Allowable passive resistance: 300 psf/ft (disregard upper 6 inches, max 3,000 psf)
  - Allowable friction coefficient: 0.35
  - Above values may be combined without reduction and may be increased by 1/3 for temporary loads such as wind or seismic

SITE RETAINING WALLS DESIGN AND CONSTRUCTION

- Foundation Design
  - Minimum Foundation Width: 24 inches
  - Minimum Foundation Depth: Depth below lowest adjacent grade to bottom of footing: 24 inches
  - Bearing Materials: Minimum of 2 feet of engineered fill
  - Allowable Bearing Capacity: 2,000 psf for footing on level ground; may be increased 750 psf for each additional foot of width or depth to a maximum of 4,000 psf. (1/3 increase for wind or seismic)
  - Unit Weight of Backfill: 125 pcf
  - Lateral Foundation Resistance:
    - Allowable Passive Earth Pressure: 300 psf/ft of depth (static)
    - Coefficient of Friction: 0.35
    - Disregard upper 6 inches
    - May be increased 1/3 for seismic conditions
    - May be combined without resistance
  - Wall Design Parameters
    - Active Earth Pressure: 40 pcf – Assumptions: 1) level backfill; 2) select backfill; 3) back-drainage; and 4) wall movement > 0.01 H allowed.
    - Seismic Earth Pressure Walls > 6 feet: 17 pcf – triangular distribution
    - Weight of Backfill: 125 pcf
    - Control/Construction Joints: As a minimum, maximum spacing of 15 feet and at angle points (non-basement walls)
    - Waterproofing: The back side of all retaining walls should be waterproofed down to the top of the foundation prior to placing subdrains or backfill. The design and selection of the waterproofing system is outside the scope of our report and is outside our purview.
  - Concrete*: Type II/V cement (geotechnical perspective only)
    0.50 w/c ratio
    4,000 psi concrete

*See “**Structural Concrete**” section of this report (Page 29).

- Wall Backfill and Drainage: See Plate 6 – Retaining Wall Construction Detail
- Select Backfill
  - Low expansion
  - Subject to geotechnical approval

POLE FOUNDATION DESIGN RECOMMENDATIONS

Pole foundations will be required for the light bollards for the new parking areas. As a minimum, the pole foundations should be at least 18 inches in diameter and at least 4 feet deep; however, the actual dimensions should be determined by the project structural engineer based on the following design parameters.

- Bearing Materials: Engineered fill approved by a representative from GMU.
- Bearing Values: Allowable bearing pressure of 3,000 pounds per square foot (psf). At least 18 inches in diameter and embedded a minimum of 4 feet below the lowest adjacent grade.
- Lateral Load: Passive resistance of 300 pounds per foot of pile diameter per foot of depth into competent bearing material.

  Passive resistance should be disregarded within the upper foot due to possible disturbance during drilling. The passive resistance may be assumed to be acting over an area equivalent to two pile diameters.

STRUCTURAL CONCRETE

Laboratory tests indicate that the onsite soils in the general area of the site possess moderate levels of sulfate content or "S1" exposure per ACI 318-14, Table 19.3.1.1. Therefore, any structural features which will be in direct contact with the site soils at depth will have restrictions on the type of Portland cement, water to cement ratio, and the concrete compressive strength per ACI 318, Table 19.3.2.1 as follows:

- Type II/V cement with a maximum water to cement ratio of 0.50, and a minimum compressive strength of 4,000 psi (from a geotechnical perspective only).
- **NOTE: Any reinforced concrete elements that extend below the water table should be designed for C2 (Severe) exposure to moisture and chlorides, which consists of a maximum water to cement ratio of 0.40 and minimum compressive strength of 5,000 psi in accordance with ACI 318, Table 19.3.2.1.**

The aforementioned recommendations regarding concrete are made from a soils perspective only. Final concrete mix design is beyond our purview. All applicable codes, ordinances, regulations, and guidelines should be followed regarding designing a durable concrete with respect to the potential for sulfate exposure from the on-site soils and/or changes in the environment. Due to the potential for seawater exposure, the use of a corrosion engineer should be considered.

FERROUS METAL CORROSION

The results of the laboratory chemical tests performed on a sample of soil collected within the site indicate that the on-site soils are moderately corrosive to ferrous metals. In addition, some utilities may be planned below the groundwater table which may have elevated chlorides due to seawater. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal signposts, etc.), in close proximity to the soil (wrought iron fencing, etc.), and/or below the groundwater table may be subject to corrosion.

The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. Additional provisions will be required to address the high chloride contents of the soil or groundwater per the 2019 CBC to protect the concrete reinforcement. The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary).

The above discussion is provided for general guidance regarding the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview. If detailed testing is required, a corrosion engineer should be consulted to perform the testing and develop appropriate mitigation measures.

MOISTURE VAPOR TRANSMISSION

Moisture Vapor Retarder

A vapor retarder or barrier such as Stego 15 Mil Class A or equivalent should be utilized beneath the building slabs. The retarder/barrier should be installed as follows:

- Below moisture-sensitive floor areas.
- Installed per the manufacture's specifications as well as with all applicable recognized installation procedures such as ASTM E1643-98.

- Joints between the sheets and the openings for utility piping should be lapped and taped. If the barrier is not continuously placed across footings/ribs, the barrier should, as a minimum, be lapped into the sides of the footings/rib trenches down to the bottom of the trench.
- Punctures in the vapor barrier should be repaired prior to concrete placement.

A capillary break is not required. Also, sand and/or the amount of sand above the moisture vapor retarder should be specified by the owner. The selection of sand above the retarder is not a geotechnical engineering issue and is hence outside our purview.

Water Vapor Transmission Discussion

The placement of a moisture vapor retarder below all slab areas is recommended where moisture sensitive flooring will be placed. It should be noted that the moisture retarder is intended only to reduce moisture vapor transmissions from the soil beneath the concrete and is consistent with the current standard of the industry in building construction in Southern California. It is not intended to provide a "waterproof" or "vapor proof" barrier or reduce vapor transmission from sources above the retarder (i.e., concrete). Sources above the retarder include any sand placed on top of the retarder (i.e., to be determined by the project structural designer) and from the concrete itself (i.e., vapor emitted during the curing process). The evaluation of water vapor from any source and its effect on any aspect of the proposed building space above the slab (i.e., floor covering applicability, mold growth, etc.) is outside our purview and the scope of this report.

Floor Coverings

Prior to the placement of flooring, the floor slabs should be properly cured and tested to verify that the water vapor transmission rate (WVTR) is compatible with the flooring requirements.

SURFACE DRAINAGE

Surface drainage should be carefully controlled during and after grading to prevent ponding and uncontrolled runoff adjacent to building structures and/or other properties. Care will be required during grading to maintain slopes, swales, and other erosion control measures needed to direct runoff toward permanent surface drainage facilities. Positive drainage of at least 2% away from the perimeters of the structures and site pavements should be incorporated into the design. In addition, it is recommended that nuisance water be directed away from the perimeters of the structures using area drains in adjacent landscape and flatwork areas and roof drains tied into the site storm drain system.

INFILTRATION DESIGN CONSIDERATION

Based on our infiltration testing discussed in a previous section of this report, the installation of an infiltration facility such as an infiltration basin or trench within the subject site is not feasible from a geotechnical standpoint. On this basis, we recommend that one or more of the following Best Management Practices (BMPs) be considered:

- Rain gardens and dispersion trenches
- Bioretention areas and planters
- Permeable pavement
- Similar BMP's infiltrating over an extensive surface area and providing robust pretreatment or embedded treatment process.

Final selection of the type and location of BMP should be provided by the project civil engineer.

BIORETENTION AREAS

If bioretention features are installed, we recommend that an impermeable liner be installed at the bottom and sides of all bioretention areas to prevent vertical and lateral water migration into the adjacent structures and pavements. The design of bioretention basins above the liner is beyond our purview.

UTILITY DESIGN AND BACKFILL CONSIDERATIONS

Utility Design

<u>Buoyancy</u>

Utilities may be subject to buoyancy uplift forces. As a minimum, groundwater levels contained on Plate 5 should be assumed subject to the "notes" contained therein.

<u>Additional Considerations</u>

Site liquefaction may affect the utilities, pavements, and other site improvements. These improvements will be affected by total, regional differential, and local differential seismic settlements. In this regard, wherever possible, utilities should not be located under building slabs.

The following additional recommendations should also be considered.

- We recommend flexible PVC connections for the utilities connecting to the buildings, and earthquake shut-off valves for pressured utilities at their entrance to the site in accordance with SCWD standards.
- Significant repair and/or replacement will likely be required for all appurtenant structures and utilities in areas not mitigated for liquefaction, in the event of the design level earthquake.
- Any proposed cast iron piping should consider the corrosivity of the onsite soil in accordance with "Ferrous Metal Corrosion" section of this report (Page 30).

Utility Trench Backfill

General

New utility pipeline trenches should be backfilled with select bedding materials beneath and around the pipes and compacted soil above the pipe bedding where utilities are located above groundwater, and slurry backfill where utilities are placed below groundwater. Recommendations for the types of the materials to be used and the proper placement of these materials are provided in the following sections.

Pipe Bedding (Above Groundwater)

The pipe bedding materials should extend from at least 6 inches below the pipes to at least 12 inches above the crown of the pipes. Pipe bedding should consist of either clean sand with a sand equivalent (SE) of at least 30, or crushed rock. If crushed rock is used, it should consist of ¾-inch crushed rock that conforms to Table 200-1.2.1 (A) of the 2021 "Greenbook." Pipe bedding should also meet the minimum requirements of the County of Orange. If the requirements of the County are more stringent, they should take precedence over the geotechnical recommendations. Sufficient laboratory testing should be performed to verify the bedding meets the minimum requirements of the Greenbook and City of Dana Point and County of Orange grading codes.

Based on our subsurface exploration and knowledge of the onsite materials, the soils that will be excavated from the pipeline trenches will not meet the recommendations for pipe bedding materials; therefore, imported materials will be required for pipe bedding.

Granular pipe bedding material having a sand equivalent of 30 or greater should be properly placed in thicknesses not exceeding 3 feet, and then sufficiently flooded or jetted in place.

Crushed rock, if used, should be capped with filter fabric (Mirafi 140N, or equivalent) to prevent the migration of fines into the rock.

Utility Trench Backfill (Above Groundwater)

All existing soil material within the limits of the pipeline alignment is considered suitable for use as trench backfill above the pipe bedding zone or above the slurry if care is taken to remove all significant organic and other decomposable debris, and moisture condition the soil materials as necessary.

Imported soils are not anticipated for backfill since the on-site soils are suitable. However, if imported soils are used, the soils should consist of clean, granular materials with physical and chemical characteristics similar to those described herein for on-site soils. Any imported soils to be used as backfill should be evaluated and approved by GMU prior to placement.

Soils to be used as trench backfill should be moistened, dried, or blended as necessary to achieve a minimum of 2% over optimum moisture content for compaction, placed in loose lifts no greater than 8 inches thick, and mechanically compacted/densified to at least 90% relative compaction as determined by ASTM Test Method D 1557. Jetting is not permitted in this trench zone.

No rock or broken concrete greater than 6 inches in maximum diameter should be utilized in the trench backfills.

Utility Trench Backfill (Below Groundwater)

Utilities that are planned below the groundwater elevation should be backfilled with 2 sack sand-cement slurry to at least 6 inches above the encountered groundwater. The backfill zone above the groundwater may consist of onsite soil or 2 sack sand-cement slurry. If onsite soil is used, it should be placed after the slurry has been allowed to cure for a minimum of 8 hours. The onsite soil should be placed in accordance with the above "Utility Trench Backfill (Above Groundwater)" section.

DSM / LTP Trench Backfill

Utility trench backfills that are planned within the proposed DSM columns and/or building LTP should consist of 2 sack sand-cement slurry regardless if the trenches are above or below groundwater.

PAVEMENT DESIGN RECOMMENDATIONS

General

It is expected that the driveways within the site will be constructed with both asphalt pavement and Portland cement concrete. Therefore, recommendations for both types of pavement areas are provided in the following sections. In order to accommodate fire truck and trash truck loadings, a traffic index (T.I.) of 5.5 has been assumed for the drive areas.

Asphalt Pavement Design

Based on an anticipated R-value of 10, to be obtained after precise grading of asphalt pavement subgrade in the commercial area, the following pavement thicknesses should be anticipated:

Location	R-Value	Traffic Index	Asphalt Concrete (in.)	Aggregate Base (in.)
Car Parking Stalls	10	4.0	4.0	4.0
Drive Aisles	10	5.5	4.0	9.5
Drive Aisles/ Fire Lane	10	7.0	6.0	11.5

Based on our analyses and the provided T.I. of 7.0 for a fire lane, as determined by the project civil engineer, we note that the structural section provided above is adequate to support an occasional OCFA 94,000-pound fire apparatus.

Asphalt pavement structural sections should consist of:

- Crushed miscellaneous base (CMB) or crushed aggregate base (CAB) materials meeting the minimum County of Orange requirements.
- Asphalt concrete (AC) materials of a type meeting the minimum County of Orange requirements.
- The subgrade soils may consist of either onsite soils or recompacted spoils from the DSM and LTP construction, and should be moisture conditioned to a minimum 2% above the optimum moisture content to a depth of at least 6 inches and compacted to at least 92% relative compaction (per ASTM 1557).
- The CMB or CAB and AC should be compacted to at least 95% relative compaction (per ASTM 1557).

Portland Cement Concrete Pavement Design

Driveways, vehicular drives, and appurtenant concrete paving such as trash receptacle bays, will require Portland cement concrete (PCC) pavement. Assuming a T.I. of 6 to 7, a design section of 8 inches of PCC over 6 inches AB should be adequate. PCC vehicular pavement should be designed in accordance with the County of Orange standards.

- The subgrade soils may consist of either onsite soils or recompacted spoils from the DSM and LTP construction, and should be moisture conditioned to a minimum 2% above the optimum moisture content to a depth of at least 6 inches and compacted to at least 92% relative compaction (per ASTM 1557).
- The CMB or CAB should be compacted to at least 95% relative compaction (per ASTM 1557).

TURF BLOCK PAVEMENT

We understand that Turf Block pavement is proposed on the project within some parking stalls and fire lanes adjacent to the proposed buildings. It is also our understanding that area drains will be installed within the turf blocks to direct water away from the turf block in order to avoid ponding and saturation of the underlying aggregate base material. Based on this, we have developed the following minimum recommendations for the turf block sections based on an assumed Traffic Index (T.I.) of 4.0 for parking stalls and 7.0 for fire lanes, and the tested R-value of 10 for the subgrade soil.

- Based on a T.I. of 4.0 for the parking stalls, we recommend that the proposed turf blocks be underlain by a 2-inch-thick leveling course of sand over 13 inches of Crushed Aggregate Base (CAB) or Crushed Miscellaneous Base (CMB).
- The turf block proposed within the fire lanes with a T.I. of 7.0 or less should be underlain by a 2-inch-thick leveling course consisting of sand over 22 inches of Crushed Aggregate base (CAB) or Crushed Miscellaneous Base (CMB).
- The CAB or CMB materials should meet current Greenbook and County of Orange requirements.
- The CAB or CMB should be placed at or above optimum moisture content and compacted to at least 95% relative compaction.
- The aggregate base should be underlain by a geofabric consisting of Mirafi 600x or equivalent placed over a properly prepared subgrade.

RECYCLED AC MATERIAL

The use of stockpiled, site-derived recycled AC and crushed miscellaneous base (CMB) material for new engineered fill subgrade, and CMB outside buildings and landscaped areas and under new asphalt concrete pavement and hardscape, will require GMU to conduct conformance laboratory testing on representative samples of the pulverized recycled materials to confirm that the samples meet the 2021 Greenbook Section 200-2.4 standards for Crushed Miscellaneous Base. GMU recommends that the recycled materials may be used as engineered fill for exterior subgrade structural support of new asphalt concrete and hardscape improvements outside of the building envelopes. The recycled materials are not to be used as compacted fill for support under any of the building areas or planters on the subject site.

DISINTEGRATED GRANITE WALKWAYS

Due to the expansive nature of the on-site soils, we recommend that the subgrade for the Disintegrated Granite (DG) pedestrian walkways be moisture conditioned to 2% over optimum to a depth of 18 inches below finish grade and compacted to 90% relative compaction. A 4-inch-thick section of Class 2 aggregate base (AB) or crushed miscellaneous base (CMB) should then be placed on the compacted subgrade soils, brought to optimum moisture condition, and compacted to 95% relative compaction prior to placement of the DG. We recommend that the minimum section for the new DG pedestrian walkways consists of 4 inches of DG moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction. The DG materials should be in conformance with Section 200-2.7 of the 2021 “Greenbook” Standard Specifications for Public Works Construction.

FLATWORK DESIGN RECOMMENDATIONS

We anticipate that the proposed improvements will be constructed on previously placed compacted fill material and will require minimum processing. However, prior to construction of flatwork/hardscape, we recommend that a 4-inch-thick layer of CMB material be incorporated below the proposed flatwork/hardscape. Spoils generated from the DSM and/or LTP may be used to achieve finish subgrade elevation for the proposed hardscape/flatwork as described in the “Corrective Grading” section of this report (Page 17). The flatwork table provided within Appendix F of this report may be utilized for integration of flatwork into the grading plans.

ROOT BARRIERS

Where new trees or large shrubs are to be located in close proximity to new concrete flatwork, rigid moisture/root barriers should be placed around the perimeter of the flatwork to at least 12 inches in depth in order to offer protection of the flatwork against potential root and moisture damage. Any flatwork near existing mature trees should also incorporate a rigid moisture/root barrier placed at least 2 feet in depth below the top of the flatwork.

PLAN REVIEW AND FUTURE SERVICES

PLAN REVIEW

Our office should review the final approved precise grading plans, DSM mitigation plans, and landscape plans for the site and comment on the anticipated effects of any major changes from the plans reviewed for this report. In addition, the final building foundation plans and final foundation loads will need to be reviewed to confirm that settlements are within tolerable limits.

FUTURE SERVICES

Construction Plan Review

GMU should review the final construction plans to confirm they are consistent with our recommendations provided in this report.

Geotechnical Testing During Grading and Construction

Given the complexity of the project, it is critical that geotechnical observation and testing is performed by GMU during the following stages of precise grading and construction:

- During site clearing and grubbing.
- During removal of any buried irrigation lines or other subsurface structures.
- During all phases of precise grading including over-excavation, temporary excavations, removals, scarification, ground preparation, moisture conditioning, proof-rolling, and placement and compaction of all fill materials.
- During installation of the DSM columns for the buttress and buildings.
- During grading for the cement treated load transfer platform.
- During installation of all foundations and floor slab elements.
- During backfill of underground utilities.
- During flatwork and paver section placement and compaction.
- During pavement section placement and compaction.
- When any unusual conditions are encountered.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgements. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and foundation installation will be identical to those observed and sampled during our study or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the grading and use of the property.

Because our conclusions and recommendations are based on a limited amount of current and previous geotechnical exploration and analysis, all parties should recognize the need for possible revisions to our conclusions and recommendations during grading of the project. Additionally, our conclusions and recommendations are based on the assumption that our firm will act as the geotechnical engineer of record during grading of the project to observe the actual conditions exposed, to verify our design concepts and the grading contractor's general compliance with the project geotechnical specifications, and to provide our revised conclusions and recommendations should subsurface conditions differ significantly from those used as the basis for our conclusions and recommendations presented in this report.

Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview.

This report has not been prepared for use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

CLOSURE

If you have any questions concerning our findings or recommendations, please do not hesitate to contact us and we will be happy to discuss them with you. The Plates and Appendices A through G that complete this report are listed in the Table of Contents.

Respectfully submitted,

David R. Atkinson
Project Manager

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Gregory Silver, M.Sc., PE, GE 2336
President / CEO
Principal Geotechnical Engineer

ns/17-206-02 (5-27-21)

SITE-SPECIFIC REFERENCES

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AERIAL PHOTOGRAPHS

DATE	FLIGHT	PHOTO
4-19-99	C136-45	170-171
10-15-97	C117-45	118-119
1-2-95	C101-45	10-11
1-14-92	C85-18	2-3
1-9-92	C-7	112-113-114
11-14-87	C-1	0012-0013
1-9-87	F	294-295
5-18-83	218-11	32-33
1-31-81	211-11	24-25
2-26-80	80033	268-269
12-13-78	203-11	43-44
1-24-77	181-11	31
1-13-75	157-11	27-28
10-29-73	132-10	20-21
1-31-70	61-10	223-224-225
3-30-67	2	94-95-96
9-20-65	1FF	86-87
3-28-59	261-R25	77-78
12-12-52	3K	49-50

TECHNICAL REFERENCES

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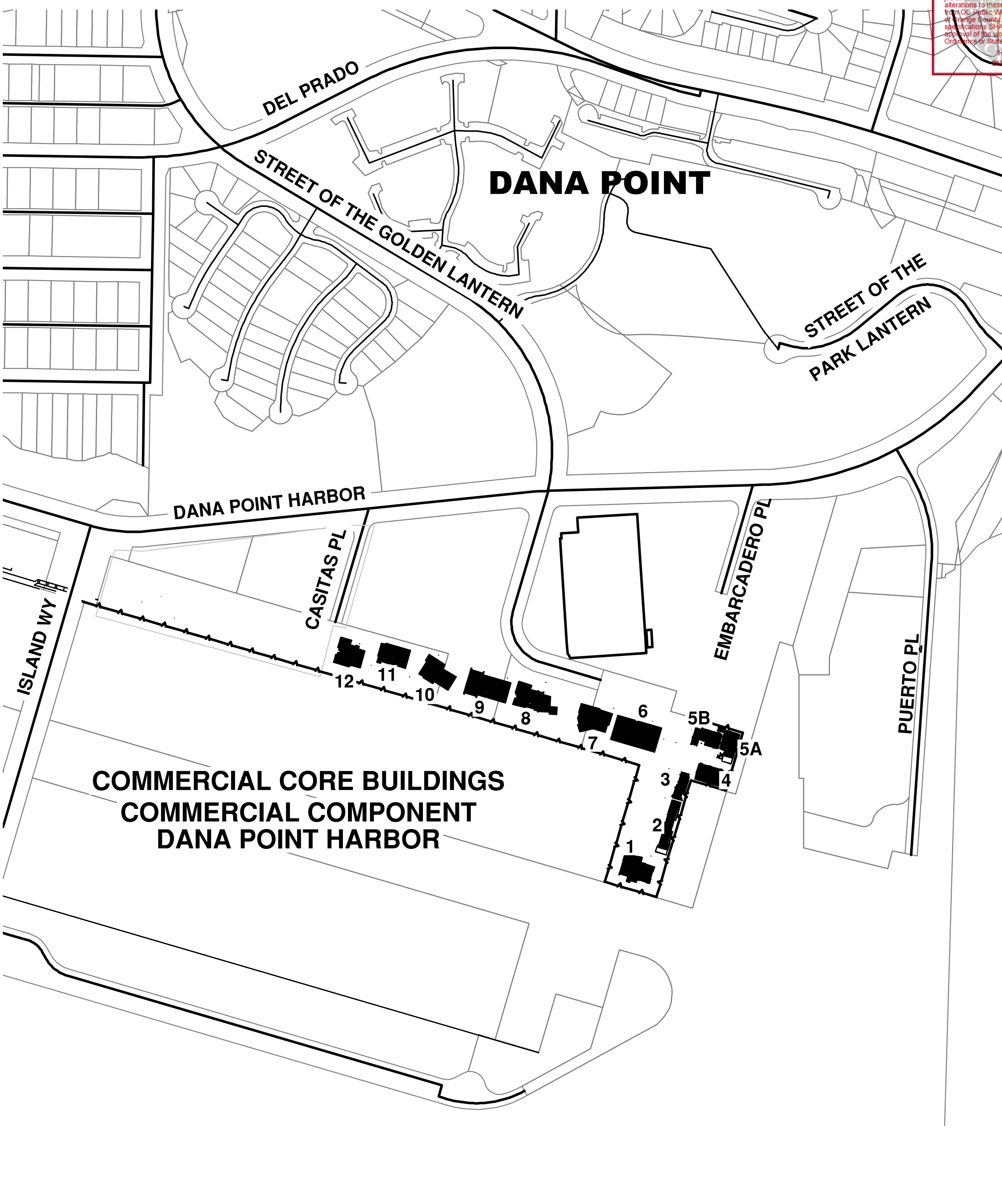
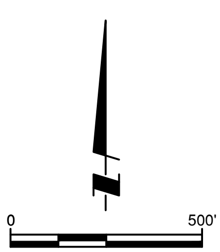
Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245





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Location Map
Commercial Buildings
Commercial Component
Dana Point Harbor Partners, LLC.

GMU

Date:	May 27, 2021	Plate
Project No.:	17-206-02	1

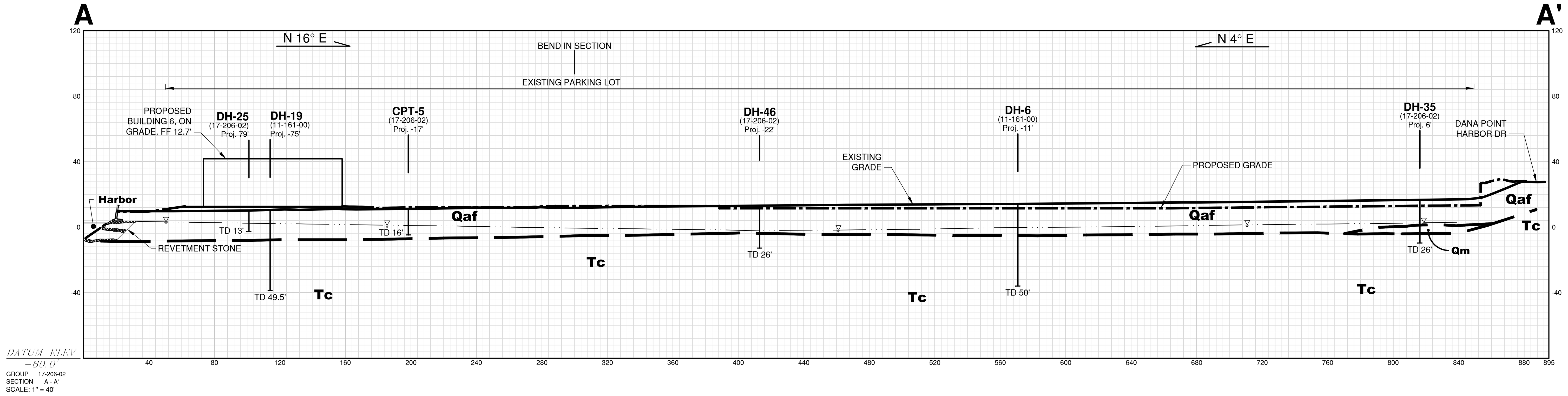
GEOTECHNICAL LEGEND

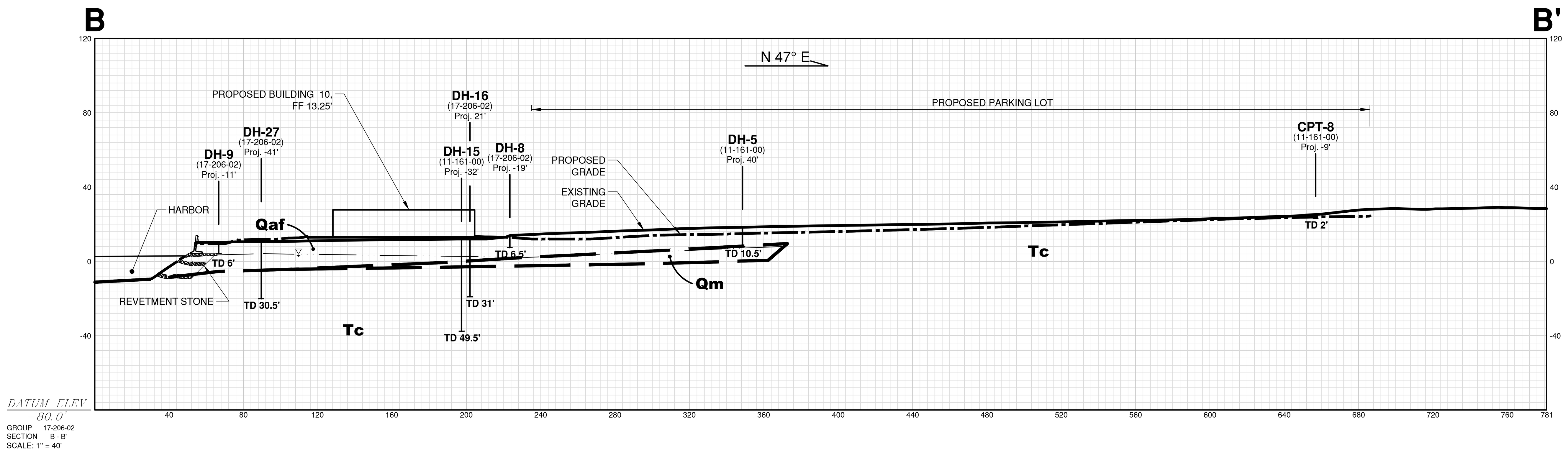
Qaf	ENGINEERED ARTIFICIAL FILL
Qm	MARINE DEPOSITS, CIRCLED WHEN BURIED
Tc	CRISTIANITOS FORMATION, CIRCLED WHEN BURIED
Tm	MONTEREY FORMATION, CIRCLED WHEN BURIED
DH	APPROXIMATE DRILL HOLE LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT 17-206-02
DH	APPROXIMATE INFILTRATION TEST LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT NO. 17-206-02
CPT-7A	APPROXIMATE LOCATION OF GMU CONE PENETRATION TEST HOLE PROJECT 17-206-02
DH-4	APPROXIMATE LOCATION OF GMU DRILL HOLE LOCATIONS (PROJECT 11-161-00)
DH-24	APPROXIMATE LOCATION OF GMU INFILTRATION TESTS (PROJECT 11-161-00)
CPT-3	APPROXIMATE LOCATION OF GMU CONE PENETRATION TEST HOLE (PROJECT 11-161-00)
C-4	APPROXIMATE LOCATION OF GMU ASPHALT CORE HOLE (PROJECT 11-161-00)
B-8	ESTIMATED LOCATION OF PREVIOUS BORING BY LEIGHTON (PROJECT 600024-004, DATED 12/6/07)
B-2	ESTIMATED LOCATION OF PREVIOUS BORING BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
CPT-10	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-004, DATED 12/6/07)
CPT-1	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
DYB 12-01	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2012-034, DATED 10/05/12)
B-2	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2005-022, DATED 11/29/05)
	GEOLOGIC CONTACT
	BURIED GEOLOGIC CONTACT
B B'	GEOTECHNICAL SECTION
	LIMITS OF REPORT

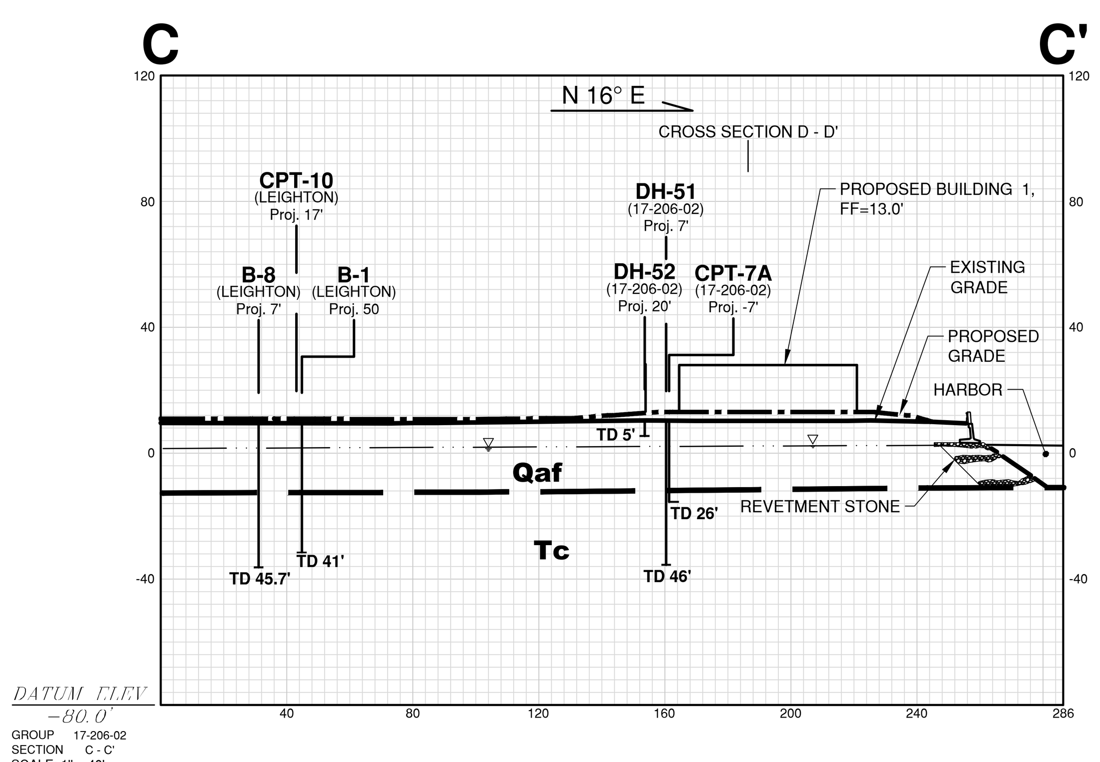
Composite Geotechnical Map

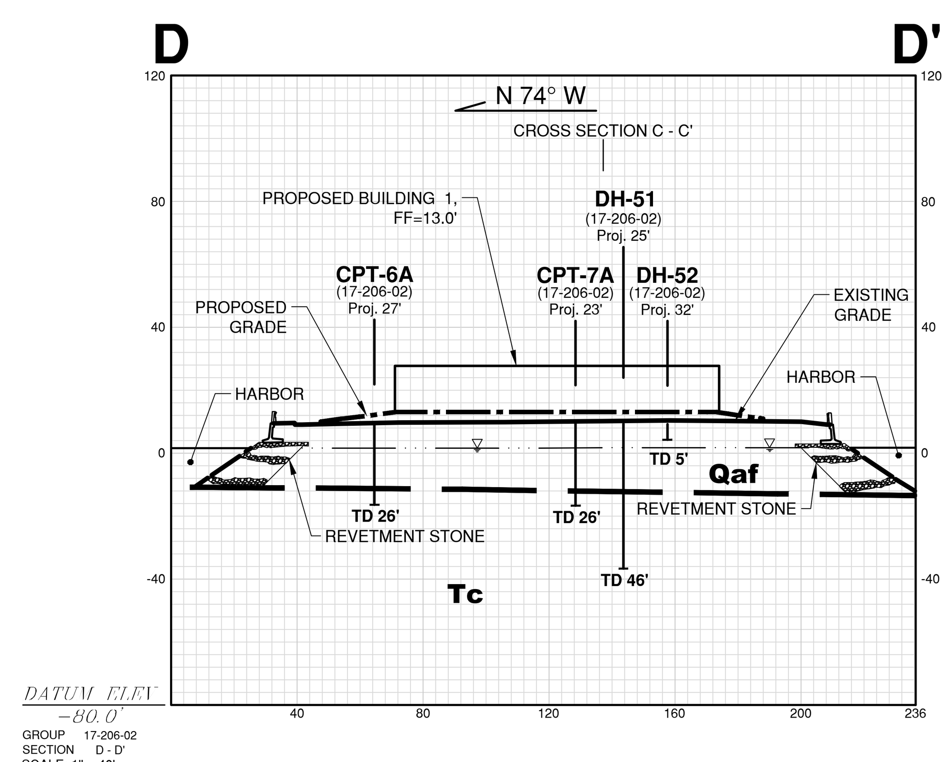
Commercial Buildings
Commercial Component Dana
Point Harbor Partners, LLC.

Date:	May 27, 2021	Plate 2
Project No.:	17-206-02	









Geotechnical Sections

Commercial Buildings
Commercial Component Dana Point Harbor Partners, LLC.

Date:	MAY 27, 2021	Plate
Project No.:	17-206-02	3

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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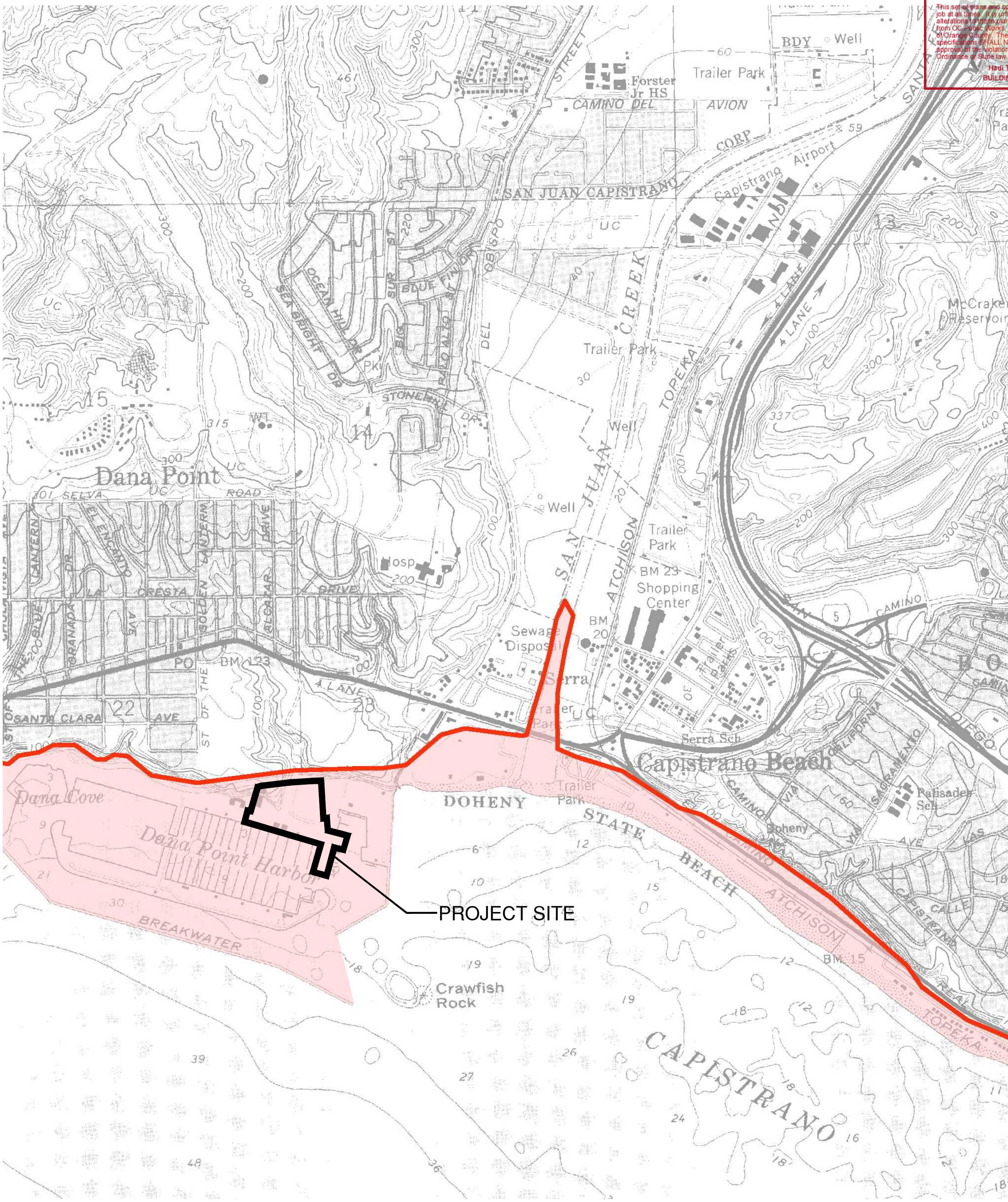
Hadi Tabatabaee
BUILDING OFFICIAL



MAP EXPLANATION

Tsunami Inundation Line

Tsunami Inundation Area

Tsunami Inundation Map

Commercial Buildings
Commercial Component
Dana Point Harbor Partners, LLC.

GMU

Date: May 27, 2021		**Plate** 4
Project No.: 17-206-02		

DRAWING: q:\2017\17-206-02\dwg\1720602_plate 4_dph_commcor_tsunami inundation map.dwg PLOTTED: 4/29/2021 2:42 PM BY: Jesus Meza

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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DESIGN GROUNDWATER LEVEL ZONES

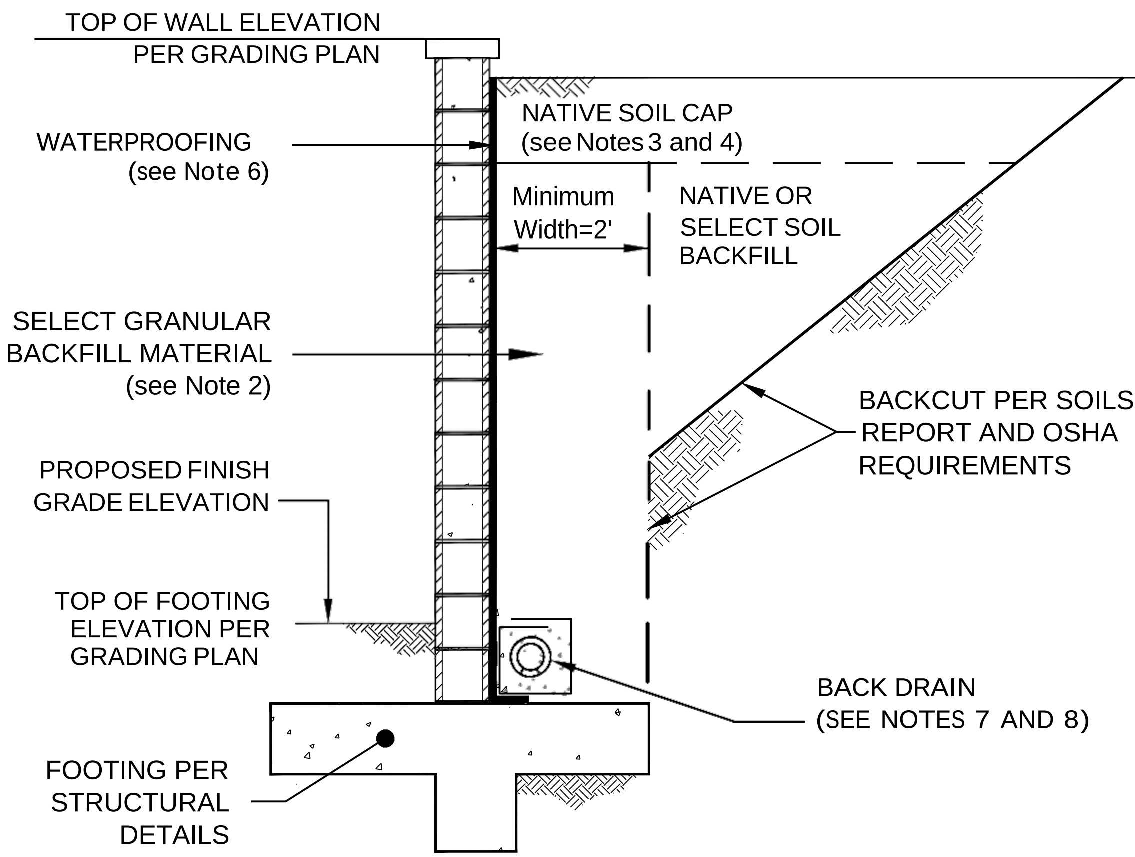
- 3' BGS (BELOW EXISTING GROUND SURFACE)
- 5' BGS
- 8' BGS
- 10' BGS
- 15' BGS

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

Date:	May 27, 2021	Plate 5
Project No.:	17-206-02	



RETAINING WALL DETAIL
NOT TO SCALE

1. FINAL DETERMINATION OF THE MATERIAL TO BE USED FOR BACKFILL SHALL BE MADE BY GMU.

2. ALL SELECT BACKFILL TO WITHIN 1 TO 2 FEET OF FINAL GRADE SHOULD CONSIST OF FREE-DRAINING GRANULAR MATERIAL (I.E. SE 30 SAND, PEA GRAVEL, OR CRUSHED ROCK). CRUSHED ROCK, IF USED, SHOULD BE WRAPPED IN FILTER FABRIC (MIRAFI 140N OR EQUIVALENT) TO MINIMIZE THE POTENTIAL FOR MIGRATION OF FINES INTO THE ROCK. THE SELECT BACKFILL SHOULD BE MOISTURE CONDITIONED TO ACHIEVE OVER OPTIMUM MOISTURE CONTENT PER THE SOILS REPORT AND COMPACTED TO AT LEAST 90% RELATIVE COMPACTION AS DETERMINED BY ASTM TEST METHOD D 1557.

3. FINE-GRAINED NATIVE SOILS SHOULD BE USED TO CAP THE SELECT BACKFILL ZONE.

4. ALL NATIVE OR SELECT SOIL WALL BACKFILL SHOULD BE MOISTURE CONDITIONED AS NECESSARY TO OVER OPTIMUM MOISTURE CONTENT PER THE SOILS REPORT AND COMPACTED TO AT LEAST 90% RELATIVE COMPACTION AS DETERMINED BY ASTM TEST METHOD D 1557.

5. THE BACKSIDE OF THE WALLS SHOULD BE WATERPROOFED DOWN TO AND ACROSS THE TOP OF THE FOOTING. THE DESIGN AND SELECTION OF THE WATERPROOFING SYSTEM IS OUTSIDE OF THE PURVIEW OF GMU.

6. THE WATERPROOFING SYSTEM AND ANY DRAIN BOARDS SHOULD BE PROTECTED FROM DAMAGE BY CONSTRUCTION ACTIVITIES. THE TOP EDGE OF THE WATERPROOFING AND ANY DRAIN BOARDS SHOULD BE PROPERLY ADHERED TO THE WALL AND SEALED TO PREVENT THE POSSIBLE ACCUMULATION OF DEBRIS BETWEEN THE DRAINAGE/WATERPROOFING SYSTEM AND THE WALL.

7. THE BACKDRAIN SYSTEM SHOULD CONSIST OF 4" PERFORATED PIPE SURROUNDED BY AT LEAST ONE CUBIC FOOT OF 3/4"-1.5" OPEN GRADED GRAVEL WRAPPED IN MIRAFI 140N FILTER FABRIC (OR EQUIVALENT). THE PERFORATED PIPE SHOULD CONSIST OF SDR-35 OR SCHEDULE 40 PVC PIPE (OR APPROVED EQUIVALENT) LAID ON AT LEAST 2" OF CRUSHED ROCK WITH THE PERFORATIONS LAID DOWN. THE BACKDRAIN GRADIENT SHOULD NOT BE LESS THAN 1% WHEN POSSIBLE. THE PERFORATED PIPE SHOULD OUTLET INTO AREA DRAINS OR OTHER SUITABLE OUTLET POINTS AT RUNS OF 200 FEET OR LESS, IF PRACTICAL. IF THE BACKDRAINS CANNOT BE OUTLETED BY GRAVITY FLOW, A SUMP PUMP SYSTEM WILL NEED TO BE DESIGNED AND CONSTRUCTED. REDUNDANT BACK-UP PUMPS OR COMPONENTS ARE RECOMMENDED. DESIGN OF THIS SYSTEM IS OUTSIDE OF THE PURVIEW OF GMU.

8. THE TIE-IN LOCATIONS FOR BACKDRAIN OUTLETS SHOULD BE SHOWN ON THE PRECISE GRADING, SITE WALL, AND/OR LANDSCAPE PLANS.

GMU	RETAINING WALL CONSTRUCTION DETAIL	PLATE 6

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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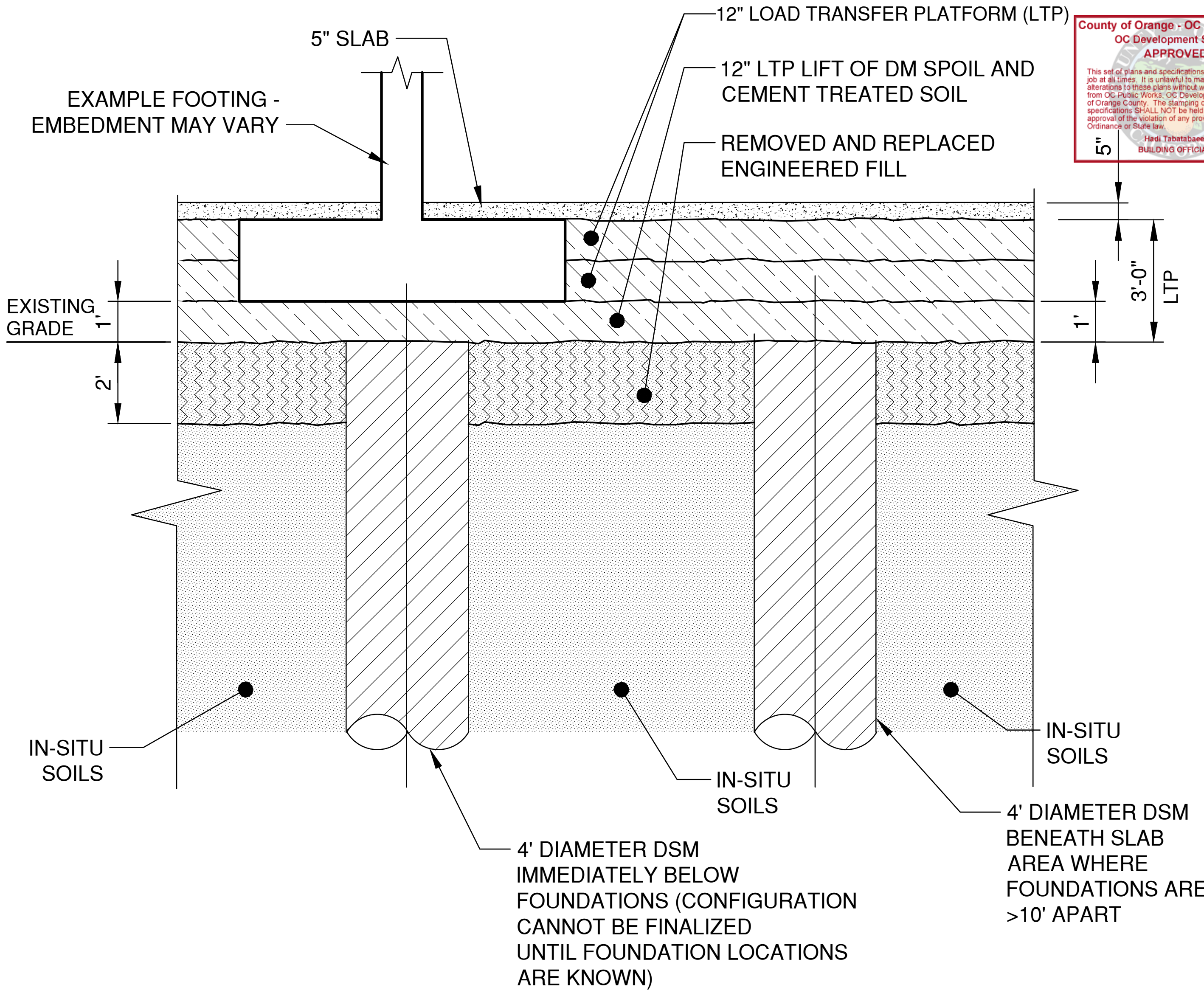
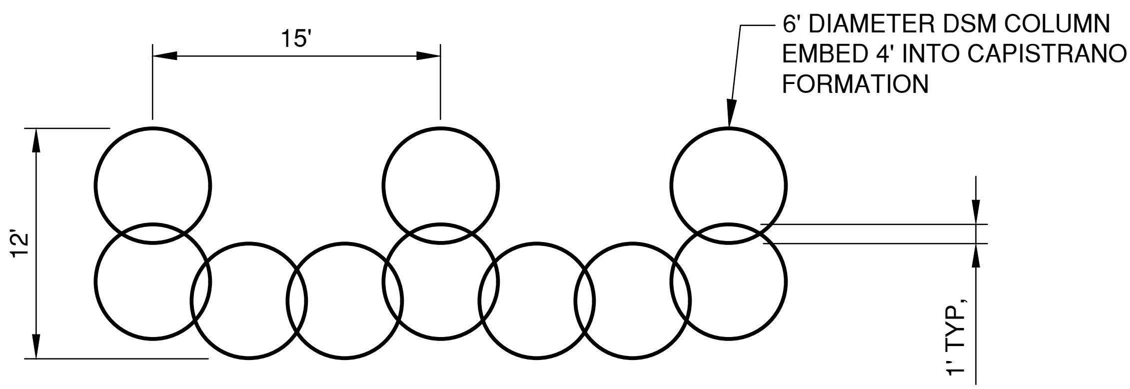
Hadi Tabatabaee
BUILDING OFFICIAL



A Typical DSM Support of Buildings 1, 6-12

Scale: 1" = 4'



B DSM BUTTRESS Detail

Scale: 1" = 10'

DSM & LTP Installation Detail
Commercial Buildings
Commercial Component
Dana Point Harbor Partners, LLC.

GMU

Date:	May 27, 2021	**Plate** 7
Project No.:	17-206-02	

DRAWING: q:\2017\17-206-02\dwg\1720602_dph_commcor_plate 7_dsm-ltp installation detail.dwg PLOTTED: 4/29/2021 3:12 PM BY: Jesus Meza

APPENDIX A

GMU Geotechnical Exploration Procedures and Logs

APPENDIX A

GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS

Our exploration at the subject site consisted of twenty-eight (28) drill holes and seven (7) Cone Penetration Test soundings (CPT). The estimated locations of the explorations are shown on Plate 2 – Geotechnical Map. Our drill holes were logged by a Staff Engineer, and drive, SPT, and bulk samples of the excavated soils were collected. “Undisturbed” samples were taken using a 3.25-inch outside-diameter drive sampler which contains a 2.416-inch-diameter brass sample sleeve 6 inches in length. Standard penetration testing (SPT) with a 2.0-inch outside-diameter split spoon sampler without liners was performed in the borings during advancement. Blow counts recorded during sampling from the drive sampler and SPT are shown on the drill hole logs. The logs of each drill hole are contained in this Appendix A, and the Legend to Logs is presented as Plate A-1 and A-2. The CPT logs are presented within Appendix A-3. Previous drill hole logs by GMU are presented within Appendix A-1. “Previous Boring Logs by Others” are presented within Appendix A-2, and “CPT Logs by Others” are presented within Appendix A-4.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Borings are intended to be that which most accurately describe a given interval of a boring, frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

MAJOR DIVISIONS			Group Letter	Symbol	TYPICAL NAMES
COARSE-GRAINED SOILS More Than 50% Retained On No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	GRAVELS 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW		Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
			GP		Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
		Gravels With Fines	GM		Silty Gravels, Gravel-Sand-Silt Mixtures.
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures.
	SANDS More Than 50% of Coarse Fraction Passes No.4 Sieve	Clean Sands	SW		Well Graded Sands and Gravelly Sands, Little or No Fines.
			SP		Poorly Graded Sands and Gravelly Sands, Little or No Fines.
		Sands With Fines	SM		Silty Sands, Sand-Silt Mixtures.
			SC		Clayey Sands, Sand-Clay Mixtures.
FINE-GRAINED SOILS 50% or More Passe The No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	SILTS AND CLAYS Liquid Limit Less Than 50%		ML		Inorganic Silts, Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts With Slight Plasticity.
			CL		Inorganic Clays of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays.
			OL		Organic Silts and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS Liquid Limit 50% or Greater		MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.
			CH		Inorganic Clays of High Plasticity, Fat Clays.
			OH		Organic Clays of Medium To High Plasticity, Organic Silts.
HIGHLY ORGANIC SOILS			PT		Peat and Other Highly Organic Soils.

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study

ADDITIONAL TESTS

DS = Direct Shear
HY = Hydrometer Test
TC = Triaxial Compression Test
UC = Unconfined Compression
CN = Consolidation Test
(T) = Time Rate
EX = Expansion Test
CP = Compaction Test
PS = Particle Size Distribution
EI = Expansion Index
SE = Sand Equivalent Test
AL = Atterberg Limits
FC = Chemical Tests
RV = Resistance Value
SG = Specific Gravity
SU = Sulfates
CH = Chlorides
MR = Minimum Resistivity
pH
(N) = Natural Undisturbed Sample
(R) = Remolded Sample
CS = Collapse Test/Swell-Settlement

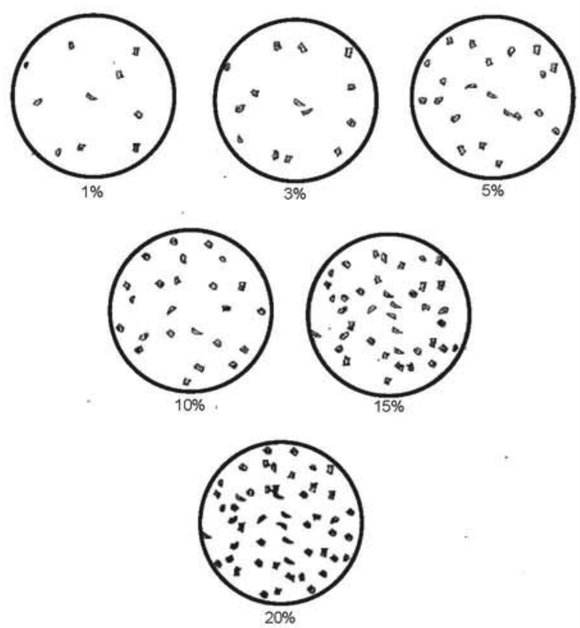
GEOLOGIC NOMENCLATURE

B = Bedding C = Contact J = Joint
F = Fracture Flt = Fault S = Shear
RS = Rupture Surface = Seepage
= Groundwater

SAMPLE SYMBOLS

Undisturbed Sample (California Sample)
Undisturbed Sample (Shelby Tube)
Bulk Sample
Unsuccessful Sampling Attempt
SPT Sample

5 10 15 Blows per 6-Inches Penetration
10: 10 Blows for 12-Inches Penetration
6/4": 6 Blows for 4-Inches Penetration
P: Push
(13): Uncorrected Blow Counts ("N" Values) for 12-Inches Penetration- Standard Penetration Test (SPT)



LEGEND TO LOGS
ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate
A-1

SOIL DENSITY/CONSISTENCY

FINE GRAINED

Consistency	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Soft	Easily penetrated by thumb, exudes between fingers	<2	<3
Soft	Easily penetrated one inch by thumb, molded by fingers	2-4	3-6
Firm	Penetrated over 1/2 inch by thumb with moderate effort	4-8	6-12
Stiff	Penetrated about 1/2 inch by thumb with great effort	8-15	12-25
Very Stiff	Readily indented by thumbnail	15-30	25-50
Hard	Indented with difficulty by thumbnail	>30	>50

COARSE GRAINED

Density	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Loose	Easily penetrated with 0.5" rod pushed by hand	<4	<5
Loose	Easily penetrated with 0.5" rod pushed by hand	4-10	5-12
Medium Dense	Easily penetrated 1' with 0.5" rod driven by 5lb hammer	10-30	12-35
Dense	Dificult to penetrat 1' with 0.5" rod driven by 5lb hammer	31-50	35-60
Very Dense	Penetrated few inches with 0.5" rod driven by 5lb hammer	>50	>60

BEDROCK HARDNESS

Density	Field Test	SPT (#blows/foot)
Soft	Can be crushed by hand, soil like and structureless	1-30
Moderately Hard	Can be grooved with fingernails, crumbles with hammer	30-50
Hard	Can't break by hand, can be grooved with knife	50-100
Very Hard	Scratches with knife, chips with hammer blows	>100

MODIFIERS

Trace	1%
Few	1-5%
Some	5-12%
Numerous	12-20%
Abundant	>20%

GRAIN SIZE

Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than a basketball
Cobbles		3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4-3"	3/4-3"	Thumb-sized to fist-sized
	Fine	#4-3/4"	0.19-0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	0.079-0.19"	Rock-salt-sized to pea-sized
	Medium	#40-#10	0.017-0.079"	Sugar-sized to rock salt-sized
	Fine	#200-#40	0.0029-0.017"	Flour-sized to sugar-sized
Fines		passing #200	<0.0029"	Flour-sized and smaller

MOISTURE CONTENT

Dry- Very little or no moisture
Damp- Some moisture but less than optimum
Moist- Near optimum
Very Moist- Above optimum
Wet/Saturated- Contains free moisture

GMU

LEGEND TO LOGS
ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate
A-2

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH- 5

Date(s) Drilled	**9/10/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**8.3**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3.5 inches)						
					CLAYEY SAND (SC), yellowish brown, slightly moist, dense, medium to coarse grained						
			Scattered gravel up to 2"				11 11 25	140	9	129	
5											
	5				dark yellowish brown, moist, medium dense, fine to medium grained		7 7 9	140			
			Rare gravel up to 1"								
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Drill Hole DH- 5

Project: Dana Point Harbor, Commercial Component **Project Location: Dana Point Harbor Drive** **Project Number: 17-206-02**	**Log of Drill Hole DH- 7** Sheet 1 of 1

Date(s) Drilled	**9/10/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**7.3**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 4.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 7 inches)						
					SANDY CLAY (CL), gray, moist, stiff, medium to coarse grained sand						
5			Abundant gravel up to 2"				3 7 10	140	20	101	
	5		Scattered gravel up to 1"		medium grained		6 7 12	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

GMU

Drill Hole DH- 7

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH- 8

Date(s) Drilled	**9/11/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**10.3**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
10					Asphalt Concrete (approximately 4.5 inches)						
					Aggregate Base (approximately 7 inches)						
			ARTIFICIAL FILL (Qaf)		CLAYEY SAND (SC), pale brown, slightly moist, dense, medium to coarse grained, some gravel						
			Gravel up to 3"				4 12 25	140	12	125	
5	5		Rare gravel up to 0.75"		brown, moist, loose, fine to medium grained		4 3 3	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-9

Date(s) Drilled	9/11/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	7.3
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3.5 inches)						
5			Gravel up to 4"		CLAYEY SAND (SC), pale brown, brown, gray and orange brown, moist, medium dense, fine to medium grained, some gravel		5 7 12	140	13	111	
	5		Rare gravel up to 1"		grayish brown and gray, moist, medium dense, fine to medium grained		3 5 7	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Project: Dana Point Harbor, Commercial Component **Project Location: Dana Point Harbor Drive** **Project Number: 17-206-02**	**Log of Drill Hole DH-10** Sheet 1 of 1

Date(s) Drilled	**9/11/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**7.3**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3 inches)						
5					CLAYEY SAND (SC), brown and gray, moist, medium dense, medium to coarse grained, some gravel						
			Gravel up to 4"				5 10 12	140	11	118	
	5		Rare gravel up to 1"		fine to medium grained		4 4 8	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

GMU

Drill Hole DH-10

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-11

Date(s) Drilled	**9/11/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**51.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**7.3**
Groundwater Depth [Elevation], feet	**14.3 [-7.0]**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf)		Asphalt Concrete (approximately 2.5 inches)						
					CLAYEY SAND (SC), orange brown and brown, moist, very dense, medium grained						
5			Gravel up to 1"				10 12 40	140	14	112	
	5		Rare gravel up to 1"		orange brown and gray, moist, medium dense, medium to fine grained		8 12 12	140			
0					gray and dark brown, moist to wet, medium dense, medium grained		5 6 9	140	17	109	
	10		Scattered gravel up to 2"		brown, dark brown, very moist, medium dense, fine to medium grained, some gravel		7 7 10	140	17	110	
-5											
	15		**CAPISTRANO FORMATION (Tc)**		Interbedded CLAYEY SILTSTONE, SANDSTONE and SILTSTONE (ML), gray, yellow brown, dark brown and black, wet, dense/very stiff, fine to coarse grained		7 12 18	140			
-10											

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Drill Hole DH-11

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-11

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Sandstone interbeds, white mottles, thinly bedded		SILTSTONE (ML), very dark gray, slightly moist, hard, fine grained		8 50/6"	140	19	101	
-15											
	25				SANDSTONE (SP), gray and brownish gray, wet, very dense, medium to fine grained		25 34 50	140			
-20											
	30		Pale brownish gray				50/5"	140	11	123	
-25											
	35		Pale yellowish gray and gray				50/6"	140			
-30											
	40				Interbedded CLAYEY SILTSTONE, SILTY SANDSTONE and SILTSTONE (ML), dark gray and dark brownish black, slightly moist, very dense/hard, fine grained		27 50	140	29	91	
-35											

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-11

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-40			Sandstone interbeds, well bedded		SILTSTONE (ML), dark brownish black and gray, slightly moist, hard		12 18 26	140			
	50		Thinly bedded, white mottles on bedding planes		SILTSTONE (ML), dark brownish black, slightly moist, hard		13 50/3"	140	30	91	
					Total Depth = 51 feet Groundwater encountered at 14.3 feet						

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-12

Date(s) Drilled	9/11/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	31.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	8.3
Groundwater Depth [Elevation], feet	10.6 [-2.3]	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf)		Asphalt Concrete (approximately 3 inches)						
					SANDY CLAY (CL), gray, dark brown and brown, slightly moist, soft to firm						
5			Abundant gravel up to 2"				7 4 5	140			
	5				CLAYEY SAND (SC), dark gray, moist, very dense, medium grained		30 32 30	140	13	122	
0			Gravel up to 1"		yellowish brown, moist, medium dense, fine to medium grained		6 6 7	140			
	10				dark brown, gray and yellowish brown, moist, medium grained ⊽		5 6 7	140	19	109	
-5											
	15		**CAPISTRANO FORMATION (Tc)**		SANDSTONE (SP), gray and yellowish gray, wet, dense, medium to fine grained		5 19 21	140			
-10											

GMU

Drill Hole DH-12

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Thinly bedded		SILTSTONE (ML), dark brownish gray, slightly moist, hard		20 39 50	140	31	87	
-15											
	25						10 17 20	140			
-20											
	30						27 50/4"	140	19	105	
					Total Depth = 31 feet Groundwater encountered at 10.6 feet						

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GMU

Drill Hole DH-12

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-13

Date(s) Drilled	9/11/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	17.3
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 4 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 7 inches)						
					CLAYEY SAND (SC), dark gray, slightly moist, dense, fine to coarse grained, some gravel						
15			Gravel up to 1"				3 10 17	140	13	120	
	5		Scattered gravel up to 0.5"		pale brown, slightly moist, medium dense, fine grained		2 1 2	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

GMU

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-14

Date(s) Drilled	9/11/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	15.3
Groundwater Depth [Elevation], feet	NA	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
15			**ARTIFICIAL FILL (Qaf)**		CLAYEY SAND (SC); dark gray, damp to moist, medium dense, fine to coarse grained sand, gravel up to 1 inch in diameter						
							7 9 13	140	12	124	
10	5				dark gray and pale brown, moist, medium dense, fine grained sand, scattered gravel up to 1/2" in diameter		9 4 7	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

GMU

Drill Hole DH-14

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-16

Date(s) Drilled	**9/12/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**31.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**8.3**
Groundwater Depth [Elevation], feet	**10.0 [-1.7]**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					Asphalt Concrete (approximately 3.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3 inches)						
					CLAYEY SAND (SC), brown and gray, moist, medium dense, fine grained, some gravel						
5			Gravel up to 2"				7 12 9	140			
	5		Abundant gravel up to 2"		gray, orange brown, brown and black, moist, very dense, medium grained		8 26 30	140	11	112	
0			Rare gravel up to 0.5"		brownish gray, moist, loose, medium to fine grained		3 3 4	140			
	10				▽ grayish brown and gray, wet, medium dense, medium to fine grained		6 5 7	140	16	110	
-5					gray and brownish gray, moist to wet, loose, medium to fine grained		2 2 2	140			
	15		**CAPISTRANO FORMATION (Tc)** Tip of sampler: Sandstone, dark gray, wet, medium grained, scattered gravel up to 2" standing water at completion of drilling		SANDSTONE (SP), pale brown, wet, very dense, medium grained		5 27 50/4"	140	13	120	
-10											

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-16

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SANDSTONE (SP), orange brown, wet, very dense, medium to coarse grained		35 50/5"	140			
-15											
	25		Orange brown and dark orange brown				50/6"	140	19	110	
-20											
	30				SANDSTONE and SANDSTONE with SILT (SP), orange brown, brown and dark gray, wet, very dense		50/6"	140			
					Total Depth = 31 feet Groundwater at 10 feet						

DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 2/8/21

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-17

Sheet 1 of 1

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.6
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3 inches)	Bulk					
10					CLAYEY SAND (SC), grayish brown, brown and orange brown, slightly moist, loose, fine grained						
			Abundant gravel up to 1"			SPT	4 4 4	140			
	5		Scattered gravel up to 0.5"		pale grayish brown and brown, moist, dense, fine grained	Cal-mod	11 10 12	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Drill Hole DH-17

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-18

Date(s) Drilled	**9/12/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**5.1 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**11.3**
Groundwater Depth [Elevation], feet	**NA []**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 2 inches)						
10			**ARTIFICIAL FILL (Qaf)** Possibly highly weathered bedrock (inconclusive)		Aggregate Base (approximately 5 inches) CLAYEY SAND (SC), brown, gray brown, slightly moist, medium dense, fine to medium grained, some gravel		8 7 8	140			
	5				Total Depth = 5.1 feet Groundwater Not Encountered		50/1"	140	15	111	

GMU

Drill Hole DH-18

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-19

Sheet 1 of 1

Date(s) Drilled	**9/12/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**12.6**
Groundwater Depth [Elevation], feet	**NA []**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (Approximately 1.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 2.5 inches)						
					CLAYEY SAND (SC), brown and yellowish brown, moist, loose, fine grained						
10			Scattered gravel up to 1", possibly highly weathered bedrock (inconclusive)				5 2 4	140			
	5		Gravel up to 4"		SAND (SP), pale yellowish brown, moist, dense, fine to medium grained		15 18 8	140			
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Drill Hole DH-19

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-20

Date(s) Drilled	**9/12/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**12.0**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (Approximately 3.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (Approximately 3.5 inches)						
10					CLAYEY SAND (SC), brown and grayish brown, slightly moist, medium dense, fine grained						
			Scattered gravel up to 2"				7 12 12	140			
	5		Possibly highly weathered bedrock (inconclusive)		pale yellowish brown and grayish brown, fine to medium grained		4 6 8	140	19	107	
					Total Depth = 6.5 feet Groundwater Not Encountered						

DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 2/8/21

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plans and specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
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BUILDING OFFICIAL

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-21

Sheet 1 of 1

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.8
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 4.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 2 inches)						
10					CLAYEY SAND (SC), brown and grayish brown, moist, loose, fine grained						
			Orange brown mottles				3 3 4	140			
	5		Orange brown mottles, gravel up to 2". Possibly highly weathered bedrock (inconclusive)		grayish brown, medium dense, fine to medium grained, some gravel		9 6 9	140	15	111	
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Drill Hole DH-21

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-22

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.0
Groundwater Depth [Elevation], feet	NA ▯	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
10			**ARTIFICIAL FILL (Qaf)**		Aggregate Base (approximately 3 inches)						
					CLAYEY SAND (SC), pale yellowish gray and orange brown, moist, medium dense, fine grained, some gravel						
			Gravel up to 2". Possibly highly weathered bedrock (inconclusive)				5 6 7	140			
5	5		Scattered rounded gravel up to 2"		pale yellowish gray and brown, moist, dense, fine grained		8 9 20	140	12	118	
					Total Depth = 6.5 feet Groundwater Not Encountered						

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-23

Date(s) Drilled	**9/12/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**6.3**
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 4 inches)						
5			**ARTIFICIAL FILL (Qaf)**		CLAYEY SAND (SC), grayish brown, moist, medium dense, fine to medium grained						
			Scattered gravel up to 2"				4 5 6	140			
	5				brownish gray, wet, medium dense, fine to medium grained		4 6 8	140	14	118	
0					Total Depth = 6.5 feet Groundwater Not Encountered						

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-24

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	6.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	5.3
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
5					Asphalt Concrete (approximately 4 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3 inches)						
					CLAYEY SAND (SC), brown and grayish brown, slightly moist, loose, fine grained	Bulk					
						SPT	3 3 6	140			
0	5				dark brownish gray, moist, medium dense, fine to medium grained	Cal-mod	2 3 3	140	17		
					Total Depth = 6.5 feet Groundwater Not Encountered						

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-25

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	13.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	10.8
Groundwater Depth [Elevation], feet	NA []	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 2 inches)						
10			**ARTIFICIAL FILL (Qaf)**		Aggregate Base (approximately 3 inches)						
					CLAYEY SAND (SC), brown and brownish gray, moist, medium dense, fine to medium grained, some gravel						
			Gravel up to 3"				4 7 11	140			
5	5				dark brown, moist, dense, medium to fine grained		24 15 11	140			
			Possibly highly weathered bedrock (inconclusive)		SANDY FAT CLAY (CH), dark gray and gray, moist, medium dense, fine grained		4 5 5	140	13		
0	10		Scattered rounded gravel up to 2", minor fine grained sand				2 4 4	140	18	109	
			bedrock fragment in sampler		Fragment of bedrock composed of SILTSTONE, CLAYEY SILTSTONE and SANDSTONE with GRAVEL (ML), dark gray and pale brown, slightly moist, hard, fine grained		50/5"	140			
			Weakly bedded		Total Depth = 13 feet Groundwater Not Encountered						

GMU

Drill Hole DH-25

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-26

Sheet 1 of 1

Date(s) Drilled	9/12/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	16.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.8
Groundwater Depth [Elevation], feet	10.0 [1.8]	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0				Asphalt Concrete (approximately 1.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 4 inches)						
					CLAYEY SAND (SC), pale brownish gray, moist, medium dense, fine grained	Bulk					
10			Scattered gravel and cobbles up to 6". Rare orange brown mottles.			SPT	5 8 16	140			
	5		Rounded gravel up to 4", interbeds of clayey siltstone with gravel, dark gray		very dense, coarse to medium grained, some gravel	Cal-mod	8 16 25	140	10	128	
5			Minor fine sand, rare orange brown staining, scattered gravel		loose	SPT	2 3 4	140			
	10				olive brown, wet, dense, fine grained ▽	Cal-mod	5 9 12	140	14	113	
			MARINE DEPOSITS (Qm)		SANDY CLAY (CL), very dark gray, wet, very stiff						
0			Minor fine to medium grained sand, gravel is sub-rounded up to 1"			SPT	4 9 15	140			
	15		**CAPISTRANO FORMATION (Tc)** Gravel is sub-rounded to rounded up to 4"		SILTSTONE with SAND (ML), very dark gray, moist, hard, some clay and gravel	Cal-mod	30 50/4"	140			
					Total Depth = 16 feet Groundwater at 10'						

GMU

Drill Hole DH-26

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-27

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OC Development Services
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Date(s) Drilled	9/13/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	30.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	7.3
Groundwater Depth [Elevation], feet	8.0 [-0.7]	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 7 inches) CLAYEY SAND (SC), pale grayish brown, slightly moist, medium dense, fine grained						
5			Scattered gravel to 3".				5 5 5	140			
	5		Scattered gravel to 2".		grayish brown, moist, dense, fine to medium grained		6 9 15	140	14	119	
0			Possibly highly weathered littoral deposits		brown, moist, very dense, fine to medium grained		50/2.5"	140			
	10		Scattered gravel (cobble fragments) consist of San Onofre breccia		SANDY CLAY (CL), dark gray, wet, very dense, fine to medium grained		20 22 10	140	26		
-5			Upper portion of sample: Sand with shell hash (broken shell fragments)		CLAYEY SAND (SC), brown, gray and orange brown, wet, medium dense, fine to medium grained		3 5 17	140			
	15		**CAPISTRANO FORMATION (Tc)**		SANDSTONE (SP), pale gray, gray and orange brown, wet, very dense, medium to fine grained		17 50/3"	140	16	115	
-10			standing water in hole at completion of drilling								

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-27

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Rare orange brown staining		SANDSTONE (SP), pale gray and pale yellowish brown, moist, very dense, medium to fine grained		36 50/4"	140			
-15											
	25						50/4"	140	15	117	
-20											
	30				SANDSTONE (SP), pale gray and pale brown, wet, very dense, medium grained		50/6"	140			
					Total Depth= 30.5 Groundwater at 8'						

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-28

Date(s) Drilled	**9/13/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**26.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**9.3**
Groundwater Depth [Elevation], feet	**10.3 [-1.0]**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 7 inches) CLAYEY SAND (SC), pale brownish gray, moist, medium dense, fine grained						
			Scattered gravel to 1".				5 6 5	140			
5	5				pale brown and brown, moist, medium dense, fine grained		9 11 6	140	14	113	
			Rare siltstone interbeds. Highly weathered.		pale grayish brown and pale gray, wet, medium dense, fine to medium grained		11 6 5	140			
0	10		Sub rounded gravel up to 2"		brownish gray, moist to wet, very dense, ⊽ fine to medium grained		7 19 21	140	14	121	
			CAPISTRANO FORMATION (Tc)		SANDSTONE with Gravel (SP), orange brown and brown, moist to wet, very dense		14 30 50/3"	140			
-5	15		Sub rounded gravel and cobbles up to 4"				50/1"	140	10	122	
-10											

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Drill Hole DH-28

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-28

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SANDSTONE (SP), pale yellowish gray and pale gray, wet, medium dense, fine to medium grained		21 50/6"	140			
-15											
	25		Pale gray				50/4.5"	140	9	124	
					Total Depth = 26 feet Groundwater encountered at 10.3 feet						

Drill Hole DH-28

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Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-29

Date(s) Drilled	9/13/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	31.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	16.7
Groundwater Depth [Elevation], feet	16.0 [0.7]	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 3 inches)						
15					SILTY SAND (SM), brown gray, yellowish brown, slightly moist, medium dense, medium grained, some gravel						
			Subrounded gravel up to 4"				5 10 12	140			
	5		Subrounded gravel 1 to 6"		SANDY CLAY (CL), dark brown, moist, hard, fine to medium grained, some gravel		50/0.5"	140	6	108	
10											
			Rounded to subrounded gravel and cobbles up to 7"		brownish gray, moist, stiff		3 4 5	140			
	10		Minor fine grained sand				4 6 7	140	29	92	
5											
			Scattered gravel		gray and orange brown, moist, firm to stiff, fine grained sand		3 4 4	140			
			MARINE DEPOSITS (Qm)		SANDY CLAY (CL); gray, moist, firm, medium grained sand						
	15		Rounded to subrounded gravel up to 3"		∇		2 3 4	140	23	100	
0											
			CAPISTRANO FORMATION (Tc)		SILTSTONE (ML), gray, moist, hard overlying SANDSTONE (SP), orange brown and dark orange brown, wet, very dense, fine to medium grained						

GMU

Drill Hole DH-29

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-29

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-5							12 31 50/5"	140			
-10	25				Interbedded SILTSTONE and SANDSTONE (SP and ML), pale brown, dark grayish brown and gray, moist, very dense/hard, fine grained		50/4"	140	21	106	
	30		Siltstone is thinly bedded with white mottles,		SANDSTONE (SP), gray, wet, dense, fine grained, overlying SILTSTONE (ML), dark brownish black, moist, very stiff		16 16 21	140			
					Total Depth = 31.5 feet Groundwater encountered at 16 feet						

GMU

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-34

Date(s) Drilled	**9/14/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**26.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**15.4**
Groundwater Depth [Elevation], feet	**15.0 [0.4]**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
15					Asphalt Concrete (approximately 4.5 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 4 inches)						
					SILTY SAND with GRAVEL (SM), brown, moist, medium dense, fine grained						
							3 6 6	140			
10	5				SANDY CLAY (CL), grayish brown, moist, very stiff		20 26 12	140	19		
			Scattered gravel up to 4"		brown, moist, fine to medium grained sand		3 8 9	140			
5	10		**MARINE DEPOSITS (Qm)** orange brown staining		SANDY CLAY (CL); gray, slightly moist, stiff to very stiff, medium grained sand		8 11 14	140	13		
					moist, very stiff, fine grained sand		6 8 10	140			
0	15		**CAPISTRANO FORMATION (Tc)** Scattered subrounded gravel up to 4"		SANDSTONE (SP), gray, wet, medium dense, medium to fine grained		3 6 8	140			

GMU

Drill Hole DH-34

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-34

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-5			Gray and yellowish gray				24 50	140			
-10	25		Sand is fine grained				30 50/4"	140	23	101	
					Total Depth = 26 feet Groundwater at 15 feet						

DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 2/8/21

GMU

Project: Dana Point Harbor, Commercial Component	**Log of Drill Hole DH-35**
Project Location: Dana Point Harbor Drive	Sheet 1 of 2
Project Number: 17-206-02	

Date(s) Drilled	**9/14/2018**	Logged By	**WD**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**26.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**16.8**
Groundwater Depth [Elevation], feet	**12.5 [4.3]**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 4 inches)						
			ARTIFICIAL FILL (Qaf)		Aggregate Base (approximately 4.5 inches)						
15					SANDY CLAY (CL), brown and grayish brown, moist, stiff, fine grained, some gravel		3 5 12	140			
	5		Gravel up to 4"		brownish gray, moist, stiff		3 6 9	140	27	92	
10			Orange brown staining, sand is fine grained		gray		3 4 6	140			
	10				gray and brown, moist, fine grained sand		5 7 11	140	22	102	
5					gray, wet, soft to firm, fine grained sand ∇		1 2 2	140			
	15		**MARINE DEPOSITS (Qm)**		SAND (SP), gray and pale gray, wet, dense, coarse to medium grained overlying SILT (ML), dark gray, very stiff		5 11 16	140	13	113	
0											

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-35

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-5			**CAPISTRANO FORMATION (Tc)**		Interbedded SILTSTONE and SANDSTONE (SP and ML), gray and dark gray, moist, very dense/hard, fine grained		7 22 22	140			
	25		Thinly bedded, rare white mottles		SILTSTONE (ML), dark gray, moist, very dense/hard		17 50/4"	140	21	105	
					Total Depth = 26 feet Groundwater encountered at 12.5 feet						

Project: Dana Point Harbor, Commercial Component Project Location: Dana Point Harbor Drive Project Number: 17-206-02	Log of Drill Hole DH-46 Sheet 1 of 2

Date(s) Drilled	9/18/2018	Logged By	WD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	13.0
Groundwater Depth [Elevation], feet	15.0 [-2.0]	Sampling Method(s)	Cal-mod sampler with 6-inch sleeve, SPT, and bulk	Drill Hole Backfill	Native and Quickrete
Remarks				Driving Method and Drop	Autohammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					Asphalt Concrete (approximately 3 inches)						
			ARTIFICIAL FILL (Qaf) Cobbles up to 8" in spoils pile		Aggregate Base (approximately 3 inches) SILTY SAND (SM), brown and pale brown, moist, medium dense, fine grained						
10			Scattered gravel				5 7 11	140			
	5						5 14 20	140	11	118	
					CLAYEY SAND (SC), brown, moist, dense, fine to medium grained						
5			Rare gravel up to 1"		brown and orange brown, moist, medium dense, fine grained		9 9 9	140			
	10				brownish gray, wet, dense, fine grained		7 11 17	140	14	114	
0			**MARINE DEPOSITS (Qm)**		SAND (SP), gray, brownish gray and orange brown, moist, very dense, fine grained		4 23 35	140			
	15		**CAPISTRANO FORMATION (Tc)** Minor siltstone, subtle bedding		SANDSTONE (SP), grayish brown, wet, very dense, medium to fine grained		33 50/4"	140	16	116	
-5											

Drill Hole DH-46

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plans and specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-46

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SANDSTONE (SP), pale gray and pale yellowish gray, wet, very dense, fine to medium grained		16 37 50	140			
-10											
	25						50/5"	140			
					Total Depth = 26 feet Groundwater at 15 feet						

DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 2/8/21

GMU

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-51

Date(s) Drilled	**10/9/2019**	Logged By	**MTF**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**46.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**5.9**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ASPHALT		5" AC				13		
			ARTIFICIAL FILL (Qaf)		SANDY CLAY (CL); brown, light brown, and gray, very moist, stiff, medium to coarse grained sand						
							9 9 15		23	102	
	5				SANDY CLAY / CLAYEY SAND (CL/SC); light brown, gray, and light reddish brown, very moist, stiff, medium to coarse grained sand		4 6 7		28	94	
	10		**MARINE DEPOSITS (Qm)**		SANDY CLAY (CL); gray and light brown, saturated, soft, medium to coarse grained sand		1 2 3		31	89	
	15				becomes soft to firm		1 2 3		29		

GMU

Drill Hole DH-51

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-51

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					becomes firm		2 4 6		22	100	
			CAPISTRANO FORMATION (Tc)		POORLY GRADED SAND (SP); light brown, light yellowish brown, and light reddish brown, saturated, very dense, fine to coarse grained sand with some fine gravel						
	25						25 50/6"				
	30				CLAYEY SAND (SC); light gray and light yellowish brown, very moist to saturated, very dense, medium grained sand with trace coarse grained sand		42 50/3.5"		19	110	
	35				POORLY GRADED SAND with trace CLAY (SP); light yellowish brown, gray, and light redsdish brown, saturated, very dense, fine to medium grained sand		35 50/6"				
	40						50/5"				

Drill Hole DH-51

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-51

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
							35 50/6"				
					Total Depth = 46' No Caving GWT @ 5.9' Below Ground Surface						

Project: Dana Point Harbor, Commercial Component
Project Location: Dana Point Harbor Drive
Project Number: 17-206-02

Log of Drill Hole DH-52

Date(s) Drilled	**10/9/2019**	Logged By	**MTF**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**5.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**NA**	Sampling Method(s)	**Cal-mod sampler with 6-inch sleeve, SPT, and bulk**	Drill Hole Backfill	**Native and Quickrete**
Remarks				Driving Method and Drop	**Autohammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			FILL (Qaf)		SANDY CLAY (CL); brown and light yellowish browm, very moist, firm to stiff, fine to coarse grained sand						
					CLAYEY SAND (SC); brown, gray, and yellowish brown, very moist, loose to medium dense, fine to medium grained sand						
	5				Total Depth = 5' No Caving No GWT						

GMU

APPENDIX A-1

Previous Drill Hole Logs by GMU

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH- 1

Date(s) Drilled	8-29-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	43.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	15.0
Groundwater Depth [Elevation], feet	12.0 [3.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	NUMBER OF BLOWS (SAMPLE DATA)	DRIVING WEIGHT, lbs (SAMPLE DATA)	MOISTURE CONTENT, % (TEST DATA)	DRY UNIT WEIGHT, pcf (TEST DATA)	ADDITIONAL TESTS (TEST DATA)
		ARTIFICIAL FILL (Qaf) 2 inches AC over 4 inches AB		SANDY CLAY (CL), brown to dark brown, moist, firm					EI
					5 6 4	140	14	112	
10	5			CLAYEY SAND (SC), brown to dark brown, moist, medium dense	3 5 9	140	16	115	CN
5	10			SANDY CLAY (CL), brown to gray brown, damp to moist, firm	5 5 8	140	21		PS AL
				Groundwater at 12 feet. ▽					
				SAND (SP), gray, wet, dense, coarse grained					
0	15				6 9 23	140	16	107	
		CAPISTRANO FORMATION (Tc)		SAND (SP), gray, wet, very dense, medium to coarse grained					
					8 18 28	140			

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-1

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Sample is unoxidized claystone at 20 feet		CLAY (CL), very dark gray, moist, very firm						
					SAND (SP), gray, wet, very dense, medium grained, some clay		50/6"	140	22	107	
-10	25										
					Becomes coarse to very coarse grained		35 50/3"	140			
-15	30										
							50/5"	140			
-20	35										
					Becomes very coarse grained with some pebbles		19 50/4"	140			
-25	40										
			Refusal at 43 feet on very hard bedrock, unable to make forward progress								
					Total Depth 43 feet Groundwater at 12 feet						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Drill Hole DH- 1

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-2

Date(s) Drilled	8-29-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	13.0
Groundwater Depth [Elevation], feet	8.5 [4.5]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 1.5 inches AC over 5 inches AB		CLAYEY SAND (SC), brown to gray, moist, medium dense to dense						
10							7 7 23	140	15	115	
	5				SANDY CLAY (CL), brown to gray, moist, firm		9 9 16	140	20	106	
5			Very rocky at 8 feet		Groundwater at 8.5 feet. ⊻						
	10				CLAYEY SAND (SC), brownish gray to gray, wet, dense, scattered pebbles		5 18 25	140	8	128	
					Total Depth 10.5 feet. Groundwater at 8.5 feet.						

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 2

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-4

Date(s) Drilled	8-29-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	20.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 2 inches AC over 7 inches AB		SANDY CLAY (CL), dark brown, damp to moist, firm to very firm						RV
							12 20 50/4"	140	8	126	
			CAPISTRANO FORMATION (Tc) Fine grained sandstone, locally laminated, poorly cemented		SAND (SM), yellow brown, damp to moist, dense, fine grained, minor silt						
							20 40 50/4"	140	9	103	
15	5										
					As above, slightly silty, moist to wet		22 50/3"	140	7	97	
10	10										
					Total Depth 10.5 feet. No groundwater.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Drill Hole DH- 4

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-5

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	16.0
Groundwater Depth [Elevation], feet	10.0 [6.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
15			**ARTIFICIAL FILL (Qaf)** 2 inches AC over 6 inches AB		SANDY CLAY (CL), brown to dark brown, moist, firm		4 11 17	140	10	119	
10	5				CLAYEY SAND (SC), brown, moist, dense		8 12 18	140	9	107	
	10				SAND (SP), brown, moist, loose, tip of sampler is wet Groundwater at 10 feet.		1 1 1	140	15	115	
					Total Depth 10.5 feet. Groundwater at 10 feet.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH- 6

Date(s) Drilled	8-29-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	50.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.5
Groundwater Depth [Elevation], feet	12.0 [-0.5]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 2 inches AC over 5 inches AB		SAND (SM), brown, moist, medium dense, medium to coarse grained, minor silt						
10											
							5 13 15	140	9	102	
					SANDY CLAY (CL), brown to dark brown, moist, firm, medium grained		5 8 18	140	20	101	DS
	5										
5											
					Scattered pebbles at 9 feet		14 8 11	140	13	114	CN
	10										
0											
					Groundwater at 12 feet. ▽						
					Some black and orange staining, wet at 14 feet		4 5 4	140	26		PS AL
	15										
-5											
					Groundwater at 12 feet.						
			CAPISTRANO FORMATION (Tc)		SILTY SAND (SM), light brown to brown, wet, fine to medium grained		21 50	140	23	103	

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH- 6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-10											
	25		Some bedding within unoxidized claystone, dipping 0 to 10 degrees at 24 feet		CLAY (CL/CH), dark gray, moist, very firm to hard		17 22 27	140			
-15											
	30		Interbedded claystone and sandstone at 29 feet		CLAY (CL/CH), and SAND (SP), dark gray and brown, moist, hard, medium to coarse grained		20 50/3"	140	17	118	DS
-20											
	35				SAND (SP), light gray to gray, wet, very dense, medium to very coarse grained		20 30 40	140			
-25											
							50/5"	140	20	113	
	40										
-30											
					SILTY SAND (SM), gray to dark gray, wet, very dense, fine to medium grained		16 27 50	140			

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 6

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-35											
					SAND (SP), gray, wet, very dense, coarse grained		37 50/6"	140	20	112	
	50				Total Depth 50 feet. Groundwater at 12 feet.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-10

Date(s) Drilled	8-27-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.0 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	10.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 3 inches AC over 3 inches AB		SANDY CLAY (CL), dark gray, moist, firm, scattered rock fragments, roots, pockets of coarse sand						
							7 10 15	140	13	107	
							14 18 22	140	13	114	
5	5										
					Abundant rock fragments below 8 feet						
							34 50/3"	140			
0	10				Total Depth 10 feet. No groundwater.						

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-12

Date(s) Drilled	8-27-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	11.0
Groundwater Depth [Elevation], feet	9.0 [2.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
10			**ARTIFICIAL FILL (Qaf)** 4 inches AC over 4 inches AB. Difficult drilling, probable boulders and cobbles below 0 feet		SANDY GRAVEL (GP), light brown to brown, damp to moist, medium dense						
					Some clay at 2 feet		8 8 11	140	14	109	
	5		Very poorly consolidated material, falling out of sampler, appears very loose with abundant mechanically fractured rock fragments		SANDY CLAY (CL), dark gray, damp, loose, abundant rock fragments, organics		9 21 21	140	17	105	PS AL
5					Groundwater at 9 feet.						
	10				CLAYEY SAND (SC), dark gray, wet, loose to medium dense, abundant rock fragments		4 4 4	140	17		CN PS AL
0											
	15		Unconsolidated material, falling out of sampler, appears extremely loose with abundant mechanically fractured rock fragments		Sample contains rock fragments, black unoxidized shale, in dense, very wet, clayey sand, very little fines		19 22 21	140	13		
-5											
			CAPISTRANO FORMATION (Tc)		SAND (SP), yellow brown to gray, wet, dense to very dense, medium to coarse grained		18 30 38	140			

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GMU GEOTECHNICAL, INC.

Drill Hole DH-12

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-10											
							30 50/2.5"	140	19	108	DS
	25										
-15											
					Becomes coarse grained at 29 feet		22 33 40	140			
	30										
-20											
							50/4"	140			
	35		Very difficult drilling, vary hard material, 1 foot thick, probable very dense sand, no rock fragments in cuttings at 35 feet								
-25											
					Becomes brown to yellow brown, some pebbles at 39 feet		(50/5")	140			
	40										
-30											
					Some manganese oxide staining at 44 feet		50/6"	140	14	122	

Drill Hole DH-12

GMU
GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-35											
					Becomes medium to coarse grained		(50/5")	140			
					Total Depth 49.5 feet. Groundwater at 9 feet.						

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-13

Date(s) Drilled	8-30-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	14.0
Groundwater Depth [Elevation], feet	13.5 [0.5]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 6 inches of concrete above the fill		SANDY CLAY (CL), brown to dark gray, damp, firm to very firm						
							19 19 15	140	14		PS AL
10					SAND (SP), light brown, dry, loose, abundant rock fragments		13 25 28	140	8	117	
	5										
5					CLAYEY SAND (SC), light brown to yellow brown, damp to moist, medium dense		7 10 9	140			
	10										
					Groundwater at 13.5 feet. ∇						
0					SAND (SP), light reddish brown, moist, dense, scattered rock fragments, some clay		36 39 12	140	14	128	
	15										
			CAPISTRANO FORMATION (Tc)		SAND (SP), light brown, wet, very dense, medium to coarse grained						
-5							42 50/4"	140			

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
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Project Number: 11-161-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-10					Becomes coarse grained at 24 feet		50/4"	140	14	121	
	25										
-15					Some iron oxide staining at 29 feet		(50/5")	140			
	30										
			Very rocky zone, 1 foot thick at 31 feet								
-20					Becomes coarse grained to pebbly at 34 feet		50/3"	140	13	125	
	35										
-25					Becomes fine to coarse grained at 39 feet		35 50/5"	140			
	40										
-30							50/3"	140	15	119	

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-35					Becomes medium grained to pebbly at 49 feet		(50/5")	140			
					Total Depth 49.5 feet. Groundwater at 13.5 feet.						

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-14

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	12.0
Groundwater Depth [Elevation], feet	13.5 [-1.5]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		**ARTIFICIAL FILL (Qaf)** About 18 inches of concrete over fill		SANDY CLAY (CL), dark brown to reddish brown, damp to moist, firm						CP DS(R) EI SU CH PH MR
10							9 11 9	140	10	117	
					CLAYEY SAND (SC), dark brown to reddish brown, moist, medium dense		8 11 13	140	13	114	CN
	5										
5											
					SANDY CLAY (CL), dark brown to brown, damp to moist, firm		7 12 16	140	21	113	PS AL
	10										
0											
					Groundwater at 13.5 feet.						
					SAND (SP), light gray to light brown, wet, dense, medium to coarse grained		1 2 6	140			
	15										
-5											
			CAPISTRANO FORMATION (Tc)		SAND (SP), light gray to light brown, wet, dense, medium to coarse grained		22 22 50/4"	140	20	104	DS

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GMU GEOTECHNICAL, INC.

Drill Hole DH-14

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-14

ELEVATION, feet	DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
-10									
	25			SAND (SM), some SILT, light brown to orange brown, wet, very dense, medium to coarse grained	28 50/6"	140			
-15									
	30				50/3"	140	12	122	
-20									
	35				(50/6")	140			
-25									
	40			Coarse sand in waste barrel at 39 feet	50/4"	140			
-30									
				Becomes light brown, fine grained at 44 feet	35 50/4"	140			

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GMU GEOTECHNICAL, INC.

Drill Hole DH-14

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-35											
						○	50/4"	140			
					Total Depth 49.5 feet. Groundwater at 13.5 feet.						

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-15

Date(s) Drilled	8-30-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	9.5
Groundwater Depth [Elevation], feet	12.0 [-2.5]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 2 inches AC over 5 inches AB		SANDY CLAY (CL), dark gray, damp to moist, firm, fine grained						
							6 11 22	140	13	115	
5	5				CLAYEY SAND (SC), brown to gray, moist, medium dense to dense, fine to medium grained		9 11 11	140	12	106	DS
0	10				SILTY SAND (SM), light brown, wet, loose, fine to medium grained		2 2 3	140	17	110	CN
					Groundwater at 12 feet. ∇						
-5	15		**CAPISTRANO FORMATION (Tc)**		SAND (SM), light gray to gray, wet, very dense, medium grained		4 28 44	140			
-10					Becomes brown with orange staining at 19 feet		50/5"	140	17		

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-15

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-15	25				SAND (SP), brown to reddish brown, wet, very dense, medium grained		(50/6")	140			
-20	30				Some iron oxide staining at 29 feet		50/5"	140	20	110	
			Very rocky between 33 and 36 feet								
-25	35		Some interbeds of unoxidized claystone in sample at 34 feet		With some CLAY (CL/CH), dark gray, at 34 feet		(50/6")	140			
-30	40				SILTY SAND (SM), brown, wet, very dense, fine to medium grained		50/5"	140	22	110	
-35							40 50/2"	140			

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-15

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
						○	50/5"	140			
-40					Total Depth 49.5 feet. Groundwater at 12 feet.						

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Drill Hole DH-15

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-16

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	7.0
Groundwater Depth [Elevation], feet	10.0 [-3.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 1.5 inches AC over 5 inches AB		CLAYEY SAND (SC), brown to dark brown, moist, dense, medium to coarse grained						
5							10 16 14	140	8	115	
							11 14 28	140	11	122	
	5										
			Rocky at 6 feet								
0											
					Becomes wet at 9 feet, sample not recovered.		10 9 9	140			
	10				Groundwater at 10 feet.						
					Total Depth 10.5 feet. Groundwater at 10 feet.						

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GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
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Log of Drill Hole DH-17

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	9.0
Groundwater Depth [Elevation], feet	13.0 [-4.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		**ARTIFICIAL FILL (Qaf)** 3 inches AC over 4 inches AB		CLAYEY SAND (SC), brown, dark brown, and orange brown, damp to moist, dense						
							9 12 14	140			
			Becomes rocky at 3 feet								
5					Scattered rock fragments at 4 feet		5 10 16	140	11	113	CN
	5										
0					Sample not recovered.		6 7 8	140			
	10										
			Becomes rocky at 12 feet								
					Groundwater at 13 feet. ∇						
-5					SAND (SP), brown, light gray, dark gray mottled, moist to wet, loose, abundant rock fragments and gravels, scattered clayey sand pockets		50/5"	140	11	128	
	15		Very difficult drilling due to rocks between 15 and 18 feet								
-10			**CAPISTRANO FORMATION (Tc)**		SAND (SP), brown to light brown, wet, very dense, coarse grained		25 45 46	140			

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GMU GEOTECHNICAL, INC.

Drill Hole DH-17

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-17

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-15							50/5"	140	17		
	25										
-20					Scattered orange staining at 29 feet		(50/6")	140			
	30										
-25					Minor clay at 34 feet		50/1.5"	140			
	35								13	127	
-30					Becomes medium to coarse grained at 39 feet		(50/6")	140			
	40										
-35							50/4"	140	16	116	

GMU GEOTECHNICAL, INC.

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plans and specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-40					SAND (SM), brown, wet, very dense, fine grained		(50/5")	140			
					Total Depth 49.5 feet. Groundwater at 13 feet. Caving at 3 feet.						

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Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-18

Date(s) Drilled	8-27-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	10.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	9.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 3 inches of AC, no AB		CLAYEY SAND (SC), light brown to gray, moist, dense, fine grained						CP EI DS(R) SU CH pH MR
							7 12	140	12	112	
					SAND (SM), light brown to gray, moist, dense, coarse grained		14				
5					CLAYEY SAND (SC), gray to dark gray, moist, dense to very dense, medium to coarse grained		20 27 50/2"	140	15	101	
	5		Difficult drilling, probable boulders at 5 feet								
0			Fragments of unoxidized bedrock within the fill at 9 feet				14 20 22	140	11	121	
	10										
					Total depth 10.5 feet. No groundwater.						

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GMU GEOTECHNICAL, INC.

Drill Hole DH-18

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-19

Date(s) Drilled	8-27-12	Logged By	LLB	Checked By	DH
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc	Total Depth of Drill Hole	49.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	8.0
Groundwater Depth [Elevation], feet	9.0 [-1.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 2.5 inches AC		CLAYEY SAND (SC), brown to dark brown, moist, dense, fine to medium grained						
5							6 14 17	140			
					SAND (SM), brown to dark brown, moist, medium dense, fine to coarse grained		9 10 11	140	13	112	
	5										
0					Groundwater at 9 feet.						
					CLAYEY SAND (SC), brown to light gray, moist to wet, loose, medium to coarse grained		3 4 5	140	25	95	CN
	10										
-5											
					SILTY SAND (SM), brown to light gray, wet, loose, coarse grained		2 3 3	140			
	15										
			Difficult drilling, probable boulders, at 17 feet								
-10											
			CAPISTRANO FORMATION (Tc)		SAND (SP), brown to gray, wet, very dense, coarse grained		50/5"	140	15	116	

GMU GEOTECHNICAL, INC.

Drill Hole DH-19

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-19

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
-15											
	25		Abundant orange and yellow staining along laminations below 24 feet		SAND (SM), light gray, moist, very dense, coarse grained		14 27 37	140			
-20											
							50/5"	140	21	108	
	30										
-25											
							25 45 50/3"	140			
	35										
-30											
							50/3"	140	15	122	
	40										
-35											
							36 50/3"	140			

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-19

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
-40											
							50/4"	140	18	117	
					Total Depth 49.5 feet. Groundwater at 9 feet. Caving at 3 feet.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole DH-20

Date(s) Drilled	8-28-12	Logged By	DRA	Checked By	DH
Drilling Method	Hand Auger	Drilling Contractor	Earthworks Techniques	Total Depth of Drill Hole	4.5 feet
Drill Rig Type	N/A	Diameter(s) of Hole, inches	4	Approx. Surface Elevation, ft MSL	8.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	40 lb Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) Upper 1 foot is planting soil from landscape planter		CLAYEY SAND (SC), with some SANDY CLAY (CL), light brown mottled, moist, medium dense		16	40	16	101	CP CN
5					Hard zone at 3.2 feet						
					SILTY SAND (SM), yellow brown, moist, dense, some gravel up to 2 inches in diameter		22	40	20	100	
					Total Depth 4.5 feet. Slight Caving. No Groundwater.						

GMU GEOTECHNICAL, INC.

Drill Hole DH-20

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole C-2

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hand Auger	Drilling Contractor	Earthworks Techniques	Total Depth of Drill Hole	2.5 feet
Drill Rig Type	N/A	Diameter(s) of Hole, inches	5	Approx. Surface Elevation, ft MSL	20.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Bulk samples only	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			<u>ARTIFICIAL FILL (Qaf)</u> 3 inches AC over 4 inches AB		Silty Sand (SM), light gray brown, damp to moist, medium dense to dense						RV SU CH pH MR
					Total depth 2.5 feet. No groundwater.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole C-3

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hand Auger	Drilling Contractor	Earthworks Techniques	Total Depth of Drill Hole	3.0 feet
Drill Rig Type	N/A	Diameter(s) of Hole, inches	5	Approx. Surface Elevation, ft MSL	20.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Bulk samples only	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) 4 inches AC over 12 inches AB		Sandy Clay (CL), brown, damp to moist, firm to very firm						CP EI RV
					Total depth 3 feet. No groundwater.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Project: Dana Point Harbor Revitalization
Project Location: Dana Point, CA
Project Number: 11-161-00

Log of Drill Hole C-4

Date(s) Drilled	8-28-12	Logged By	LLB	Checked By	DH
Drilling Method	Hand Auger	Drilling Contractor	Earthworks Techniques	Total Depth of Drill Hole	2.5 feet
Drill Rig Type	N/A	Diameter(s) of Hole, inches	5	Approx. Surface Elevation, ft MSL	16.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Bulk samples only	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
15			**ARTIFICIAL FILL (Qaf)** 2.5 inches AC over 5.5 inches AB		Clayey Sand (SC), brown, damp to moist, medium dense to dense						PS HY RV
					Total depth 3 feet. No groundwater.						

DH_REV3 11-161-00.GPJ GMULAB.GPJ 10/23/12

GMU GEOTECHNICAL, INC.

Drill Hole C-4

APPENDIX A-2

Previous Boring Logs by Others

GEOTECHNICAL BORING LOG B-8

Date 11-6-07
Sheet 1 **of** 2
Project Dana Point Harbor Renovation, Dana Point, CA.
Project No. 600024-004
Drilling Co. Martini Drilling, Coporation
Type of Rig CME-75
Hole Diameter HSA 8-inch
Drive Weight 140 lbs (Auto Hammer)
Drop 30"
Elevation Top of Hole 7.8'
Location Sport Fishing Dock

Logged By SP
Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0							SC	@0': 4 inches of asphalt over 4 inches of base course. **Fill:** @0.75': Clayey SAND, olive gray brown, slightly moist.	EI, CR
5				Bag-1 R-1	5 12 16	105.7	18.5	CL	@2.5': Sandy CLAY, very stiff, olive gray brown, some moist, fine to medium grained.	
	5			R-2	4 4 6	99.1	25.7	CL	@5': Sandy CLAY, firm, olive gray brown, some moist, fine to medium grained sand. [LL = 41, PI = 20]	AL, DS
0				R-3	5 8 8	99.1	25.7	CL	@7.5': Sandy CLAY, stiff, olive green, moist, fine grained sand. [LL = 49, PI = 26]	AL, CN
	10			S-1	2 3 4			CL	@10': Sandy CLAY, firm, olive green, moist, fine grained sand.	
-5										
	15			R-4	1 5 7	112.4	14.1	SM	@15': Silty SAND, loose, olive green, moist, fine to medium grained. [P200 = 16.0%]	SA
-10										
	20			S-2	push 1 2			SC	**Possible Alluvium:** @20': Clayey SAND, very loose, olive green, very moist to wet, fine to medium grained. [P200 = 19.5%]	P200
-15										
	25			R-5	31 50/4"	113.3	17.5		**Bedrock:** @25': SANDSTONE, very dense, yellowish olive green, wet, medium to coarse grained.	
-20										
	30									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
Tx TRIAXIAL COMPRESSION
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
UC UNCONFINED COMPRESSION

GEOTECHNICAL BORING LOG B-8

Date 11-6-07

Project Dana Point Harbor Renovation, Dana Point, CA.

Project No. 600024-004

Drilling Co. Martini Drilling, Coporation

Type of Rig CME-75

Hole Diameter HSA 8-inch

Drive Weight 140 lbs (Auto Hammer)

Drop 30"

Elevation Top of Hole 7.8'

Location Sport Fishing Dock

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			S-3	28 50/6"				30': SANDSTONE, very dense, yellowish olive green, wet, medium to coarse grained.	
-25										
	35			R-6	44 50/3"	118.6	20.6		@35': SANDSTONE, very dense, yellowish olive green, wet, medium to coarse grained.	CN, CU
-30										
	40			S-4	35 50/4"				@40': SANDSTONE, very dense, yellowish olive green, wet, medium to coarse grained.	
-35										
	45			R-7	44 50/2"	112.7	12.4		@45': SANDSTONE, very dense, yellowish olive green, wet, medium to coarse grained.	
									Total Depth of borehole: 45.7 feet Free ground water encountered at 12 feet during drilling. Borehole backfilled with soil cuttings and patched with bentonite chips and rapid set concrete.	
-40										
	50									
-45										
	55									
-50										
	60									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- Tx TRIAXIAL COMPRESSION
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- UC UNCONFINED COMPRESSION

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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BUILDING OFFICIAL

GEOTECHNICAL BORING LOG B-1

Date 11-6-02 | Sheet 1 of 2
Project WRT/Dana Point | Project No. 600024-001
Drilling Co. Martini Drilling Company | Type of Rig CME-75 HSA
Hole Diameter 6" | Drive Weight 140 lbs. | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map.

Logged By DAG
Sampled By DAG

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								@ 0' ASPHALT, about 3" @ 3" FILL CLAYEY SAND, moist, olive-brown, fine- to medium-grained, rounded pebbles to 1/2"	CR,EI
				B-1					@ 3' encoutering occasional rocks to 3"	
	5			R-1	14 13 12			SC CL	@ 5' upper 3": CLAYEY SAND, as above, dark gray, rounded gravels to 1" lower 4": SANDY CLAY, stiff, moist, olive-brown, high plasticity, medium-grained sands, sub-grounded gravels to 1/2" note: partial recovery from R-1	
	10			S-1	2 4 5		17.3	CL-ML	@ 10' SILTY CLAY, stiff, moist (sat?), medium gray, mottled, contains some fine sands, staining,rounded pebbles to 1/2", fractured rock in middle of sampler, fine sands at top 2" of sampler	
	15			R-2	2 3 6			SC	@ 15' CLAYEY SAND, loose, wet, olive-brown, medium-grained, contains silt, minor pebbles, minor amounts of sandy clay in sampler	
	20			S-2	N/A			SM	@ 20' CAPISTRANO FORMATION SILTY SANDSTONE, saturated, olive-brown, medium- to coarse-grained, mottled, stained, some fine sands present, minor amounts of clay	
				S-3	15 40 50/4"			SP	@ 22.5' SANDSTONE, very dense, saturated, brown, medium- to coarse-grained, some fines present, rounded pebbles to 1/2", heavily mottled and stained	
	25			S-4	10 42 50			SP	@ 25' SANDSTONE, very dense, saturated, olive-brown, medium-grained, contains low-plasticity fines, mottling, staining	
	30									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-1

Date 11-6-02 Sheet 2 of 2
Project WRT/Dana Point Project No. 600024-001
Drilling Co. Martini Drilling Company Type of Rig CME-75 HSA
Hole Diameter 6" Drive Weight 140 lbs. Drop 30"
Elevation Top of Hole ' Location See Boring Location Map.

Logged By DAG
Sampled By DAG

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			S-5	8 16/6"			SP	@ 30' SANDSTONE, as above, minor rounded pebbles, laminated "staining" pattern appears as horizontal bands Note: S-5 driven 12" only	
	35			S-6	45 50/5"			SM	@ 35' SILTY SANDSTONE, very dense, wet, brown, medium- to coarse-grained, some fine sands present	
	40			S-7	32 50/3"			SM	@ 40' SILTY SANDSTONE, as above	
	45								Total Depth of hole : 41 feet below ground surface (bgs). Groundwater was encountered within the hole during drilling at an approximate depth of 6 feet bgs. Backfilled with soil cuttings and surface finished with cold asphalt patch. Note: Sea Level measured at approximately 2.5 feet bgs	
	50									
	55									
	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-3

Date 11-6-02 Sheet 1 of 2
Project WRT/Dana Point Project No. 600024-001
Drilling Co. Martini Drilling Company. Type of Rig CME-75 HSA
Hole Diameter 6" Drive Weight 140 lbs. Drop 30"
Elevation Top of Hole ' Location See Boring Location Map.

Logged By DAG
Sampled By DAG

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								ASPHALT, about 3" @ 3" FILL CLAYEY SAND, moist, dark brown, fine- to medium-grained, sub-rounded gravels to 1" gravelly, high-plasticity clay, contains some rounded rocks to 3"	RV
				B-1					@ 2.5' SANDY CLAY, moist, dark brown, highly plastic, contains fine-grained sands, some gravel to 1/2",less gravel than above	
	5			R-1	10 19 18	112.5	12.6	SC	@ 5' CLAYEY SAND, medium dense, moist, fine-grained, high-plasticity clay, rounded pebbles to 1/4", sample contained one (1) rounded 2" rock, sampler was wet on outside	SA,MD
∇				B-2						
	10			S-1	2 2 6			SM	@ 10' SILTY SAND, loose, saturated, olive-brown, fine-grained, contains minor high-plasticity clay, 2" black clay at top of sampler (may be sluff)	
	15			S-2	16 25 12			SP	@ 15' ALLUVIUM GRAVELLY SAND, dense, wet, medium gray, medium- to coarse-grained, gravels to 1.5", contains low-plasticity silt @ 16.5' to 18' driller encountered rough drilling	
	20			S-3	48 50/3"			SP	@ 20' CAPISTRANO FORMATION SANDSTONE, very dense, saturated, tan, medium-grained, minor silt, minor pebbles, difficult to remove from sampler	
	25									
				R-2	25 50/6"	117.3	13.3	SP	@ 27.5' SANDSTONE, very dense, wet, medium gray, medium- to coarse-grained, contains some silt	
	30									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-3

Date 11-6-02
Project WRT/Dana Point
Project No. 600024-001
Drilling Co. Martini Drilling Company.
Type of Rig CME-75 HSA
Hole Diameter 6"
Drive Weight 140 lbs.
Drop 30"
Elevation Top of Hole '
Location See Boring Location Map.

Logged By DAG
Sampled By DAG

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			S-4	N/A			SP	@ 30' SANDSTONE, wet, brown, fine-grained, some fines present, samples may consist of "heaved" material only	
	35			S-5	34 50/6"			SP	@ 35' SANDSTONE, very dense, wet, olive-brown, medium-grained, contains some silt, may have minor mottling, yellow staining appears as horizontal rings	
	40			S-6	50/6"			SP	@ 40' SANDSTONE, very dense, wet, brown, medium-grained, orange and red staining, "rust" particles, rocks to 1", some coarse sand, 1/2" muscovite fragment	
	45			S-7A S-7	6 25 25/3"			SP	@ 45' SANDSTONE, very dense, saturated, blue-gray, orange and yellow mottling, 3" siltstone fragment in tip of sampler (black clay or claystone)	
	50			R-3A R-3	28 50/3"			CL	@ 50' CLAYSTONE, hard, black, fissile, some mottling, tiny shell fragments, similar to material found in tip of S-7, upper 3" of sample is Sand as above	
	55								Total Depth 51 feet below ground surface (bgs). Groundwater was encountered within the hole during drilling at an approximate depth of 9 feet (bgs). Backfilled with soil cuttings and surface finished with cold asphalt patch.	
	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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Template: DYLG1; Prj ID: 2005-022.GPJ

BORING LOCATION: See Figure 2		**ELEVATION AND DATUM (feet):** 7 MSL	
LATITUDE: 33° 27' 38.0" N		**LONGITUDE:** 117° 41' 31.4" W	
DRILLING EQUIPMENT: Mayhew 1000		**DRILLING METHOD:** Rotary Wash	
BORING DIAMETER (inches): 5		**BORING DEPTH (feet):** 22	
DATE STARTED: 6/2/05		**DATE COMPLETED:** 6/2/05	
SPT HAMMER DROP: 30 inches **WT:** 140 lbs		**DRIVE HAMMER DROP:** 30 inches **WT:** 140 lbs	
LOGGED BY: JL	**CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)**	**ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							ASPHALT CONCRETE - 4 inches SILTY SAND (SM); olive, moist, medium dense, fine-grained sand, trace fine gravel - FILL						
5													CA
	5			11 20 23	21			103	17	NP	NP	16	DS
0													
	10			3 3 3	6		light brown, loose, trace corase gravel						
-5							wet						
	15			11 25 50/3 inches	62		dark brown, very dense, fine- to coarse-grained sand, trace fine to coarse gravel	108	19				
-10													
							SANDSTONE (Capistrano Formation); olive, wet, very dense, fine-to coarse-grained sand, trace fine gravel						
	20			50/6 inches	100								
-15							Boring terminated at 22 feet due to refusal. Groundwater encountered at 12 feet during drilling. Boring backfilled with cement/bentonite grout. Surface patched with cold patch asphalt.						
	25												
-20													

LOG OF BORING B-1

Page 1 of 1
Dana Point Boat Launch
Project No. 2005-022

PLATE
A2

BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM (feet):**	7 MSL
LATITUDE:	33° 27' 39.8" N	**LONGITUDE:**	117° 41' 31.4" W
DRILLING EQUIPMENT:	Mayhew 1000	**DRILLING METHOD:**	Rotary Wash
BORING DIAMETER (inches):	5	**BORING DEPTH (feet):**	15
DATE STARTED:	6/2/05	**DATE COMPLETED:**	6/2/05
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	30 inches **WT:** 140 lbs
LOGGED BY: JL	**CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)**	ID: 2.4 OD: 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							CONCRETE - 7 inches SILTY SAND (SM); olive, moist, medium dense, fine-grained sand - FILL						
5													CA RV
				9 16 25	20			91	10			31	
	5												
0				9 9 20	14			109	20				DS
							wet						
							SILTY GRAVEL with SAND (GM); dark gray, wet, medium dense, fine to coarse gravel, fine-grained sand						
	10			6 7 17	12								
-5							SILTSTONE (Capistrano Formation); dark gray, wet, very dense, nonplastic						
	15			15 27/3 inches	100		Boring terminated at 14.75 feet due to refusal. Groundwater encountered at 7 feet during drilling. Boring backfilled with cement/bentonite grout. Surface patched with rapid set concrete.						
-10													
	20												
-15													
	25												
-20													

LOG OF BORING B- 2

Page 1 of 1
Dana Point Boat Launch
Project No. 2005-022

PLATE
A3

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Template: DYLG1; Prj ID: 2005-022.GPJ

BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM (feet):**	7 MSL
LATITUDE:	33° 27' 38.7" N	**LONGITUDE:**	117° 41' 32.0" W
DRILLING EQUIPMENT:	Mayhew 1000	**DRILLING METHOD:**	Rotary Wash
BORING DIAMETER (inches):	5	**BORING DEPTH (feet):**	21
DATE STARTED:	6/2/05	**DATE COMPLETED:**	6/2/05
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	30 inches **WT:** 140 lbs
LOGGED BY: JL	**CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)**	ID: 2.4 OD: 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							CONCRETE - 7 inches						
5							SILTY SAND (SM); olive, moist, medium dense, fine-grained sand, trace fine gravel - FILL			NP	NP	17	CA COMP RV
	5			7 8 11	9								
0							wet						
	10			6 9 21	30		SILTY GRAVEL with SAND (GM); dark greenish gray, wet, medium dense to dense, fine to coarse gravel, fine-grained sand						
-5													
	15			27/1 Inch 75/6 inches	100 100								
-10													
							SANDSTONE (Capistrano Formation); olive, wet, very dense, fine-grained sand						
	20			20 50/6 inches	100		Boring terminated at 21 feet due to refusal. Groundwater encountered at 7 feet during drilling. Boring backfilled with cement/bentonite grout. Surface patched with rapid set concrete.						
-15													
	25												
-20													

LOG OF BORING B- 3

Page 1 of 1
Dana Point Boat Launch
Project No. 2005-022

PLATE

A4

Template: DYLG1; Prj ID: 2005-022.GPJ

BORING LOCATION:	See Figure 2	ELEVATION AND DATUM (feet):	10 MSL
LATITUDE:	33° 27' 39.2" N	LONGITUDE:	117° 41' 33.4" W
DRILLING EQUIPMENT:	Mayhew 1000	DRILLING METHOD:	Rotary Wash
BORING DIAMETER (inches):	5	BORING DEPTH (feet):	7
DATE STARTED:	6/2/05	DATE COMPLETED:	6/2/05
SPT HAMMER DROP:	30 inches WT: 140 lbs	DRIVE HAMMER DROP:	30 inches WT: 140 lbs
LOGGED BY: JL	CHECKED BY: QL	DRIVE SAMPLER DIAMETER (inches)	ID: 2.4 OD: 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							ASPHALT CONCRETE - 4 inches						
							SILTY GRAVEL with SAND (GM); brown, moist, medium dense, fine to coarse gravel, fine-grained sand, few cobbles - FILL						
				6 9 18	13		CLAYEY SAND (SC); olive, moist, medium dense, fine-to coarse-grained sand, trace coarse gravel - FILL	104 104	8 10	30	10	18	CA COMP RV
5	5			8 15 15	15		Increased fines, brown, few SANDY SILT (ML)	111 119	13 14				
							Boring terminated at 6.5 feet. No groundwater encountered during drilling. Boring backfilled with cement/bentonite grout. Surface patched with cold patch asphalt.						
0	10												
-5	15												
-10	20												
-15	25												
-20													

LOG OF BORING B- 4

Page 1 of 1
Dana Point Boat Launch
Project No. 2005-022

PLATE
A5

APPENDIX A-3

Cone Penetration Testing (CPT) Logs by GMU

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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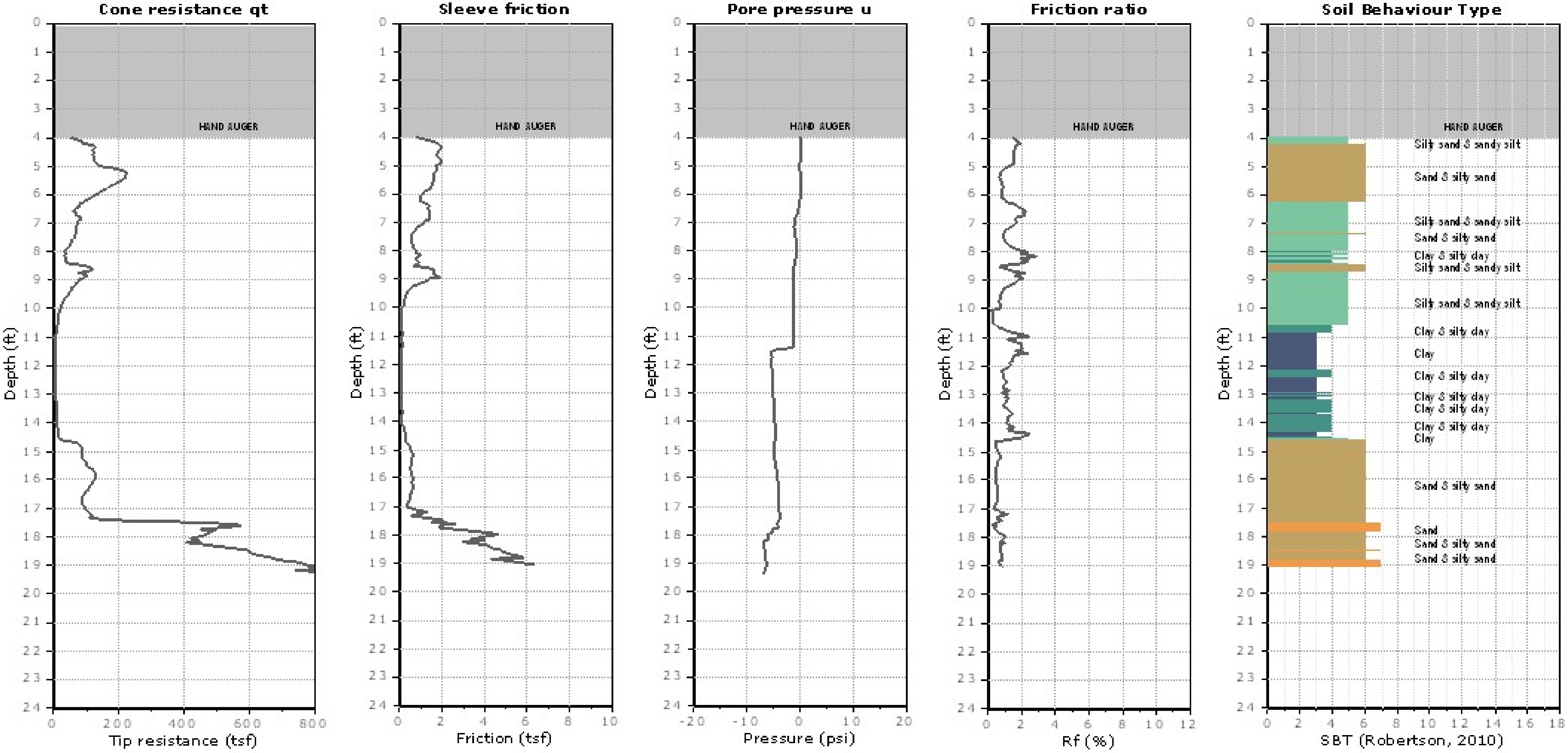
Hadi Tabatabaee
BUILDING OFFICIAL

Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **GMU Geotechnical**
Location: **34571 Golden Lantern, Dana Point, CA**

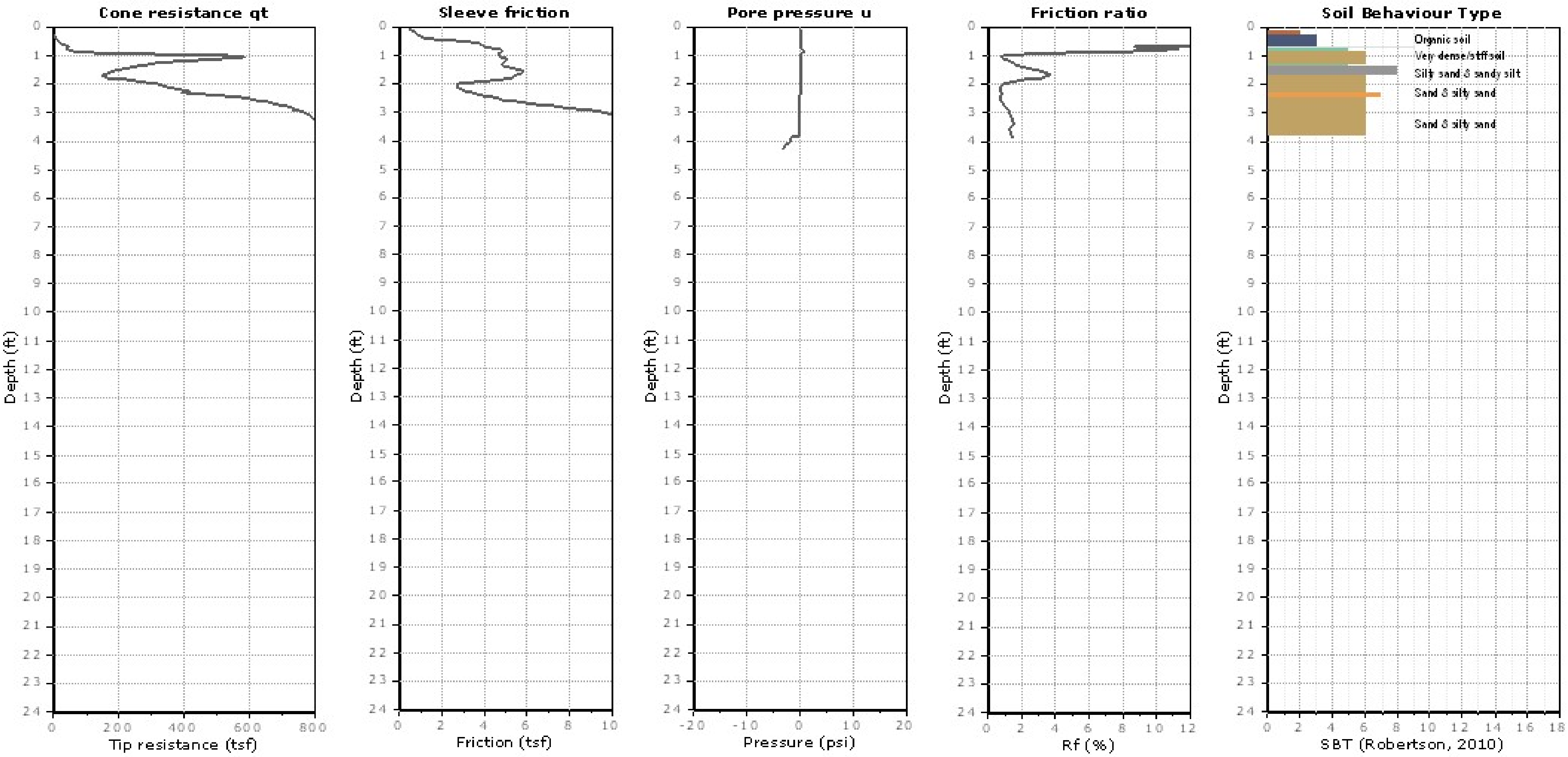
CPT-1A
Total depth: 19.37 ft, Date: 7/12/2019



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: GMU Geotechnical
Location: 34571 Golden Lantern, Dana Point, CA

CPT-2A
Total depth: 4.27 ft, Date: 7/12/2019



Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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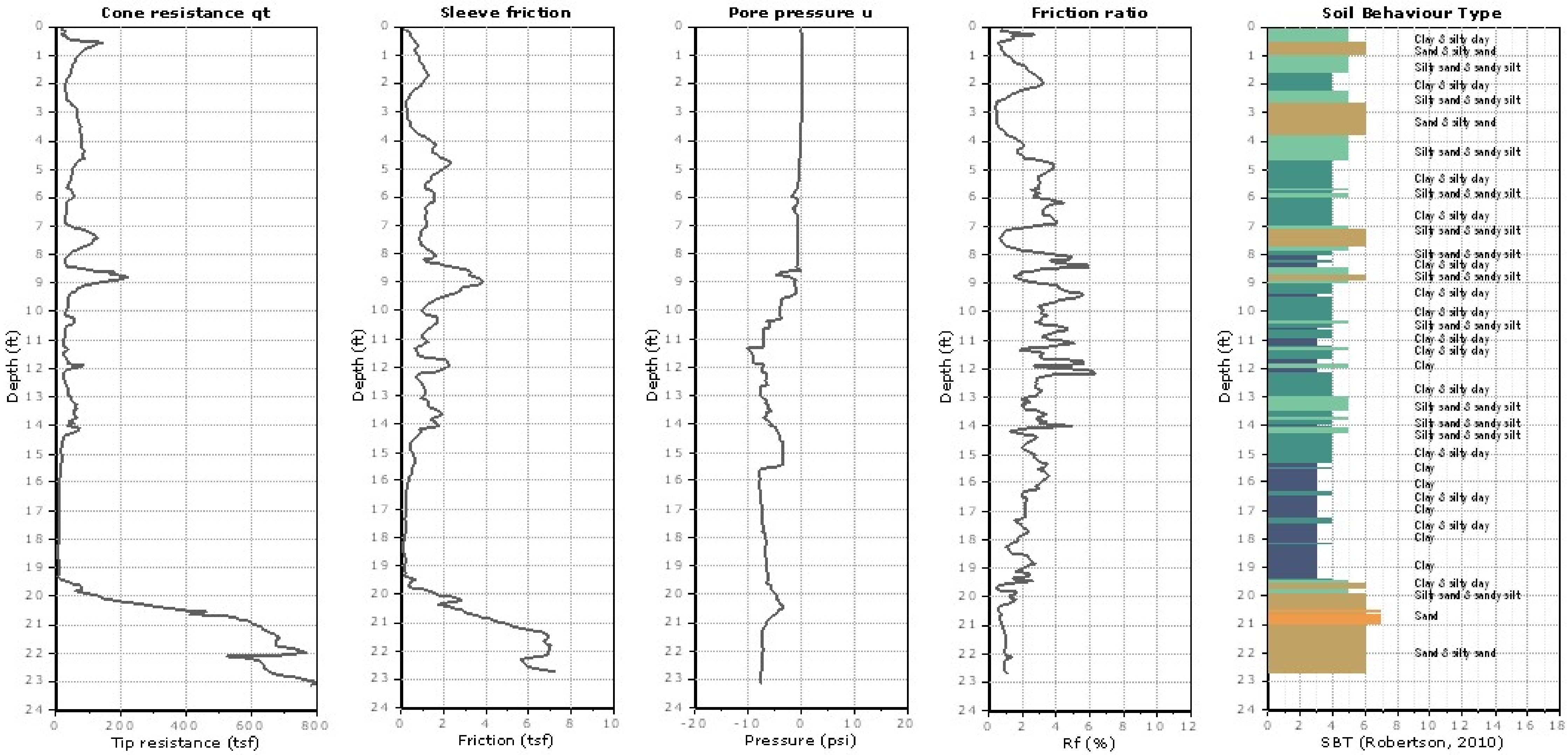
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: GMU Geotechnical

Location: 34571 Golden Lantern, Dana Point, CA

CPT-3A

Total depth: 23.11 ft, Date: 7/12/2019



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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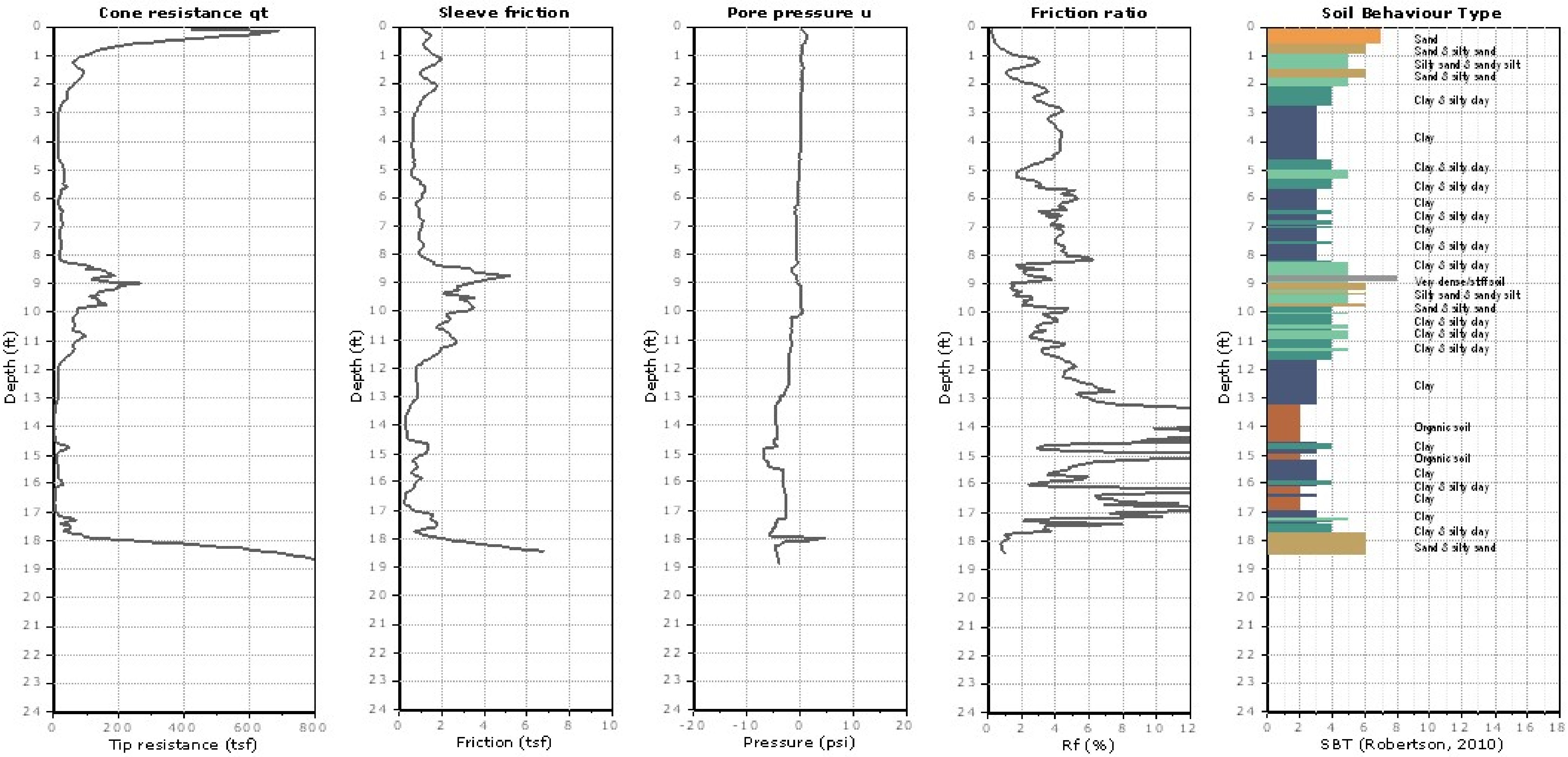
BUILDING OFFICIAL

Project: GMU Geotechnical
Location: 34571 Golden Lantern, Dana Point, CA

CPT-4A
Total depth: 18.83 ft, Date: 7/12/2019



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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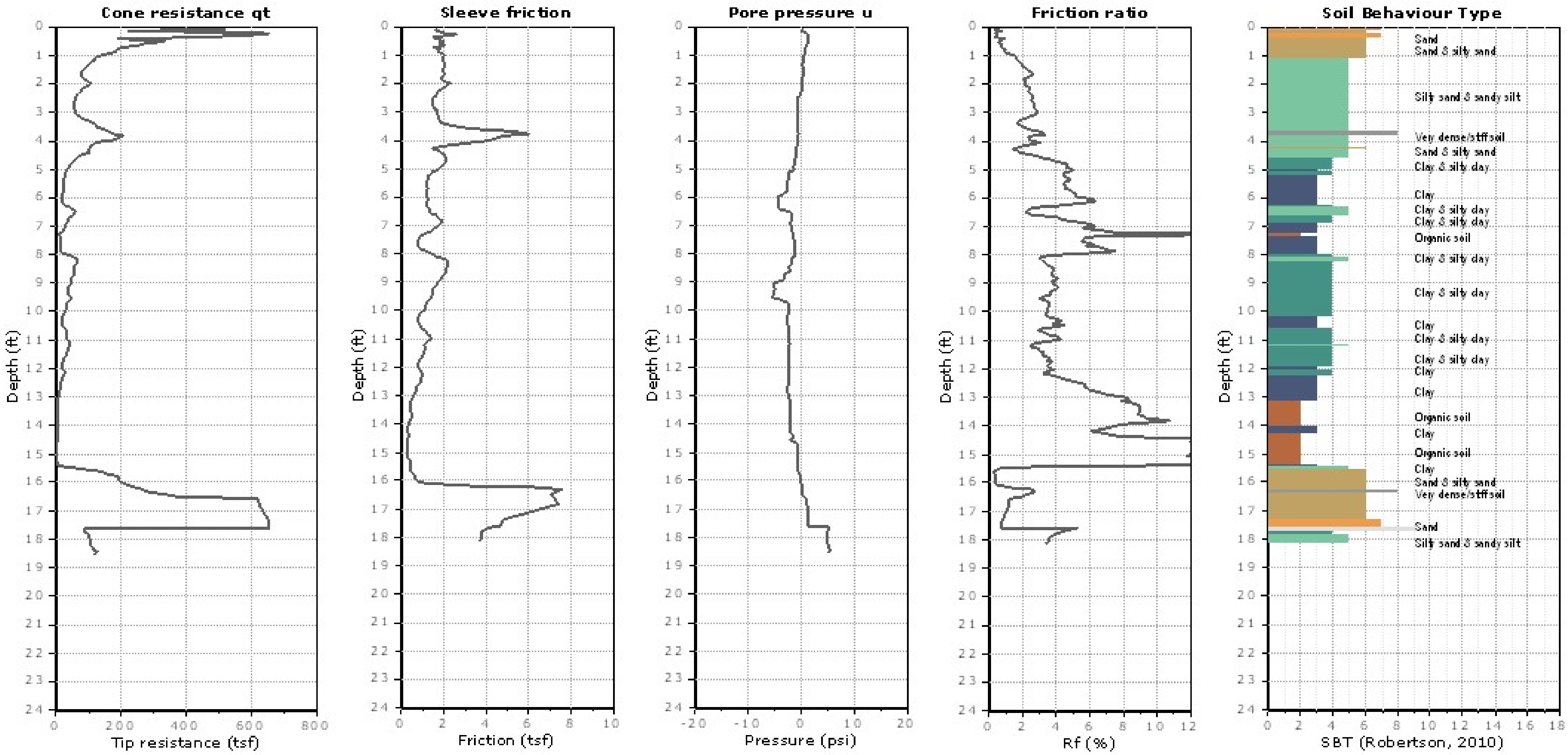
Project: GMU Geotechnical

Location: 34571 Golden Lantern, Dana Point, CA

CPT-5A

Total depth: 18.52 ft, Date: 7/12/2019

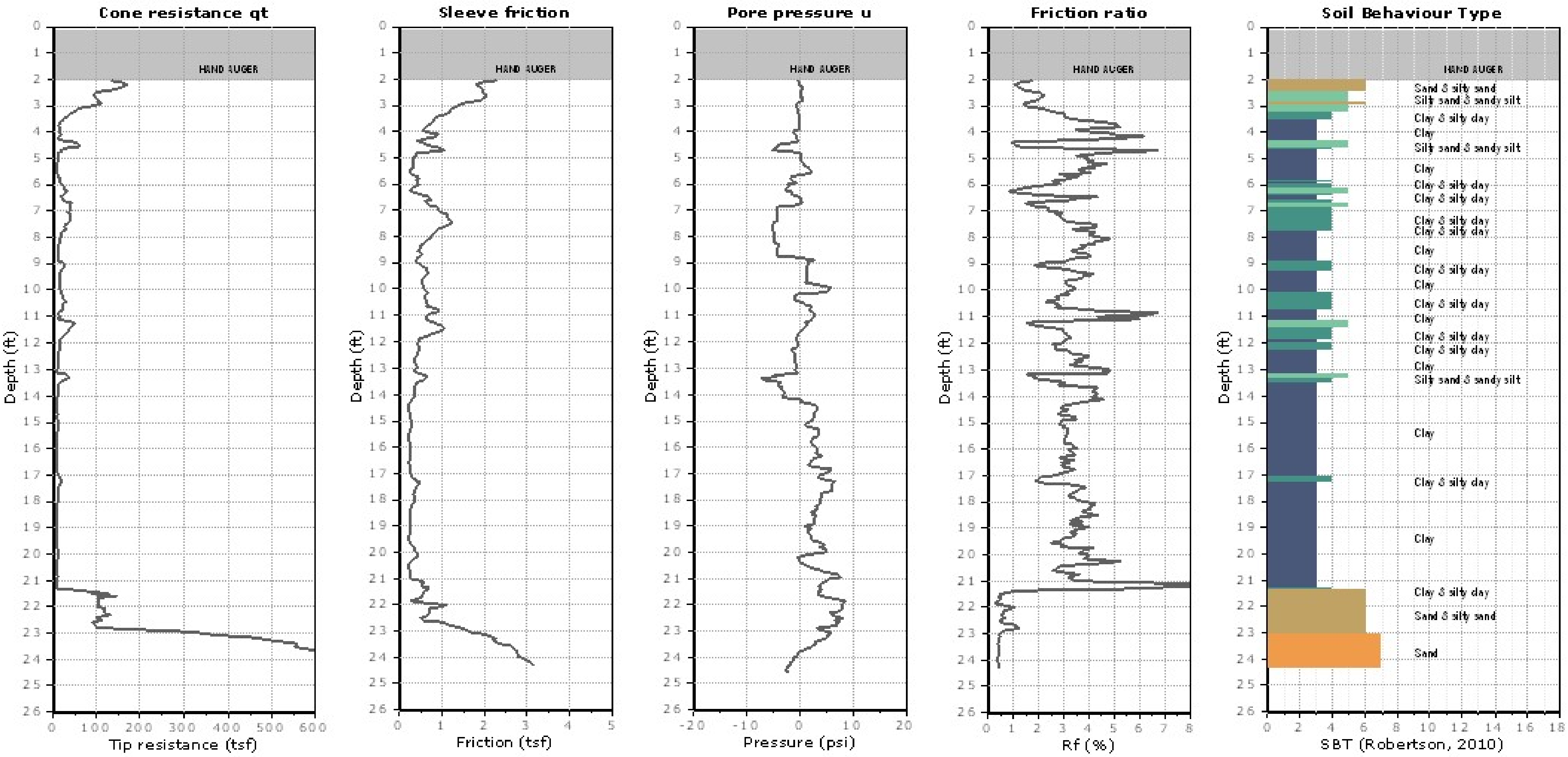


Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: GMU Geotechnical **CPT-6A**

Location: 34699 Golden Latern, Dana Point, CA Total depth: 24.62 ft, Date: 10/9/2019



Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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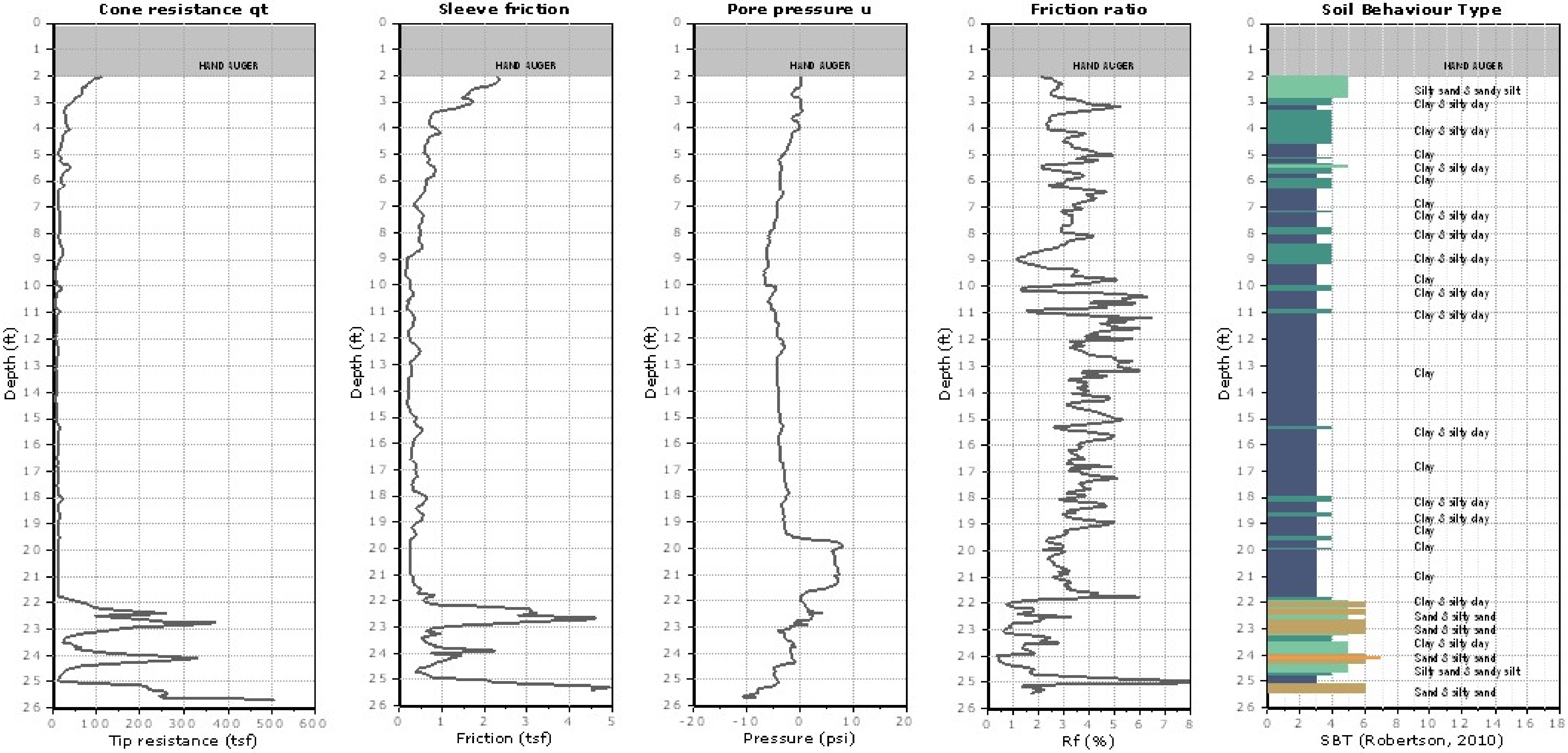
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: GMU Geotechnical

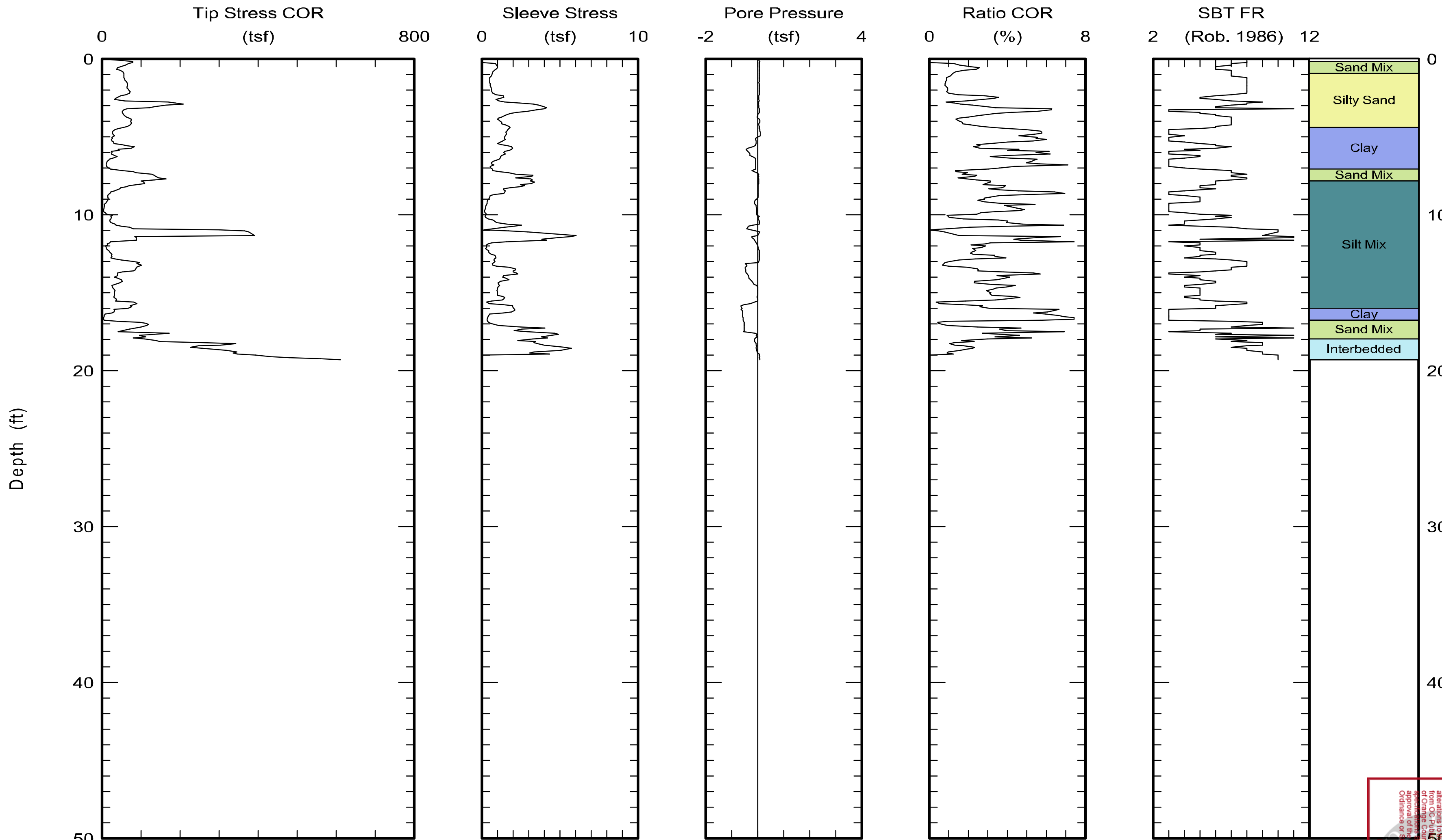
Location: 34699 Golden Latern, Dana Point, CA

CPT-7A

Total depth: 25.72 ft, Date: 10/9/2019



Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 29/Aug/2012 Test ID: CPT-1 Project: DanaPoint
	Customer: GMU Geotechnical, Inc. Job Site: OCDPH Revitalization	



Maximum depth: 19.32 (ft)

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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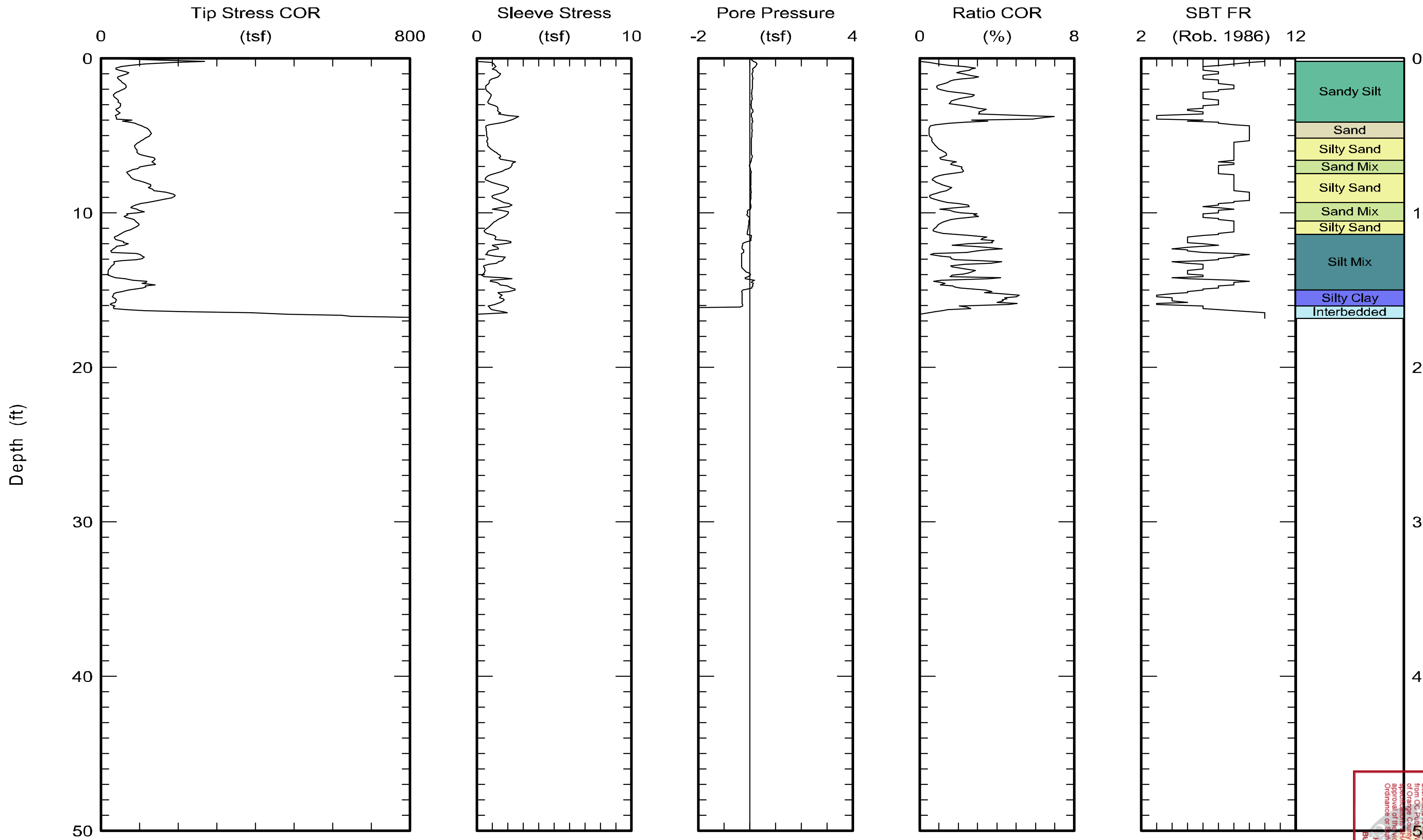
Test ID: CPT-1
File: Z29G1209C.ECP

Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 29/Aug/2012 Test ID: CPT-4 Project: DanaPoint
	Customer: GMU Geotechnical, Inc. Job Site: OCDPH Revitalization	



Maximum depth: 16.85 (ft)

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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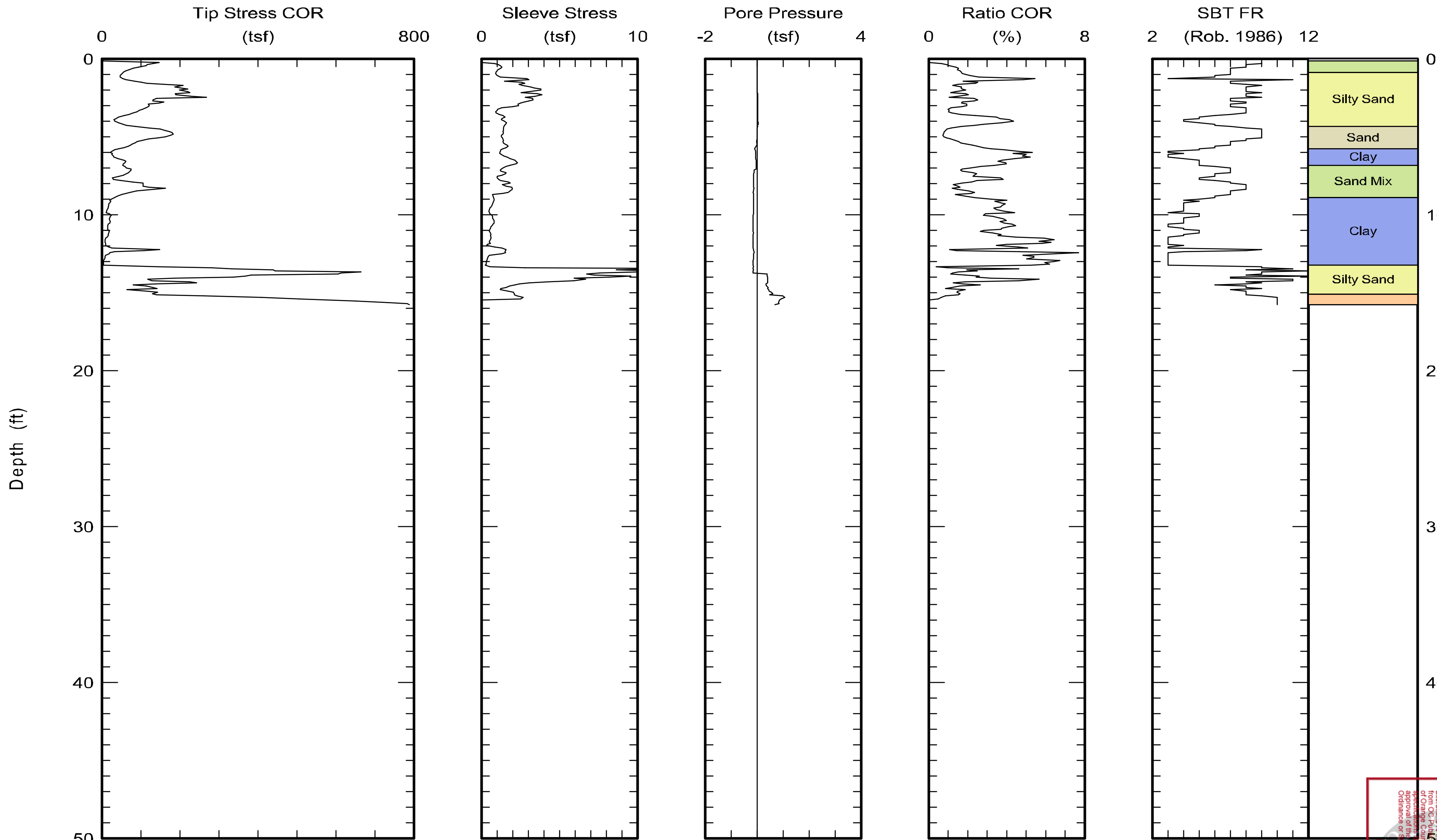
Test ID: CPT-4
File: Z29G1207C.ECP

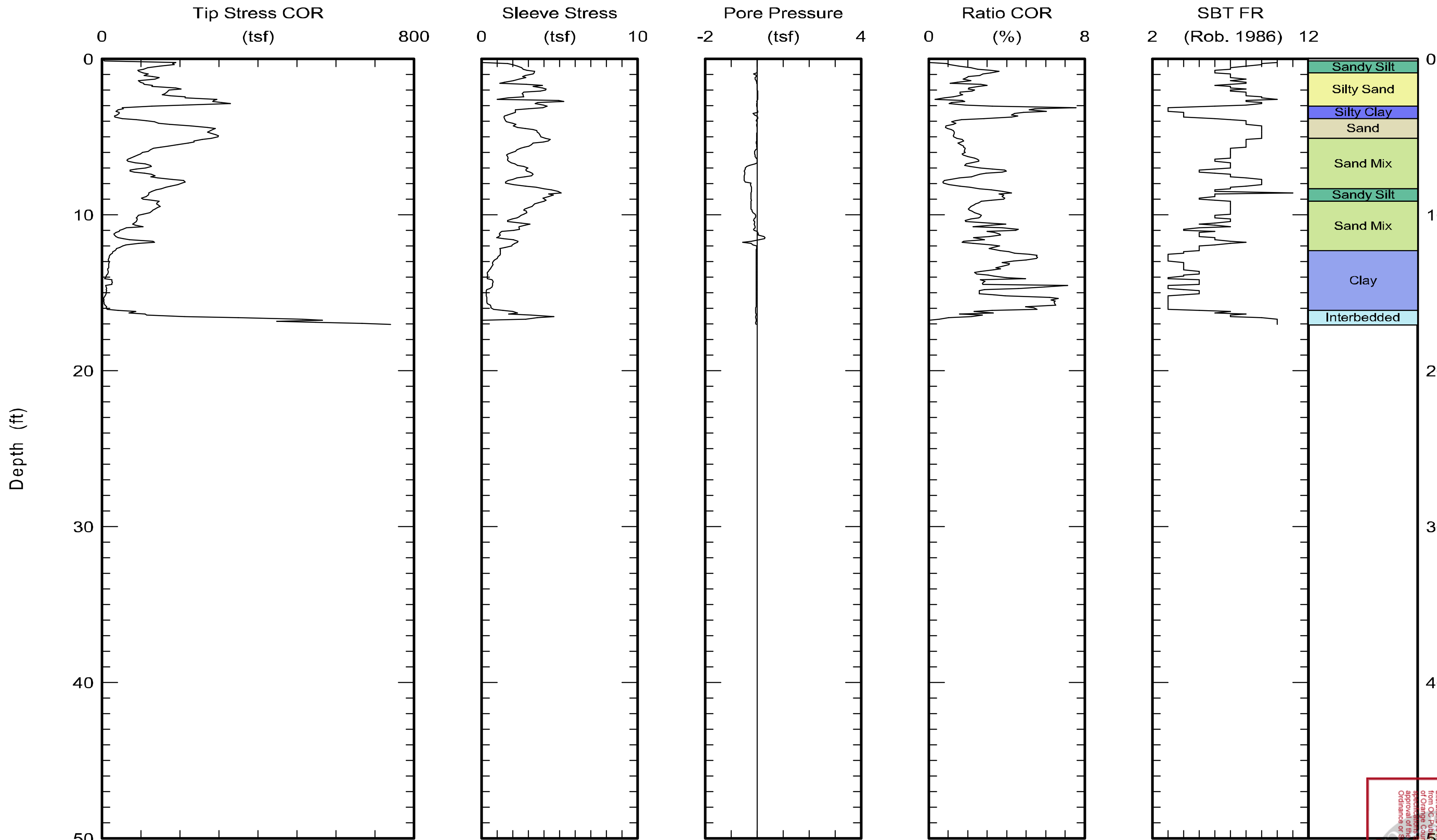
Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 29/Aug/2012 Test ID: CPT-5 Project: DanaPoint
	Customer: GMU Geotechnical, Inc. Job Site: OCDPH Revitalization	



Maximum depth: 15.79 (ft)

Test ID: CPT-5
File: Z29G1206C.ECP

Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 29/Aug/2012 Test ID: CPT-6 Project: DanaPoint
	Customer: GMU Geotechnical, Inc. Job Site: OCDPH Revitalization	



Maximum depth: 17.07 (ft)

Test ID: CPT-6
File: Z29G1204C.ECP

APPENDIX A-4

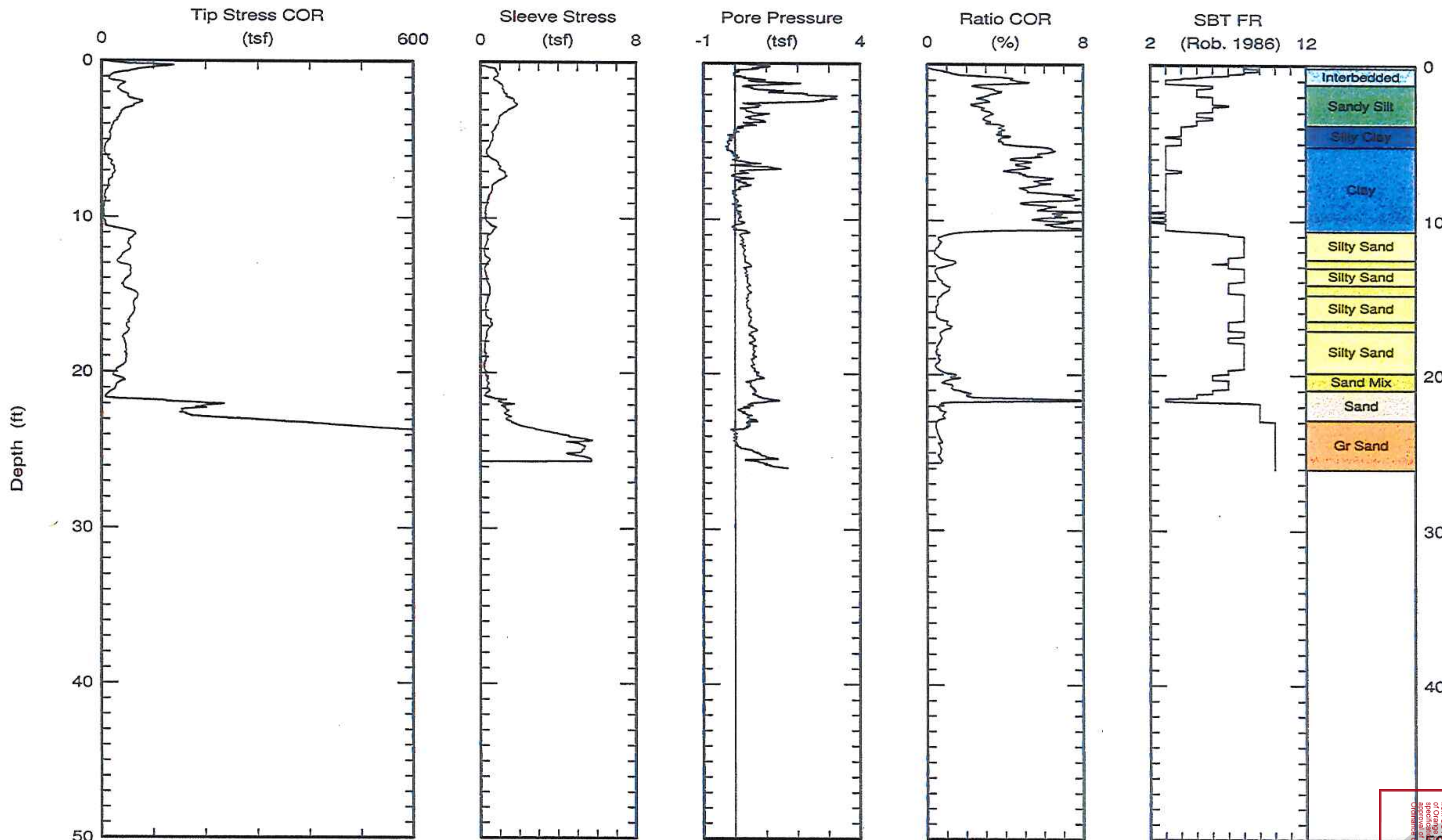
Cone Penetration Testing (CPT) Logs by Others

Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
skehoe@msn.com

CPT Data
30 ton rig

Date: 05/Nov/2007
Test ID: CPT-10
Project: DanaPoint

Customer: Leighton
Job Site: Dana Point Harbor



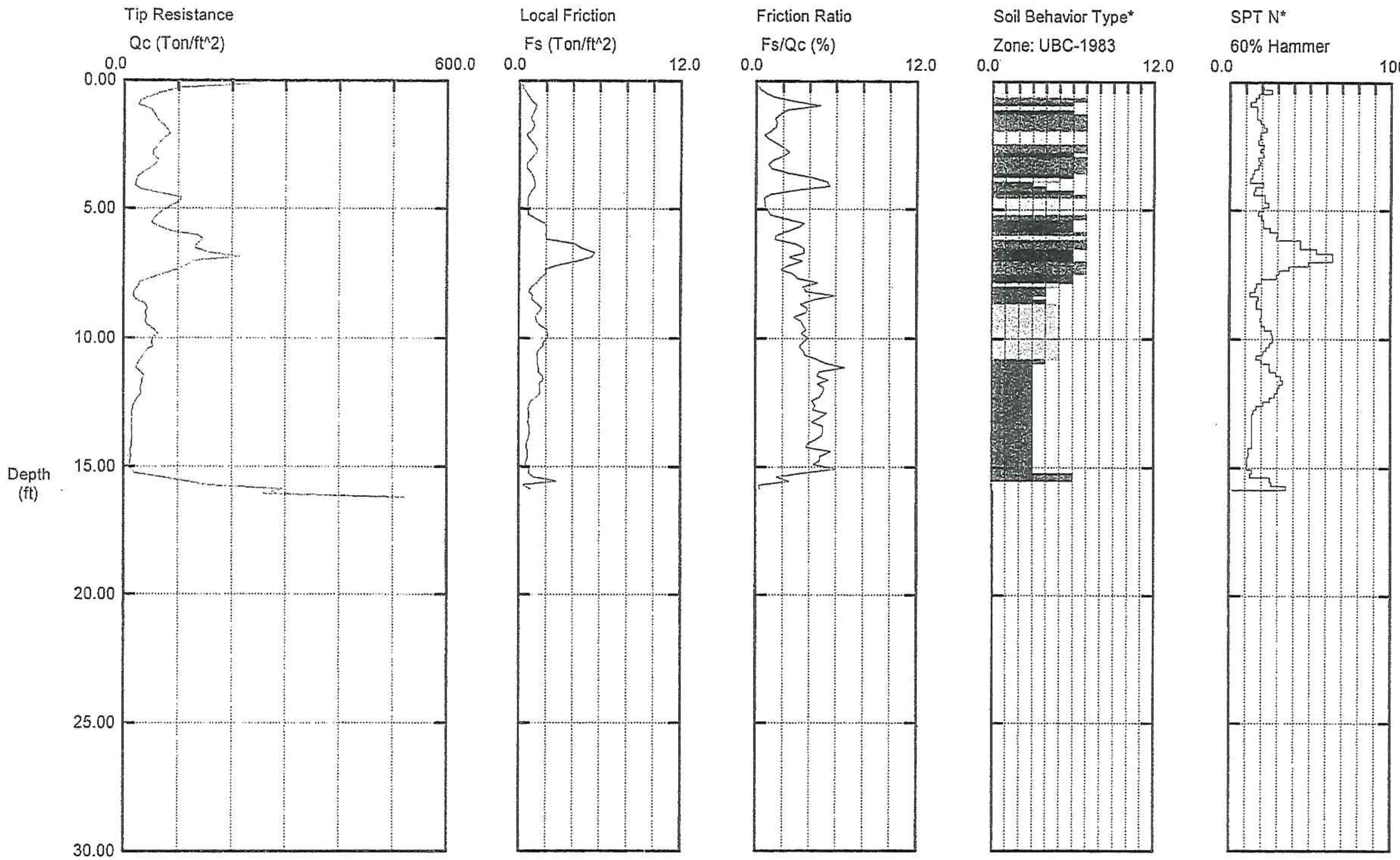
Maximum depth: 26.02 (ft)

ɔil behavior type and SPT b·   ·n data from UBC-1983

Leighton Consu. .ng, Inc.

Operator: Bobby-Victor
Sounding: CPT-01
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 08:31
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 16.24 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

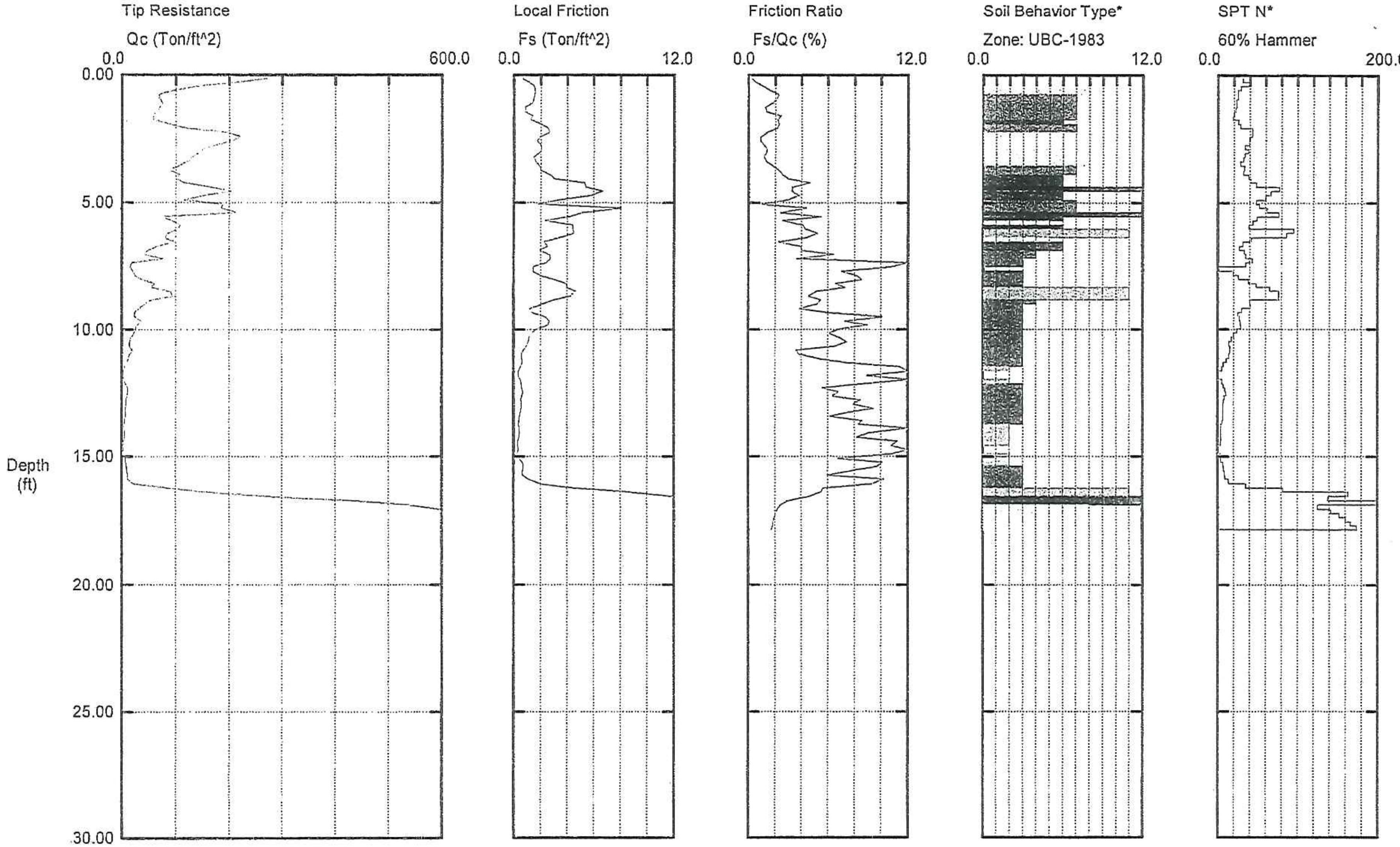
sdf-500

ɔil behavior type and SPT b   n data from UBC-1983

Leighton Consu...ng, Inc.

Operator: Bobby-Victor
Sounding: CPT-02
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 09:05
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 18.21 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

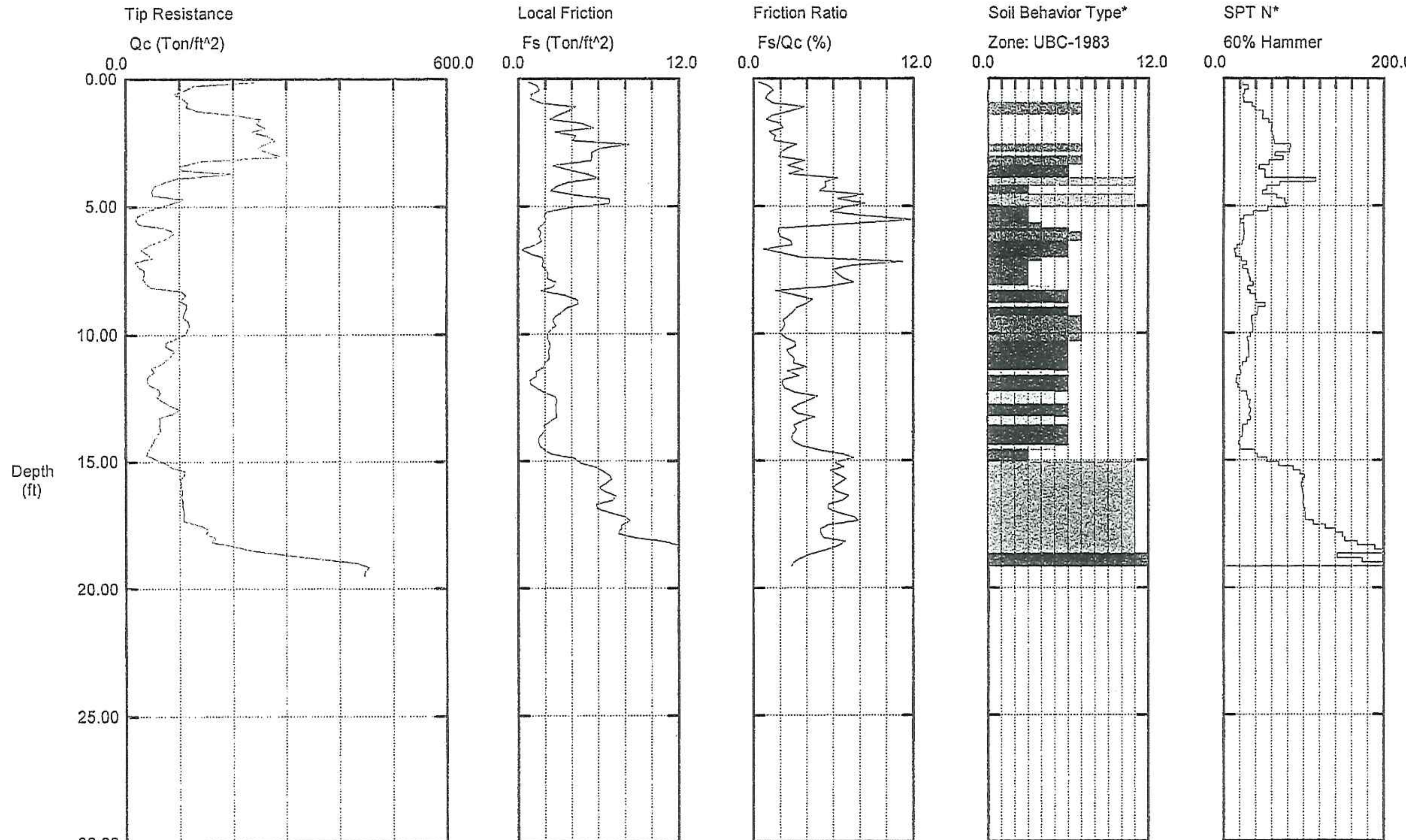
sdf-501

ɔil behavior type and SPT b n data from UBC-1983

Leighton Consu...ing, Inc.

Operator: Bobby-Victor
Sounding: CPT-03
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 09:35
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 19.52 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

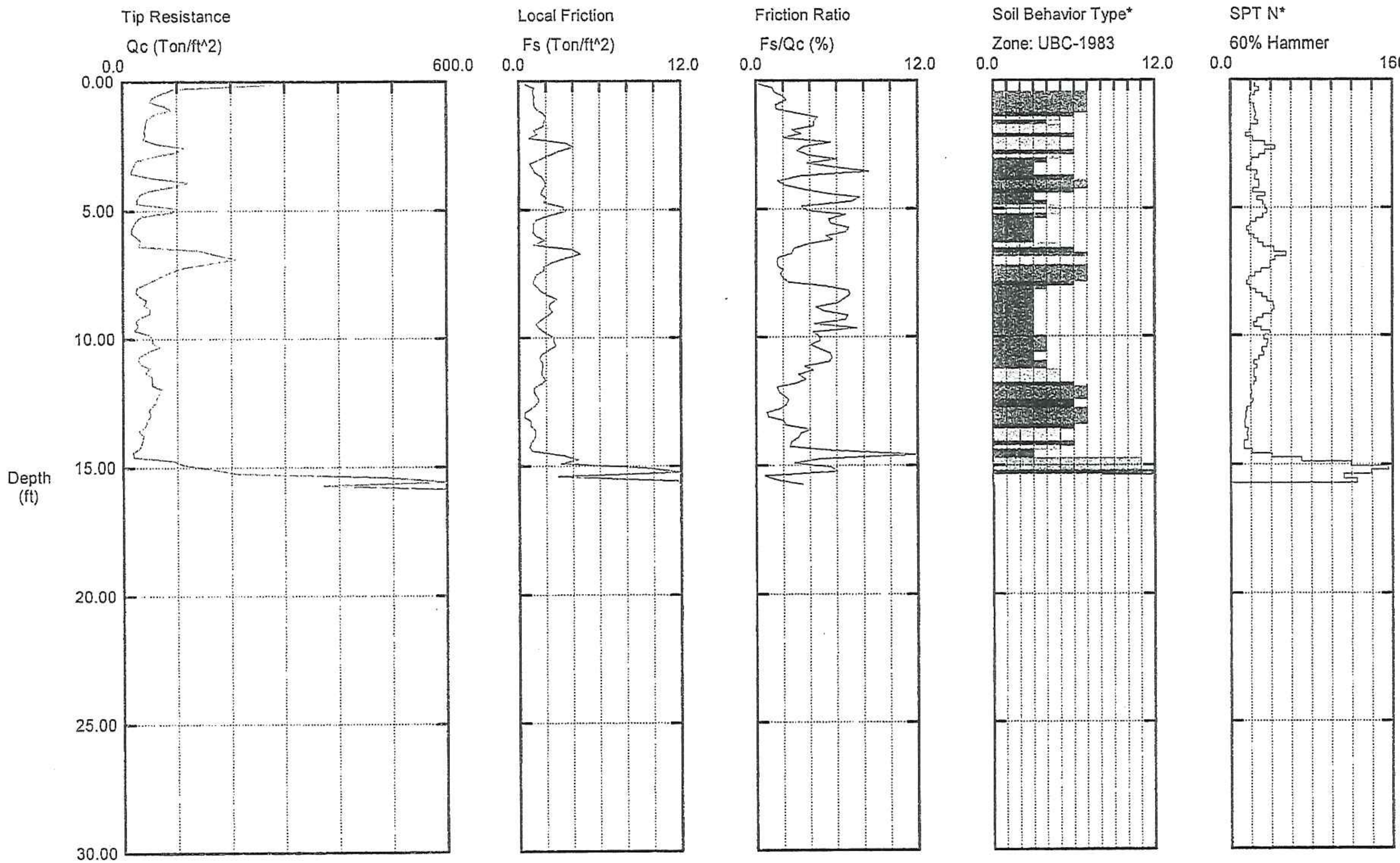
sdf-502

il behavior type and SPT b… n data from UBC-1983

Leighton Consu…ng, Inc.

Operator: Bobby-Victor
Sounding: CPT-04A
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 10:28
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 16.08 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

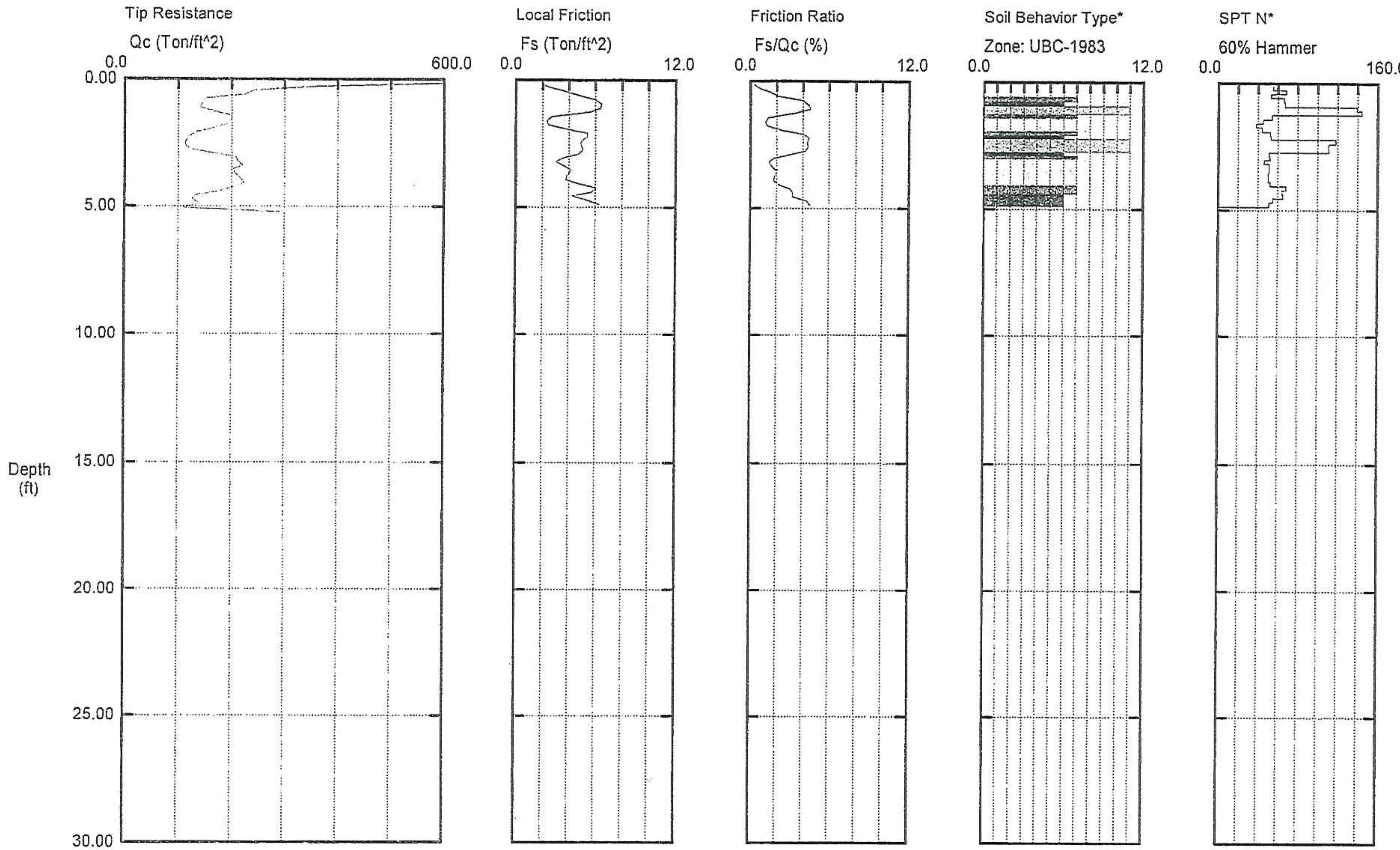
sdf-504

soil behavior type and SPT based on data from UBC-1983

Leighton Consulting, Inc.

Operator: Bobby-Victor
Sounding: CPT-05A
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 11:16
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 5.25 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

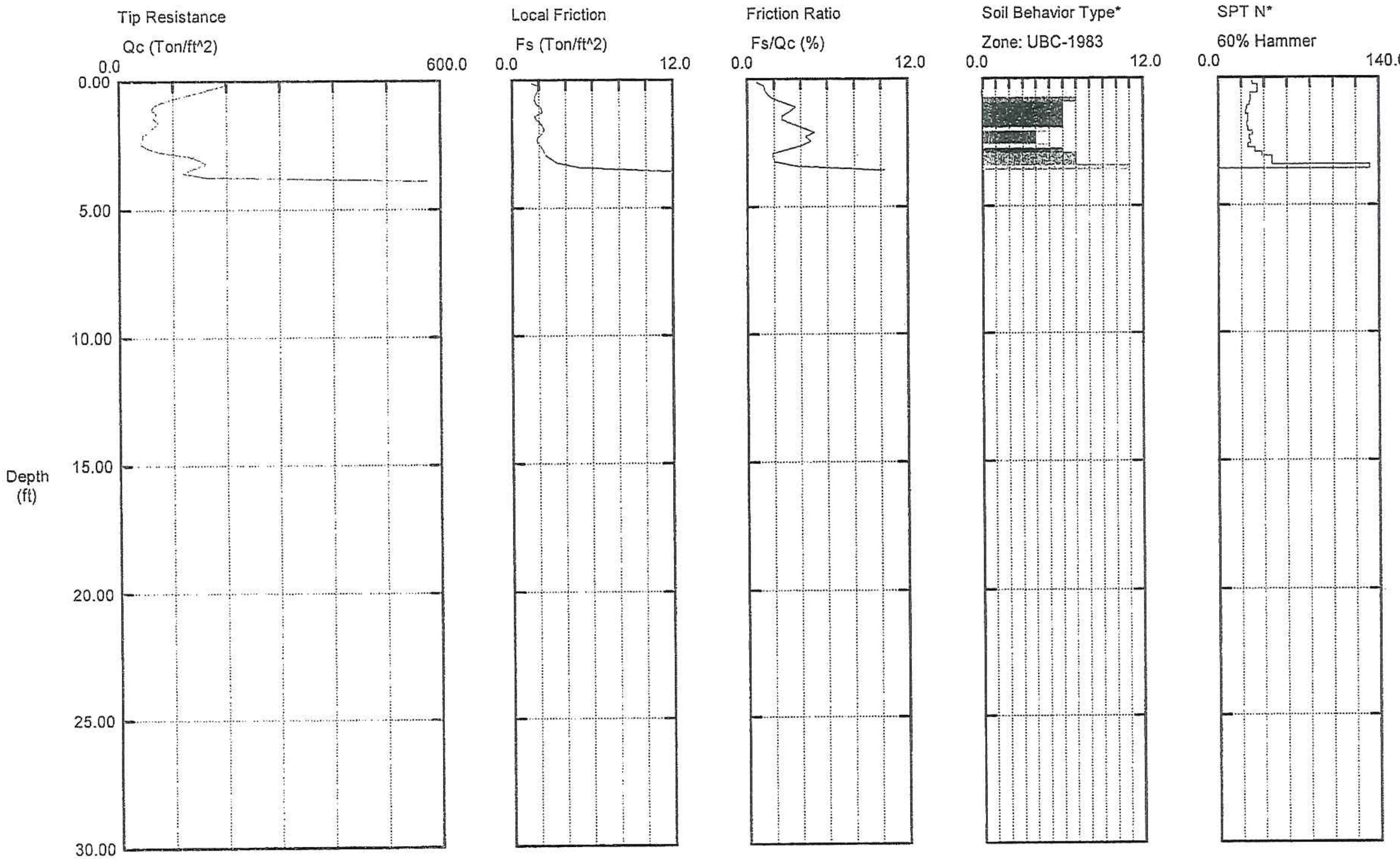
sdf-506

il behavior type and SPT b n data from UBC-1983

Leighton Consu..ing, Inc.

Operator: Bobby-Victor
Sounding: CPT-06
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 11:34
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 3.94 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

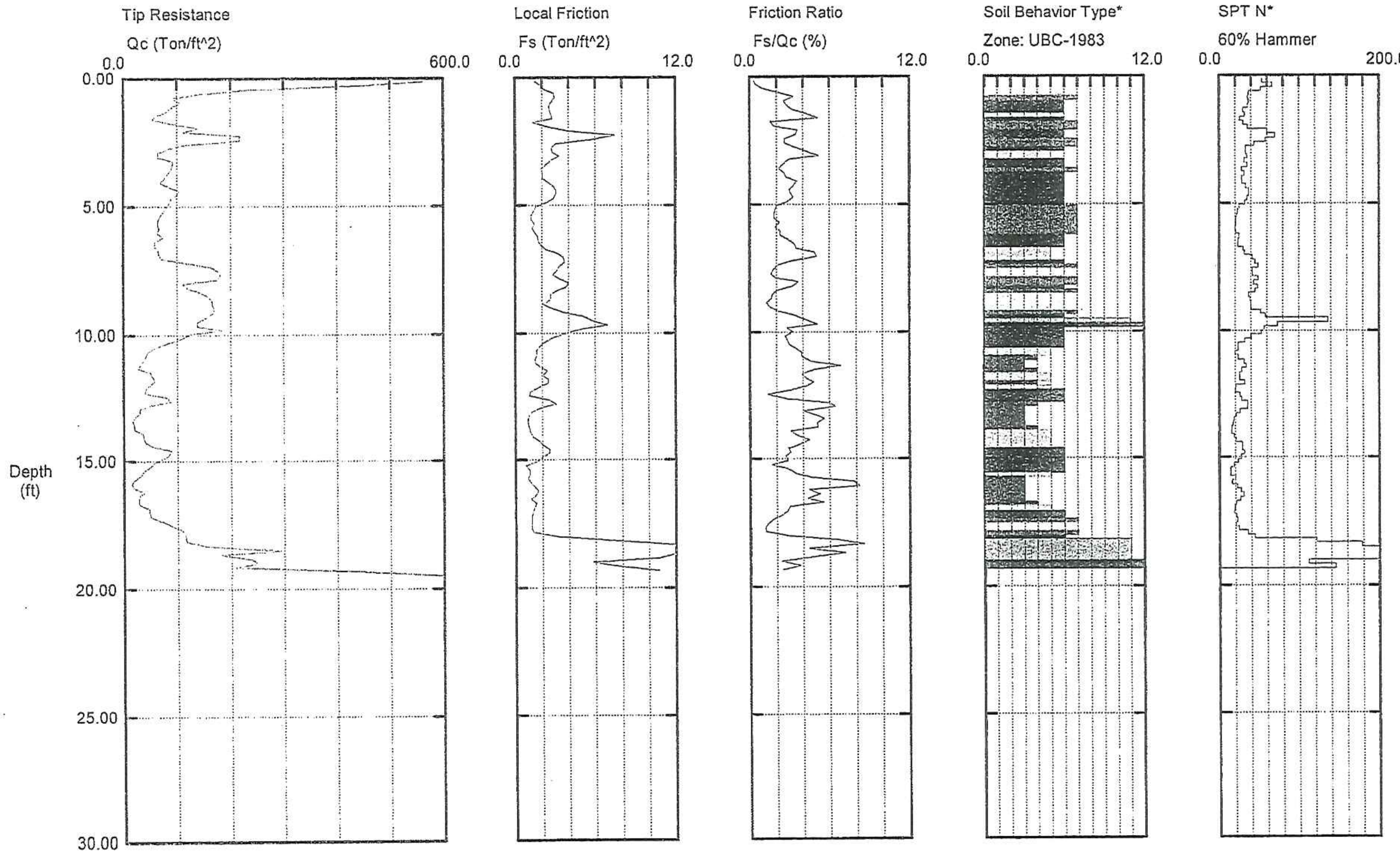
sdf-507

il behavior type and SPT b n data from UBC-1983

Leighton Consu...ng, Inc.

Operator: Bobby-Victor
Sounding: CPT-07
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 11:44
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 19.69 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

sdf-508

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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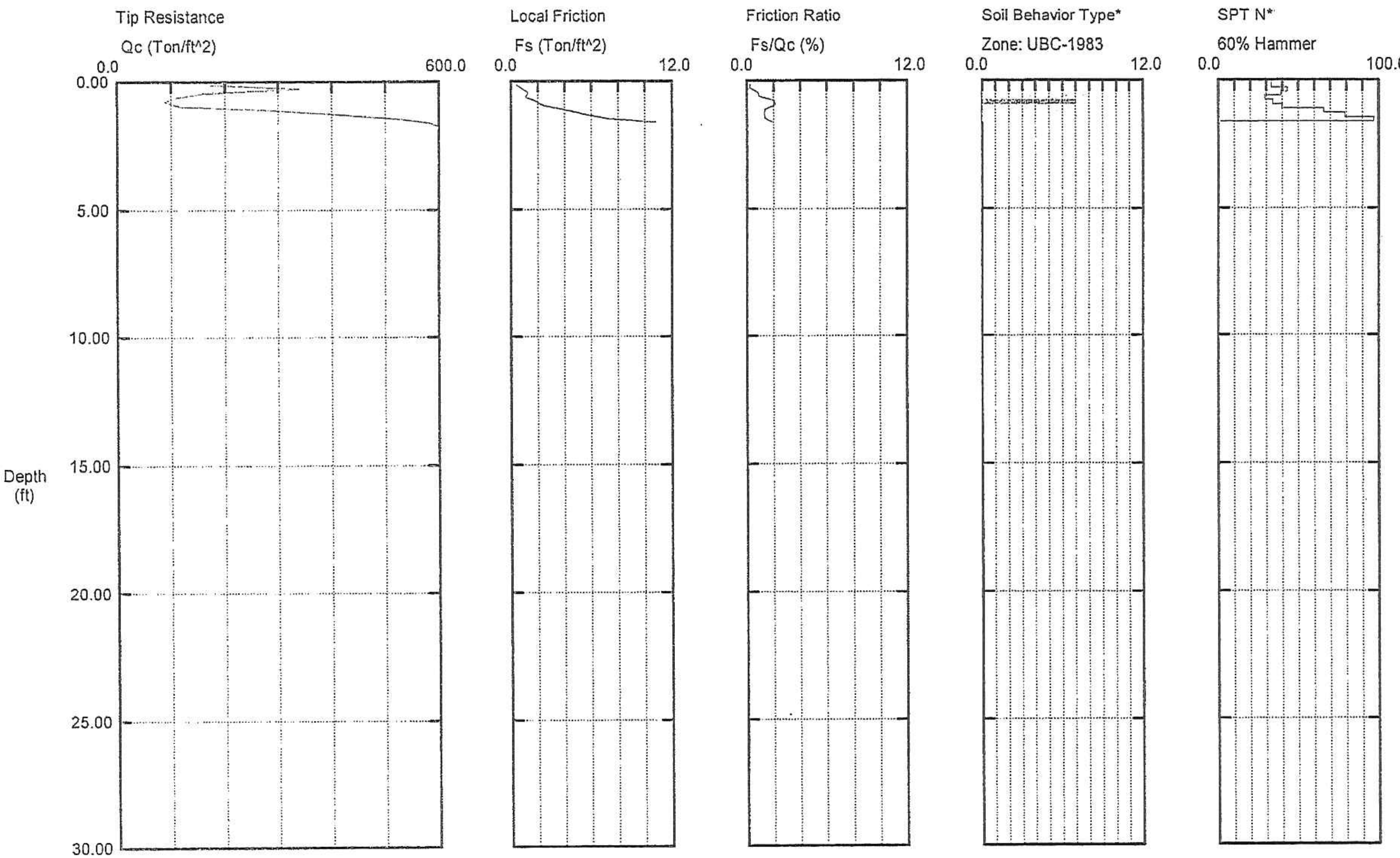
Hadi Tabatabaee
BUILDING OFFICIAL

ה data from UBC-1983

Leighton Consu..ng, Inc.

Operator: Bobby-Victor
Sounding: CPT-08
Cone Used: 468/BH-VO/R#3

CPT Date/Time: 11-15-02 12:25
Location: WRT/Dana Point
Job Number: 600027-001



Maximum Depth = 1.97 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

sdf-509

APPENDIX B

Recent Geotechnical Laboratory Procedures and Test Results by GMU

APPENDIX B

GMU GEOTECHNICAL LABORATORY PROCEDURES AND TEST RESULTS

MOISTURE AND DENSITY

Field moisture content and in-place density were determined for each 6-inch sample sleeve of undisturbed soil material obtained from the drill holes. The field moisture content was determined in general accordance with ASTM Test Method D 2216 by obtaining one-half the moisture sample from each end of the 6-inch sleeve. The in-place dry density of the sample was determined by using the wet weight of the entire sample.

At the same time the field moisture content and in-place density were determined, the soil material at each end of the sleeve was classified according to the Unified Soil Classification System. The results of the field moisture content and in-place density determinations are presented on the right-hand column of the Log of Drill Hole and are summarized on Table B-1. The results of the visual classifications were used for general reference.

PARTICLE SIZE DISTRIBUTION

As part of the engineering classification of the materials underlying the site, samples were tested to determine the distribution of particle sizes. The distribution was determined in general accordance with ASTM Test Method D 422 using U.S. Standard Sieve Openings 3", 1.5", 3/4, 3/8, and U.S. Standard Sieve Nos. 4, 10, 20, 40, 60, 100, and 200. In addition, on some samples, a standard hydrometer test was performed to determine the distribution of particle sizes passing the No. 200 sieve (i.e., silt and clay-size particles). The results of the tests are contained in this Appendix B. Key distribution categories (% gravel; % sand, etc.) are contained on Table B-1.

ATTERBERG LIMITS

As part of the engineering classification of the soil material, a representative sample of the on-site soil material was tested to determine relative plasticity. This relative plasticity is based on the Atterberg limits determined in general accordance with ASTM Test Method D 4318. The results of these tests are contained in this Appendix B and also on Table B-1.

EXPANSION TESTS

To provide a standard definition of one-dimensional expansion, a test was performed on typical on-site materials in general accordance with ASTM Test Method D 4829. The result from this test procedure is reported as an "expansion index". The results of this test are contained in this Appendix B and also on Table B-1.

CHEMICAL TESTS

The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with California Test Method 417, the minimum resistivity test for potential metal corrosion was performed in general accordance with California Test Method 643, and the concentration of soluble chlorides was determined in general accordance with California Test Method 422. The results of these tests are contained in this Appendix B and also on Table B-1.

COMPACTION TESTS

Bulk samples representative of the on-site materials were tested to determine the maximum dry density and optimum moisture content of the soil. These compactive characteristics were determined in general accordance with ASTM Test Method D 1557. The results of this test are contained in this Appendix B and also on Table B-1.

DIRECT SHEAR STRENGTH TESTS

Direct shear tests were performed on typical on-site materials. The general philosophy and procedure of the tests were in accord with ASTM Test Method D 3080 - “Direct Shear Tests for Soils Under Consolidated Drained Conditions”.

The tests are single shear tests and are performed using a sample diameter of 2.416 inches and a height of 1.00 inch. The normal load is applied by a vertical dead load system. A constant rate of strain is applied to the upper one-half of the sample until failure occurs. Shear stress is monitored by a strain gauge-type precision load cell and deflection is measured with a digital dial indicator. This data is transferred electronically to data acquisition software which plots shear strength vs. deflection. The shear strength plots are then interpreted to determine either peak or ultimate shear strengths. Residual strengths were obtained through multiple shear box reversals. A strain rate compatible with the grain size distribution of the soils was utilized. The interpreted results of these tests are shown in this Appendix B.

CONSOLIDATION TESTS

The one-dimensional consolidation properties of “undisturbed” native soil and bedrock samples were evaluated according to the provisions of ASTM Test Method D 2435. Sample diameter was 2.416 inches and sample height was 1.00 inch. Water was added during the test at approximate insitu normal loads to evaluate the potential for hydro-collapse and to produce saturation during the remainder of the testing. Consolidation readings were taken regularly during each load increment until the change in sample height was less than approximately 0.0001 inch over a two-hour period. The graphic presentation of consolidation data is a representation of volume change in axial load. As a result, both expansion and consolidation are illustrated. The results of the consolidation load tests are summarized in this Appendix B and Appendix B-1.

R-VALUE TESTS

Bulk samples representative of the underlying on-site materials were tested to measure the response of a compacted sample to a vertically applied pressure under specific conditions. The R-value of a material is determined when the material is in a state of saturation such that water will be exuded from the compacted test specimen when a 16.8 kN load (2.07 MPa) is applied. The results from these test procedures are reported in Appendix B-1 and also on Table B-1

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH- 5	2.5	5.8	Af	SC	8.6	129	82															
DH- 7	2.5	4.8	Af	CL	19.6	101	80												7.6	934	336	796
DH- 8	2.5	7.8	Af	SC	11.7	125	96															
DH- 9	2.5	4.8	Af	SC	13.3	111	71															
DH-10	2.5	4.8	Af	SC	10.8	118	72															
DH-11	2.5	4.8	Af	SC	14.0	112	78															
DH-11	7.5	-0.2	Af	SC	16.5	109	84	2	76	22	7											
DH-11	10	-2.7	Af	SC	17.3	110	91															
DH-11	20	-12.7	Tc	ML	19.0	101	78															
DH-11	30	-22.7	Tc	SP	10.6	123	81															
DH-11	40	-32.7	Tc	ML	28.8	91	92															
DH-11	50	-42.7	Tc	ML	29.9	91	96															
DH-12	5	3.3	Af	SC	12.6	122	95	9	65	25												
DH-12	10	-1.7	Af	SC	19.1	109	98	0	81	18	8	28	19	9								
DH-12	20	-11.7	Tc	ML	31.1	87	91															
DH-12	30	-21.7	Tc	ML	19.2	105	89															
DH-13	2.5	14.8	Af	SC	12.8	120	91											18				
DH-14	2.5	12.8	Af	SC	11.6	124	92															
DH-16	5	3.3	Af	SC	10.6	112	60															
DH-16	7.5	0.8	Af	SC				0	88	12												
DH-16	10	-1.7	Af	SC	15.6	110	83															
DH-16	12.5	-4.2	Af	SC				2	79	19												
DH-16	15	-6.7	Tc	SP	12.8	120	89															
DH-16	25	-16.7	Tc	SP	19.0	110	99															
DH-18	5	6.3	Af	SC	14.8	111	81															

GMU_TABLE_SOIL_LAB_DATA 17-206-02 (UPDATED ELEV.).GPJ FNC AB GWGN01.GDT 2/8/21

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

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TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-20	5	7.0	Af	SC	19.1	107	92											16				
DH-21	5	6.8	Af	SC	14.9	111	79															
DH-22	5	6.0	Tc	SC	12.1	118	81															
DH-23	5	1.3	Af	SC	14.3	118	95															
DH-24	5	0.3	Af	SC	17.3																	
DH-25	2.5	8.3	Af	SC				3	61	36												
DH-25	7.5	3.3	Af	CH	13.3			1	45	53	16	50	25	25								
DH-25	10	0.8	Af	CH	17.9	109	92															
DH-26	5	6.8	Af	SC	10.0	128	89															
DH-26	10	1.8	Af	SC	14.0	113	81															
DH-27	5	2.3	Af	SC	14.3	119	96															
DH-27	10	-2.7	Af	CL	25.9																	
DH-27	15	-7.7	Tc	SP	15.9	115	97															
DH-27	25	-17.7	Tc	SP	14.8	117	96															
DH-28	5	4.3	Af	SC	14.0	113	81															
DH-28	7.5	1.8	Af	SC				1	85	15												
DH-28	10	-0.7	Af	SC	13.7	121	99															
DH-28	15	-5.7	Tc	SP	9.5	122	72															
DH-28	25	-15.7	Tc	SP	9.3	124	74															
DH-29	0	16.7	Af	CL											126.0	10.0			8.7	365	1272	439
DH-29	5	11.7	Af	CL	6.5	108	32															
DH-29	7.5	9.2	Af	CL				7	36	57												
DH-29	10	6.7	Af	CL	29.5	92	97															
DH-29	12.5	4.2	Af	CL								44	22	22								
DH-29	15	1.7	Tc	ML	22.6	100	90															

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Project No. 17-206-02

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GMU_TABLE_SOIL_LAB_DATA 17-206-02 (UPDATED ELEV.).GPJ FNC AB GWGN01.GDT 2/8/21

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

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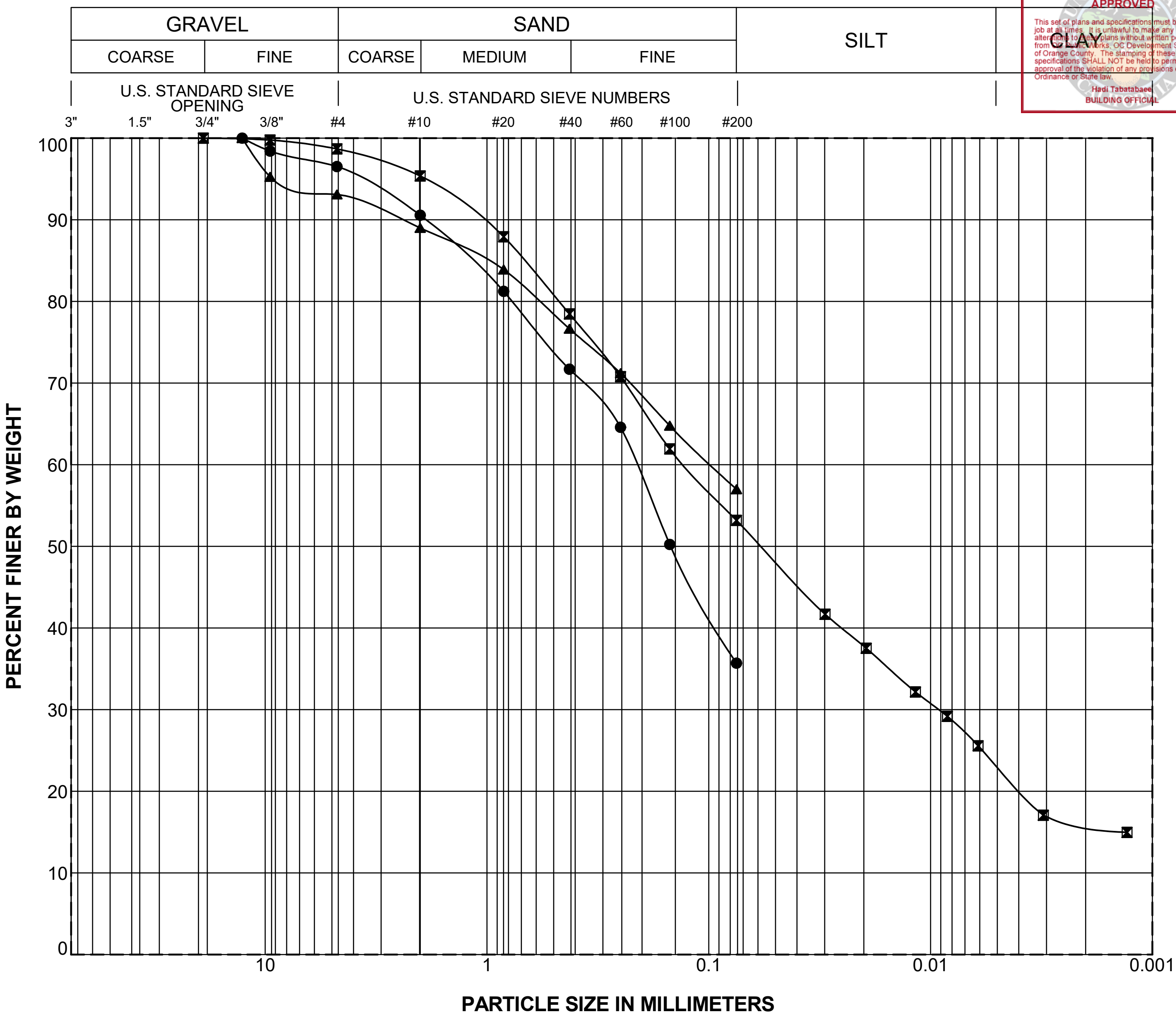
BUILDING OFFICIAL

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-29	25	-8.3	Tc	ML	20.9	106	99															
DH-34	0	15.4	Af	SM											127.5	10.0						
DH-34	5	10.4	Af	CL	18.7																	
DH-34	10	5.4	Af	CL	12.7																	
DH-34	25	-9.6	Tc	SP	22.8	101	95															
DH-35	0	16.8	Af	CL											129.5	9.0	29		7.9	1763	792	457
DH-35	5	11.8	Af	CL	27.4	92	92															
DH-35	10	6.8	Af	CL	22.4	102	95															
DH-35	15	1.8	Tc	SP	13.1	113	76															
DH-35	25	-8.2	Tc	ML	21.4	105	99															
DH-46	5	8.0	Af	SM	11.1	118	73															
DH-46	10	3.0	Af	SC	13.9	114	81															
DH-46	15	-2.0	Tc	SP	16.2	116	99															
DH-51	0	NA	Qaf	CL	13.4										128.5	9.0	64		7.8	1205	984	800
DH-51	2	NA	Qaf	CL	23.1	102	98															
DH-51	5	NA	Qaf	CL	28.1	94	97															
DH-51	10	NA	Qm	CL	30.6	89	94					47	22	25								
DH-51	15	NA	Qm	CH	29.2			1	33	66	24	52	21	31								
DH-51	20	NA	Qm	CH	21.7	100	88					51	22	29								
DH-51	30	NA	Tc	SM	18.7	110	100															

GMU_TABLE_SOIL_LAB_DATA 17-206-02 (UPDATED ELEV.).GPJ FNC AB GWGN01.GDT 2/8/21

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

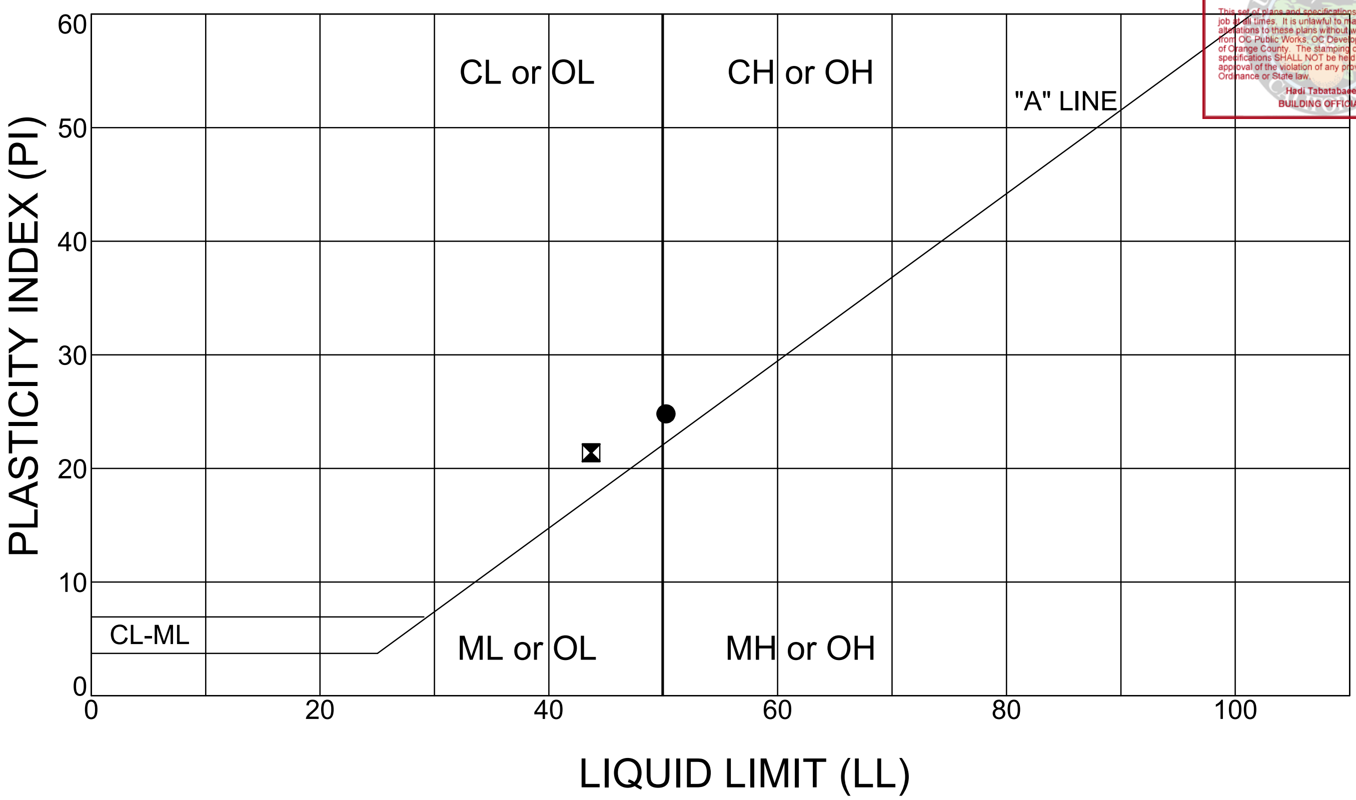


Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-25	2.5	Af	●			CLAYEY SAND (SC)
DH-25	7.5	Af	⊠	50	25	SANDY FAT CLAY (CH)
DH-29	7.5	Af	▲			SANDY CLAY (CL)

PARTICLE SIZE DISTRIBUTION

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU



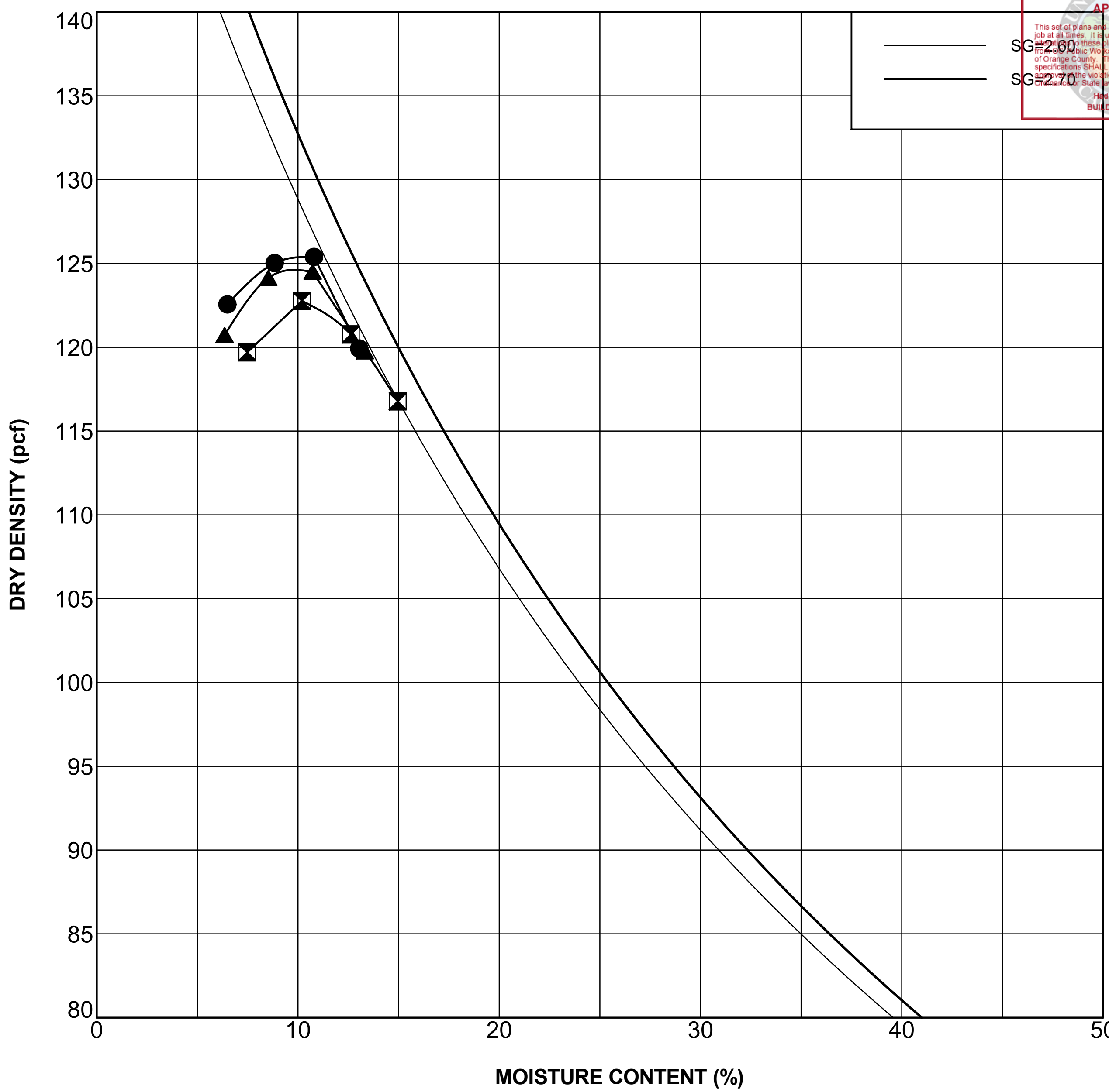
Boring Number	Depth (feet)	Geologic Unit	Test Symbol	Insitu Water Content (%)	LL	PL	PI	Classification
DH-25	7.5	Af	●	13	50	25	25	SANDY FAT CLAY (CH)
DH-29	12.5	Af	⊠		44	22	22	SANDY CLAY (CL)

LIMITS 17-206-02 (UPDATED ELEV.).GPJ 11/26/19

ATTERBERG LIMITS

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU



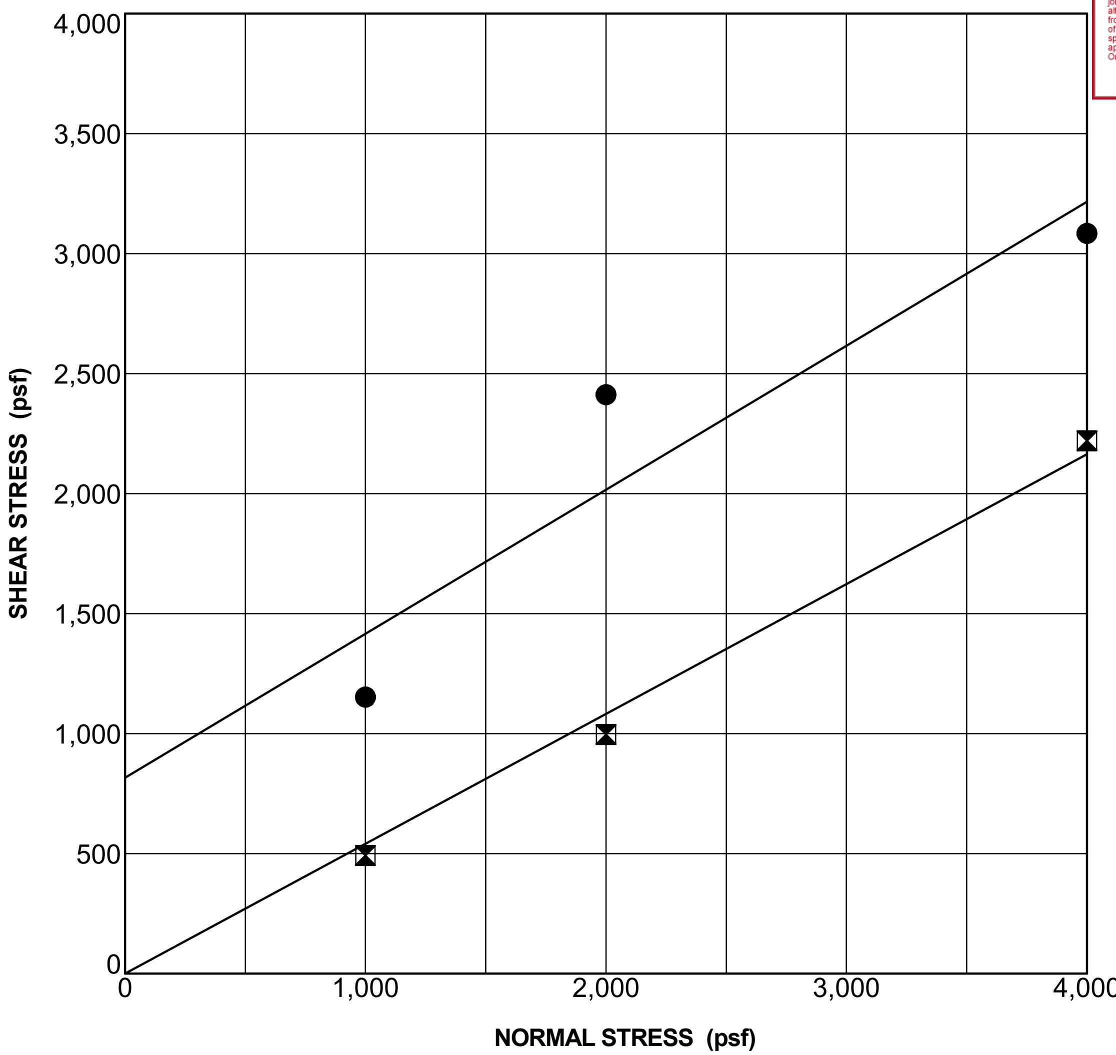
Boring Number	Depth (feet)	Geologic Unit	Symbol	Maximum Dry Density, pcf	Optimum Moisture Content, %	Classification
DH-29	0.0	Af	●	126	10	SANDY CLAY (CL)
DH-34	0.0	Af	⊠	127.5	10	SILTY SAND (SM)
DH-35	0.0	Af	▲	129.5	9	SANDY CLAY (CL)

DVTCOMP 17-206-02 (UPDATED ELEV.).GPJ 11/26/19

COMPACTION TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU



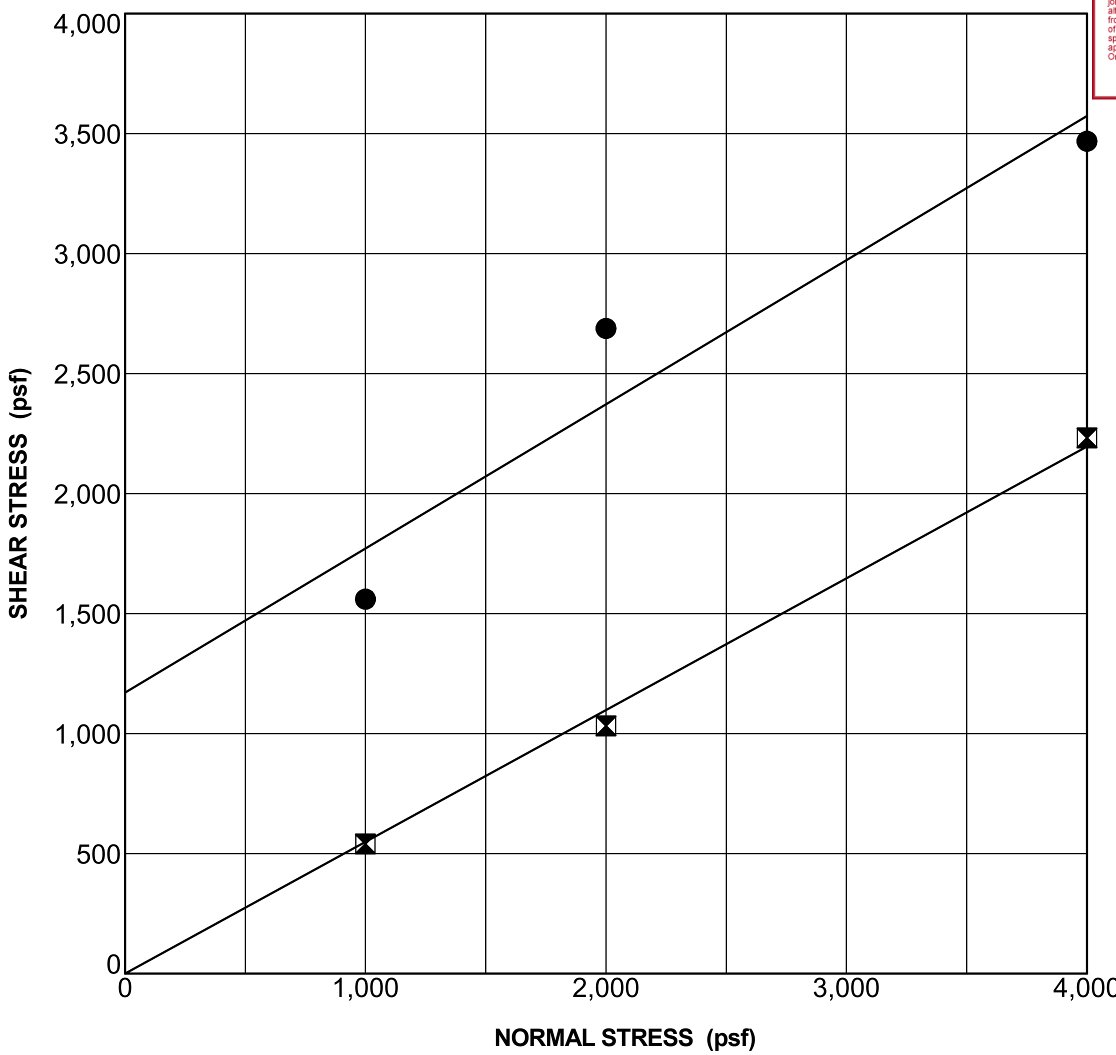
SAMPLE AND TEST DESCRIPTION
Sample Location: DH-11 @ 2.5 ft **Geologic Unit:** Af **Classification:** CLAYEY SAND (SC)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	816	31.0
⧗ Ultimate Strength	0	28.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU



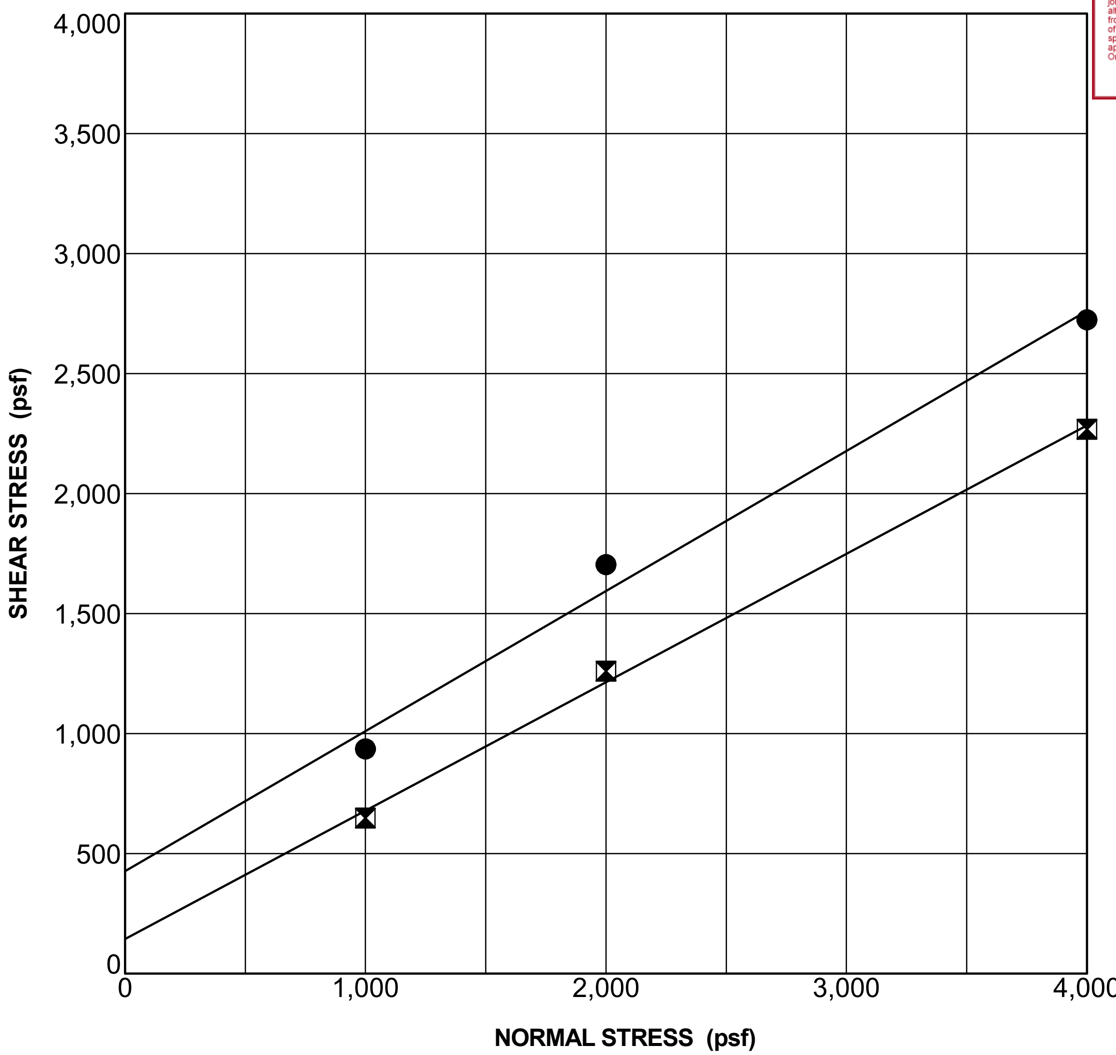
SAMPLE AND TEST DESCRIPTION
Sample Location: DH-11 @ 20.0 ft **Geologic Unit:** Tc **Classification:** CLAYEY SILT (ML)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	1170	31.0
⧗ Ultimate Strength	0	29.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU



SAMPLE AND TEST DESCRIPTION
Sample Location: DH-12 @ 10.0 ft **Geologic Unit:** Af **Classification:** CLAYEY SAND (SC)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	426	30.0
⧗ Ultimate Strength	144	28.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

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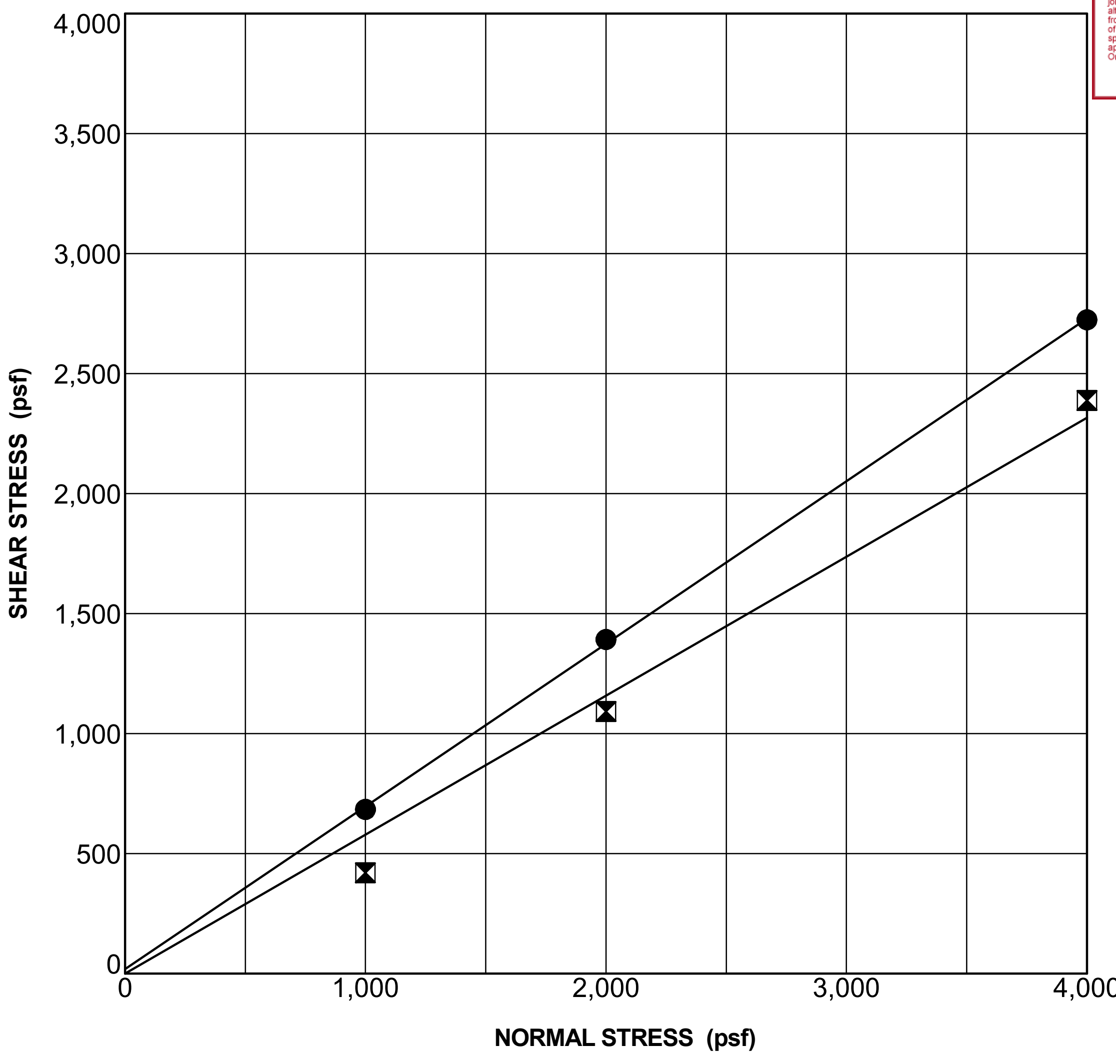

SAMPLE AND TEST DESCRIPTION
Sample Location: DH-21 @ 5.0 ft **Geologic Unit:** Af **Classification:** CLAYEY SAND (SC)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	18	34.0
⧗ Ultimate Strength	0	30.0

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SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
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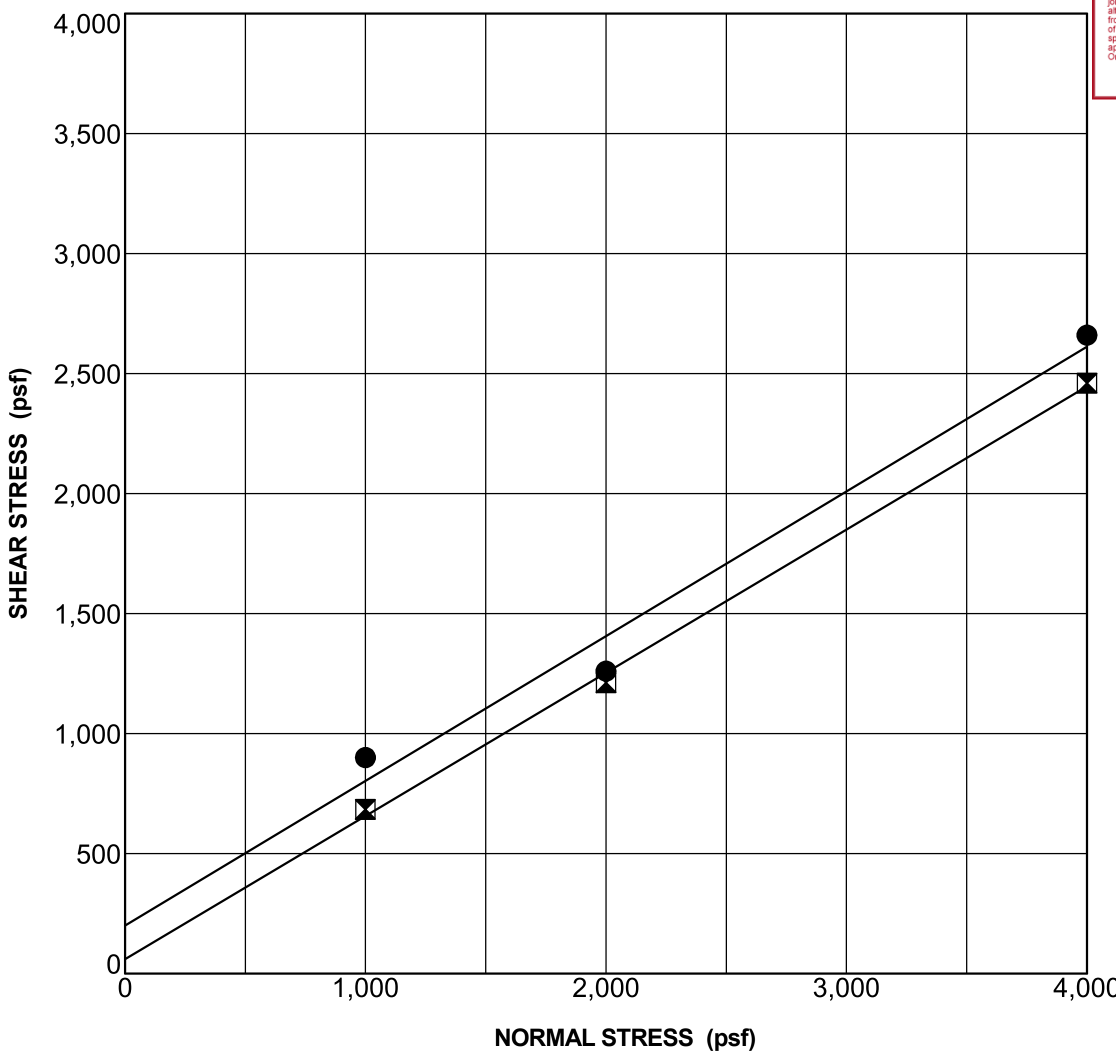

SAMPLE AND TEST DESCRIPTION
Sample Location: DH-29 @ 0.0 ft **Geologic Unit:** Af **Classification:** SANDY CLAY (CL)
Strain Rate (in/min): 0.005 **Sample Preparation:** Remolded
Notes: 90% Compaction at optimum

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	200	31.0
⊠ Ultimate Strength	60	30.8

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
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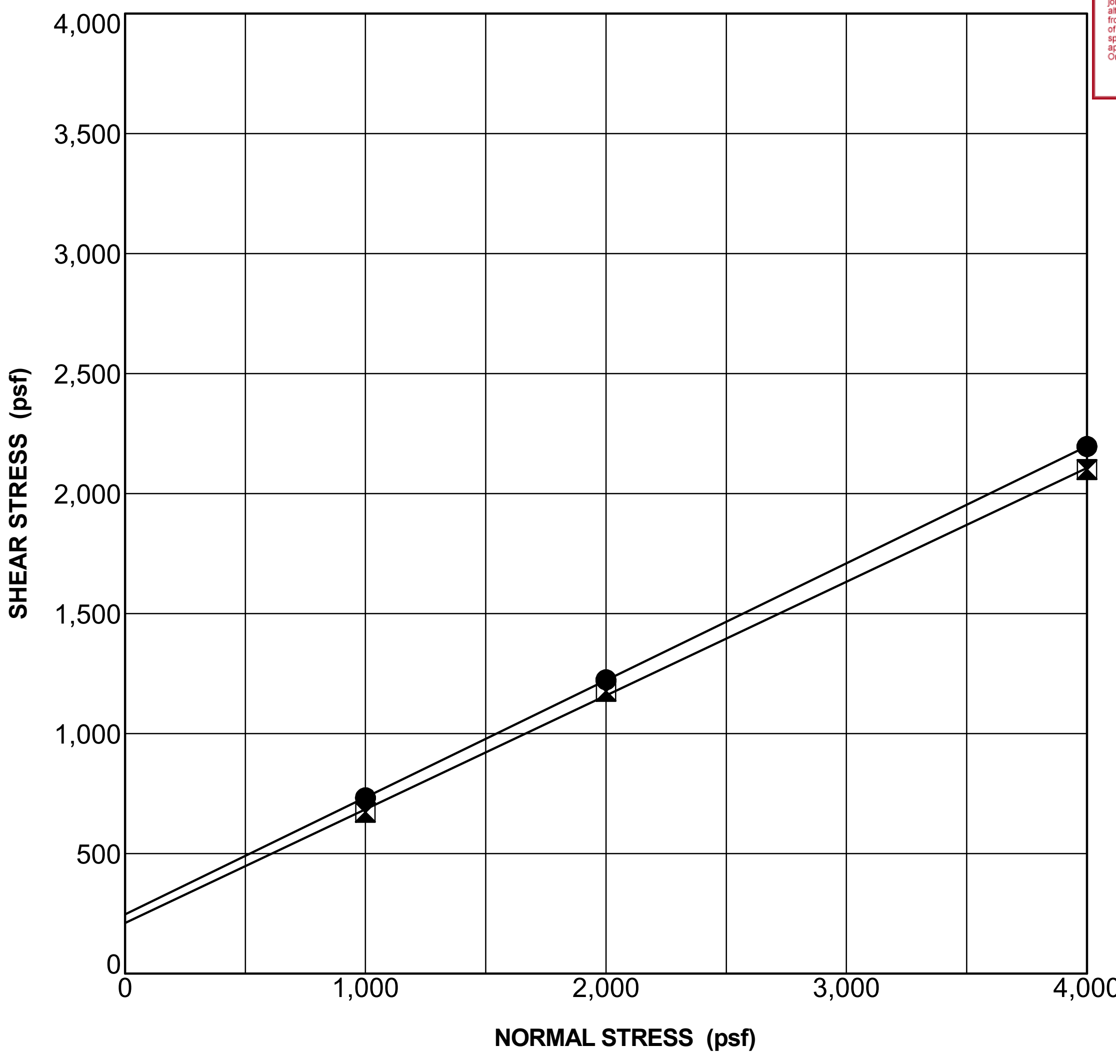
GMU_DIRECT_SHEAR 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19



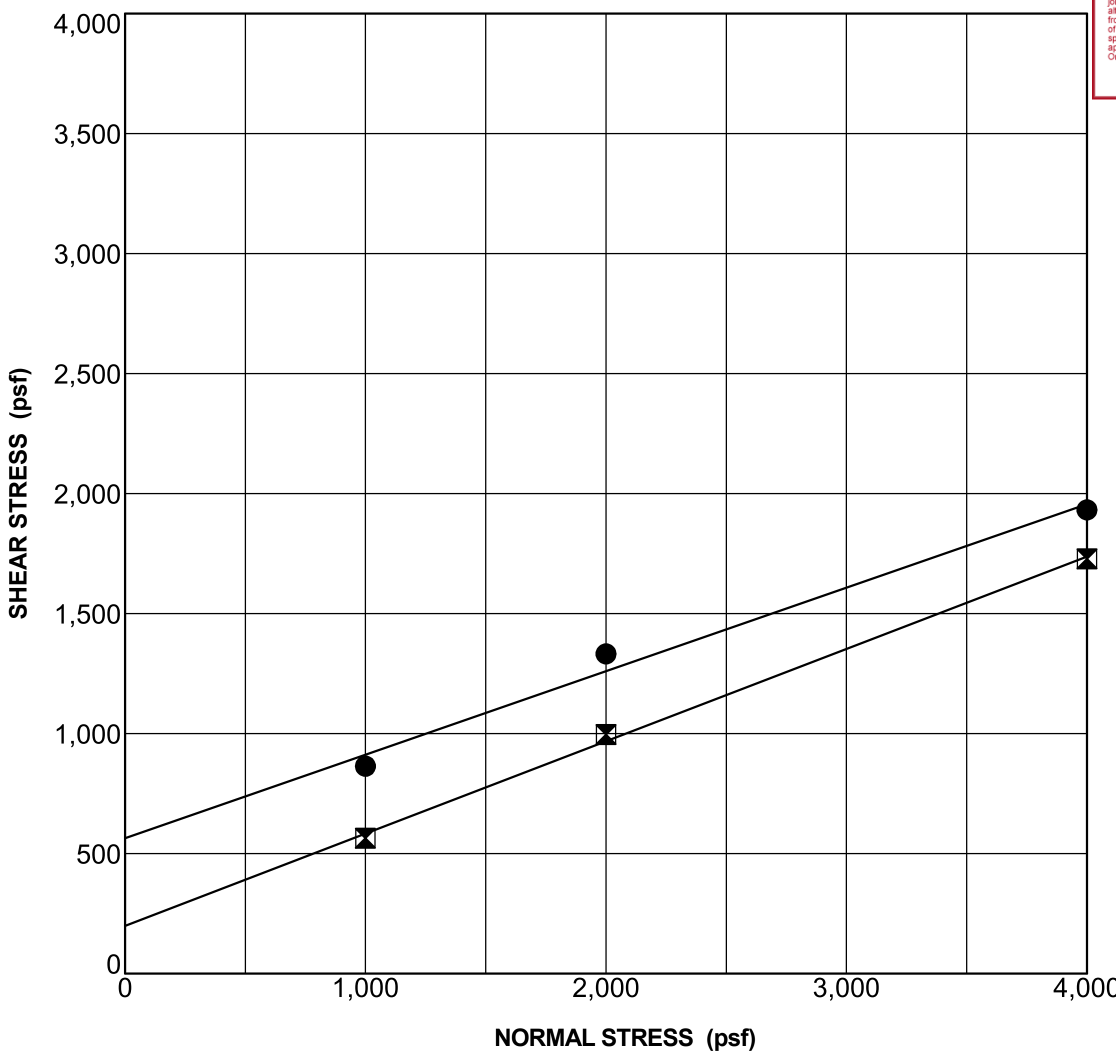
SAMPLE AND TEST DESCRIPTION
Sample Location: DH-34 @ 0.0 ft **Geologic Unit:** Af **Classification:** SILTY SAND (SM)
Strain Rate (in/min): 0.005 **Sample Preparation:** Remolded
Notes: 90% Compaction at optimum

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	246	26.0
⧗ Ultimate Strength	210	25.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component

Project No. 17-206-02



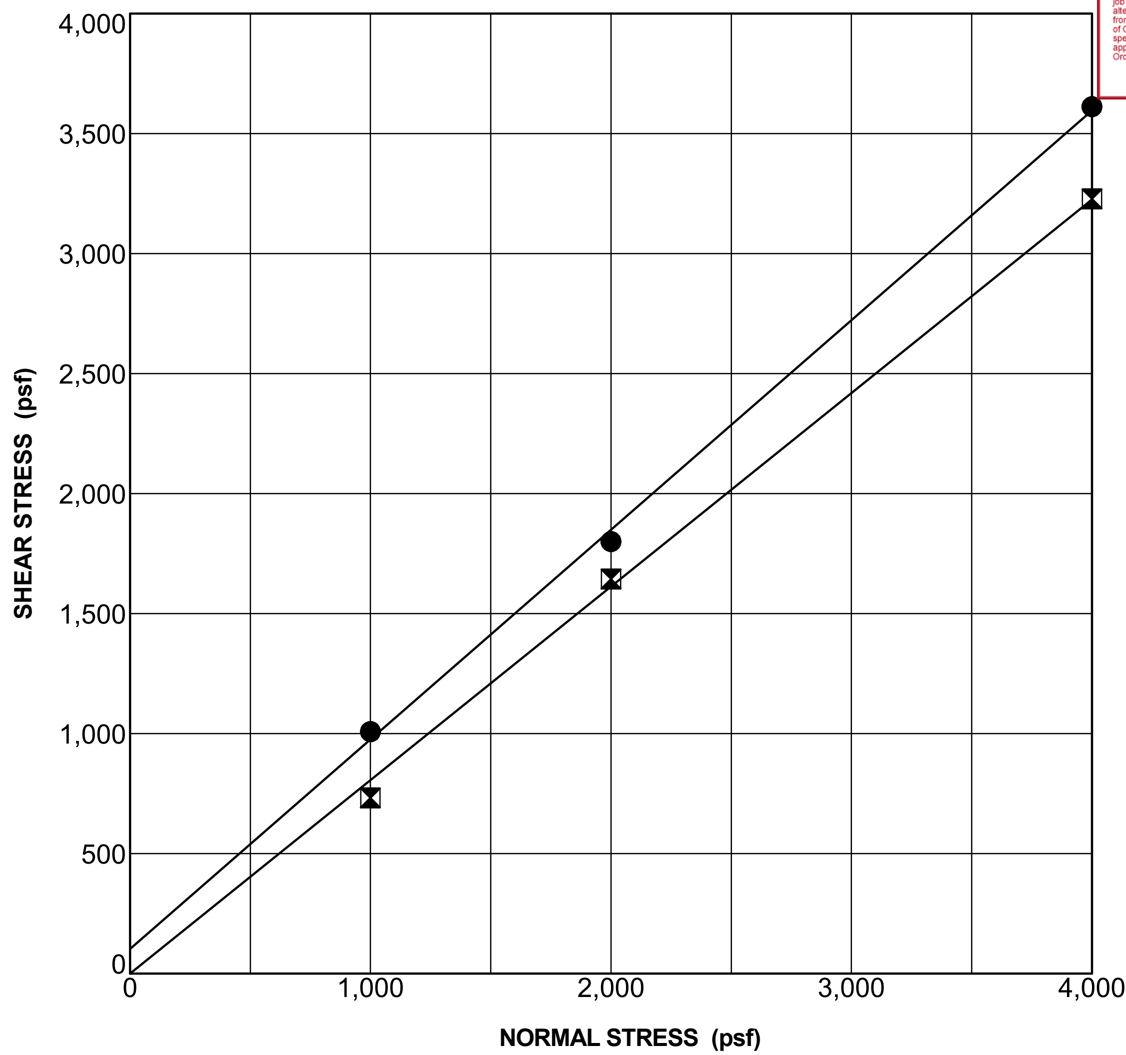
SAMPLE AND TEST DESCRIPTION
Sample Location: DH-35 @ 5.0 ft **Geologic Unit:** Af **Classification:** SANDY CLAY (CL)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	564	19.0
⧗ Ultimate Strength	198	21.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU_DIRECT_SHEAR 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19



SAMPLE AND TEST DESCRIPTION
Sample Location: DH-46 @ 5.0 ft **Geologic Unit:** Af **Classification:** SILTY SAND (SM)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes: Sample saturated prior and during shearing

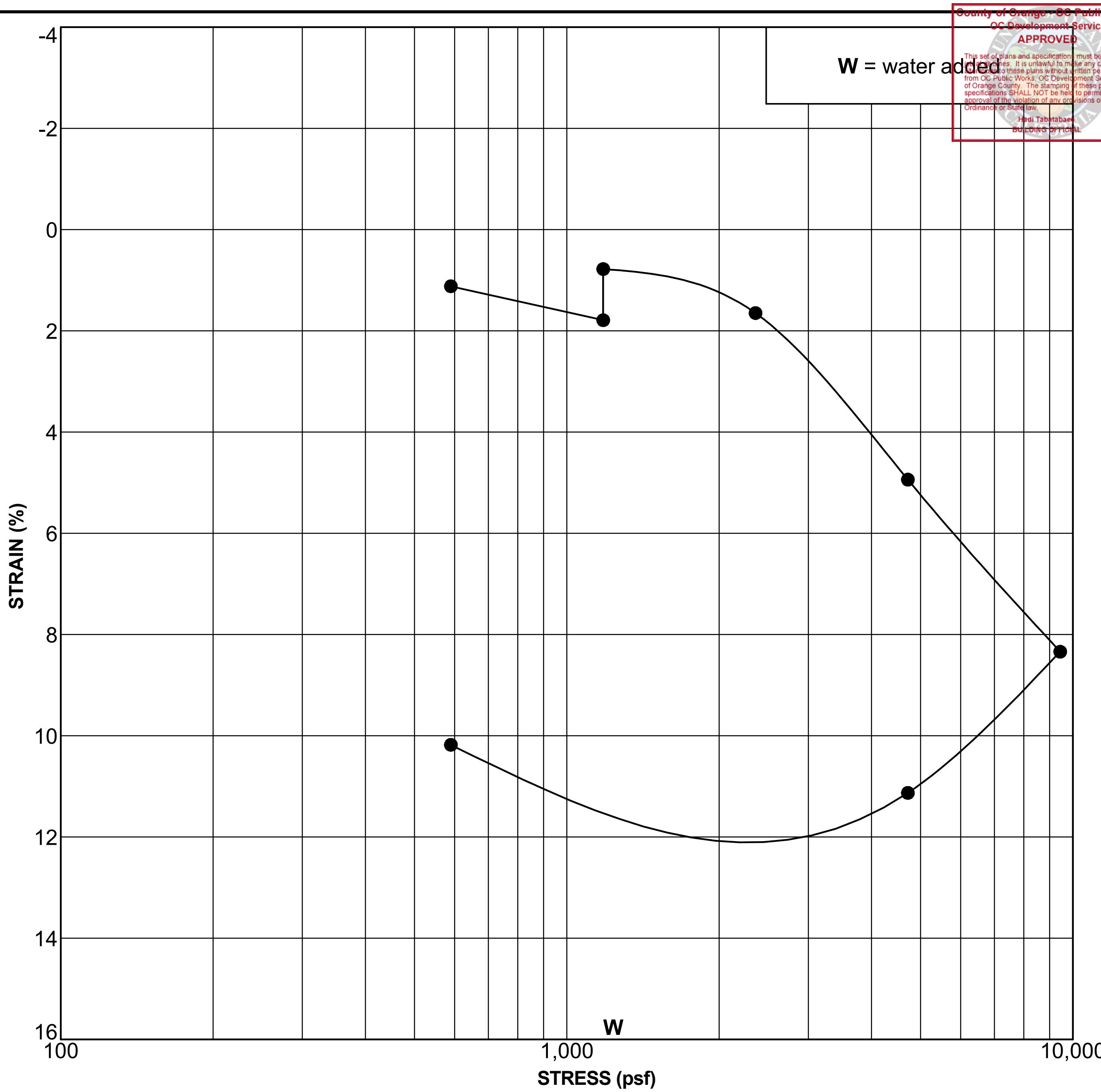
STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	102	41.0
⧗ Ultimate Strength	0	39.0

SHEAR TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU

GMU_DIRECT_SHEAR 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-25	10.0	Af	●	In Situ	-1.01	SANDY FAT CLAY (CH)

CONSOLIDATION TEST DATA

Project: Dana Point Harbor, Commercial Component
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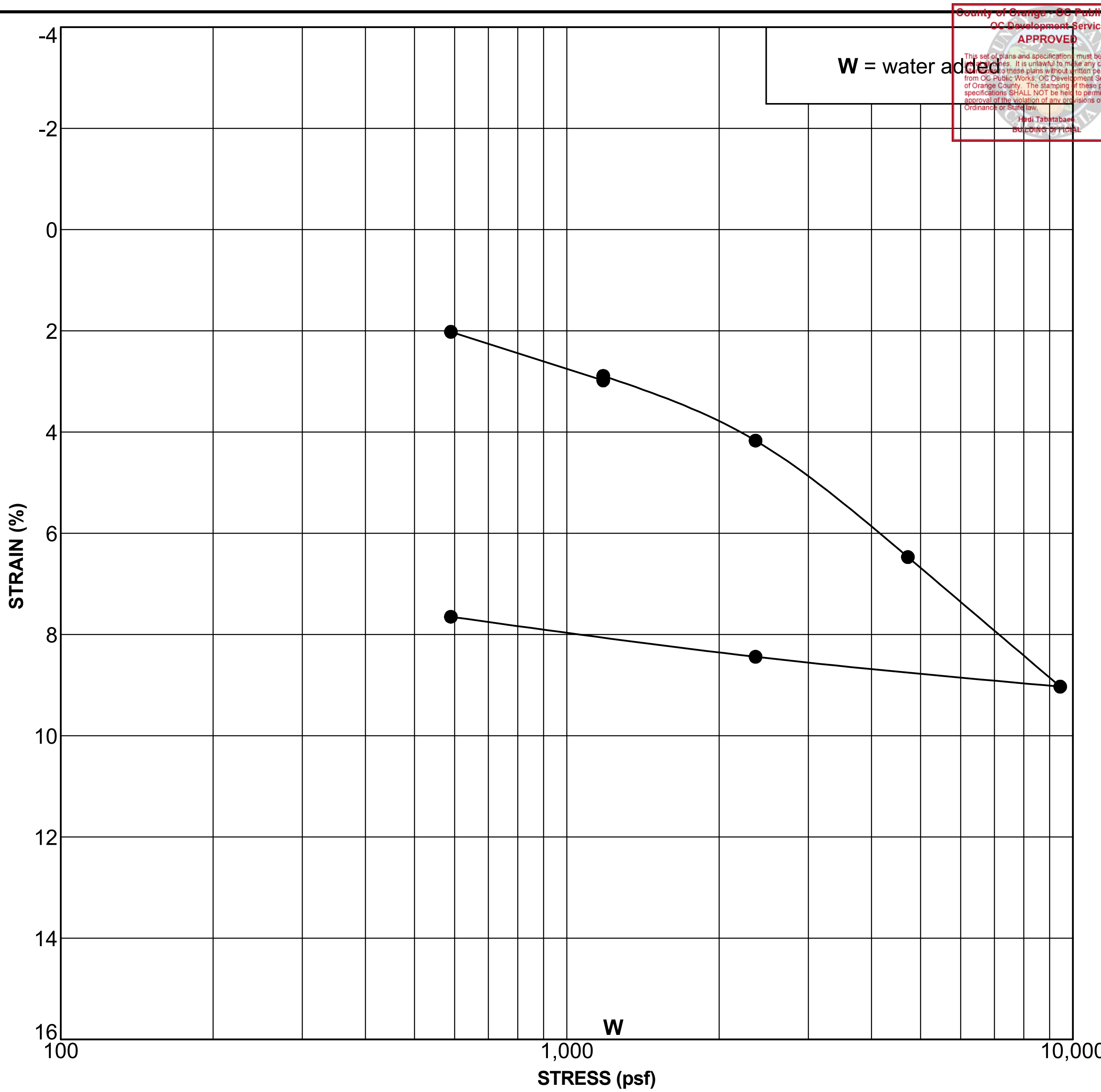
GMU_CONSOL 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-51	10.0	Qm	●	In Situ	-0.09	SANDY LEAN CLAY (CL)

GMU_CONSOL 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19

CONSOLIDATION TEST DATA

Project: Dana Point Harbor, Commercial Component
Project No. 17-206-02

GMU

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
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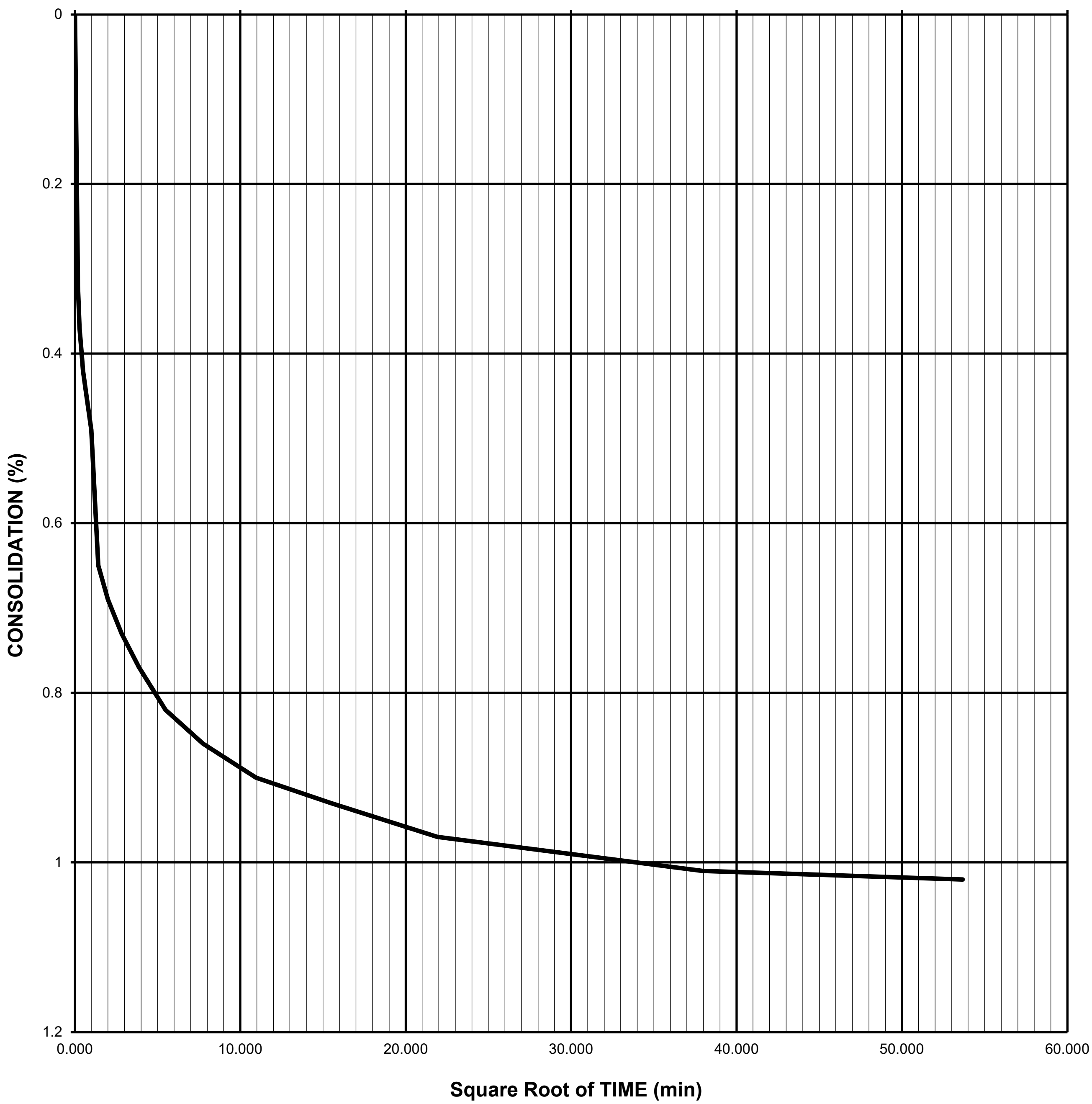
BUILDING OFFICIAL

TIME RATE CONSOLIDATION RESULTS

PROJECT NAME:	Dana Point Harbor	PROJECT NUMBER:	17-206-02
SAMPLE LOCATION:	DH-25	SAMPLE DEPTH:	10
SAMPLE DESCRIPTION:	Sandy Clay with Gravel (CL)	LOAD (PSF)	2360



APPENDIX B-1

Previous Laboratory Test Results by GMU

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Saturation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
C-2	0.5	21.8		ML															6.75	69	1740	6300
C-3	1.5	20.8	Qaf	CL-ML											115.5	13.5	84	12				
C-4	1	17.3	Qaf	SM				4	70	26	11	23	20	3				20				
DH- 1	0	17.3		SC-CL													55					
DH- 1	2	15.3		SC	14.3	112	80															
DH- 1	4	13.3	Qaf	SC	15.9	115	96															
DH- 1	9	8.3	Qaf	CL	21.2			2	46	52	24	41	23	18								
DH- 1	14	3.3		SP	16.2	107	78															
DH- 1	24	-6.7		SP	22.2	107	108															
DH- 2	2	13.3		SC	14.6	115	87															
DH- 2	4	11.3		CL	19.6	106	93															
DH- 2	9	6.3		GC	7.6	128	69															
DH- 4	0	22.3		SC-CL														10				
DH- 4	2	20.3		SP	7.5	126	64															
DH- 4	4	18.3		SP	8.9	103	39															
DH- 4	9	13.3		SP	7.1	97	27															
DH- 5	2	16.3		SC	9.9	119	67															
DH- 5	4	14.3		SC/SP	8.6	107	41															
DH- 5	9	9.3		SC	14.9	115	90															
DH- 6	2	11.8		SC/SP	9.3	102	40															
DH- 6	4	9.8	Qaf	ML	20.4	101	86															
DH- 6	9	4.8	Qaf	CL-SC	13.2	114	77															
DH- 6	14	-0.2	Qaf	CL	26.4			6	41	53	25	38	21	17								
DH- 6	19	-5.2		SP	22.6	103	99															
DH- 6	29	-15.2	Tc	SP/CL	16.6	118	111															

GMU_TABLE_SOIL_LAB_DATA 11-161-00 (UPDATED ELEV.).GPJ FNC AB GWGN01.GDT 2/8/21

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH- 6	39	-25.2		SC	19.7	113	112															
DH- 6	49	-35.2		SP	20.3	112	114															
DH-10	2	10.3		SM/SC	12.5	107	61															
DH-10	4	8.3		SP-SM	13.5	114	80															
DH-12	2	11.3		SC	14.3	109	73															
DH-12	4	9.3	Qaf	SM/CL	16.8	105	78	12	62	26	8	39	21	18								
DH-12	9	4.3	Qaf	SC	16.6			9	46	45	22	33	20	13								
DH-12	14	-0.7		GC	12.7																	
DH-12	24	-10.7	Tc	SP-SM/SC	18.6	108	93															
DH-12	44	-30.7		SP-SM/ML	14.4	122	108															
DH-13	2	14.3	Qaf	SC	14.5			9	65	26	12	33	22	11								
DH-13	4	12.3		SC	7.6	117	49															
DH-13	14	2.3		SM	13.5	128	124															
DH-13	24	-7.7		SP	13.6	121	98															
DH-13	34	-17.7		SC	13.4	125	110															
DH-13	44	-27.7		SM	14.6	119	98															
DH-14	0	14.3	Qaf	SC											135.0	8.0	34		7.9	727	246	1060
DH-14	2	12.3		GC/SC	9.6	117	61															
DH-14	4	10.3	Qaf	SM/SM-SC	13.0	114	76															
DH-14	9	5.3	Qaf	SC	20.6	113	119	2	69	29	9	32	23	9								
DH-14	19	-4.7	Tc	CL/SM	20.5	104	91															
DH-14	29	-14.7		SP-SM	12.1	122	92															
DH-15	2	9.8		SC	13.1	115	79															
DH-15	4	7.8	Qaf	ML-SM	11.7	106	56															
DH-15	9	2.8	Qaf	SM	16.5	110	87															

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Project: Dana Point Harbor Revitalization
Project No. 11-161-00

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-15	19	-7.2		SM	16.7																	
DH-15	30	-18.2		SM	20.2	110	105															
DH-15	39	-27.2		SC	22.5	110	119															
DH-16	2	7.3		SP-SM	8.4	115	50															
DH-16	4	5.3		SP-SM	10.9	122	80															
DH-17	4	7.3	Qaf	SP-SM	10.8	113	63															
DH-17	14	-2.7		GM	11.3	128	103															
DH-17	24	-12.7		SP-SM	16.6																	
DH-17	35	-23.7		SC	13.2	127	114															
DH-17	44	-32.7		SP-SM	15.6	116	97															
DH-18	0	11.3	Qaf	SC											127.5	10.0	19		8.3	635	264	820
DH-18	2	9.3		SM/CL	11.8	112	65															
DH-18	4	7.3		CL-CH	15.1	101	62															
DH-18	9	2.3		CL	11.3	121	82															
DH-19	4	6.3		SP-SM	12.9	112	72															
DH-19	9	1.3	Qaf	CL/SP-SM	25.5	95	91															
DH-19	19	-8.7		SP-SM	15.3	116	94															
DH-19	29	-18.7		SP-SM	21.0	108	104															
DH-19	39	-28.7		SP	14.8	122	111															
DH-19	49	-38.7		SP	17.8	117	115															
DH-20	2	8.3	Qaf	SC	15.7	101	65															
DH-20	3	7.3	Qaf	ML-CL											107.0	14.5						
DH-20	3.5	6.8		ML	19.9	100	81															

GMU_TABLE_SOIL_LAB_DATA 11-161-00 (UPDATED ELEV.).GPJ FNC AB GWGN01.GDT 2/8/21

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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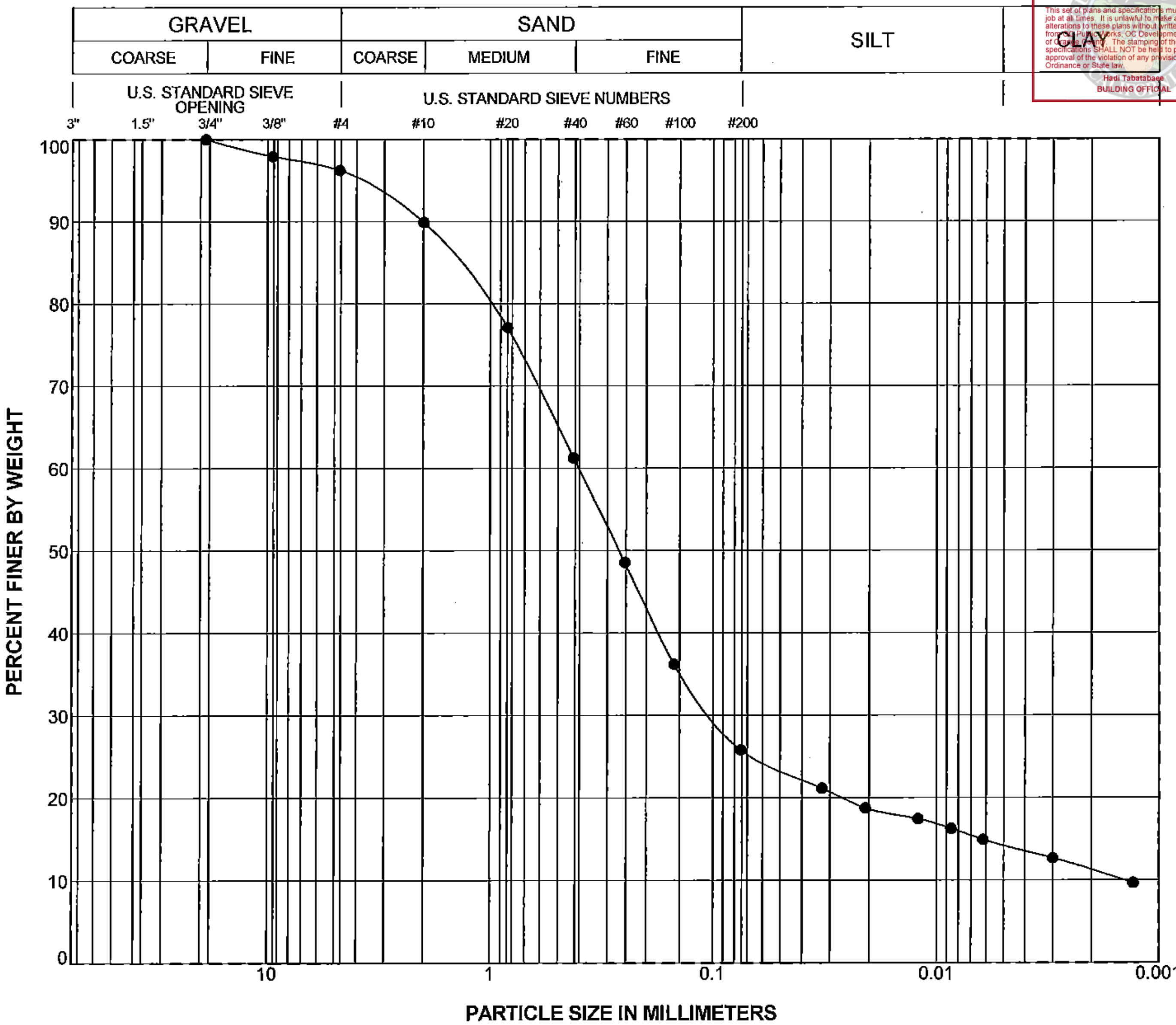

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
C-4	1.0	Qaf	●	23	3	Silty Sand (SM)

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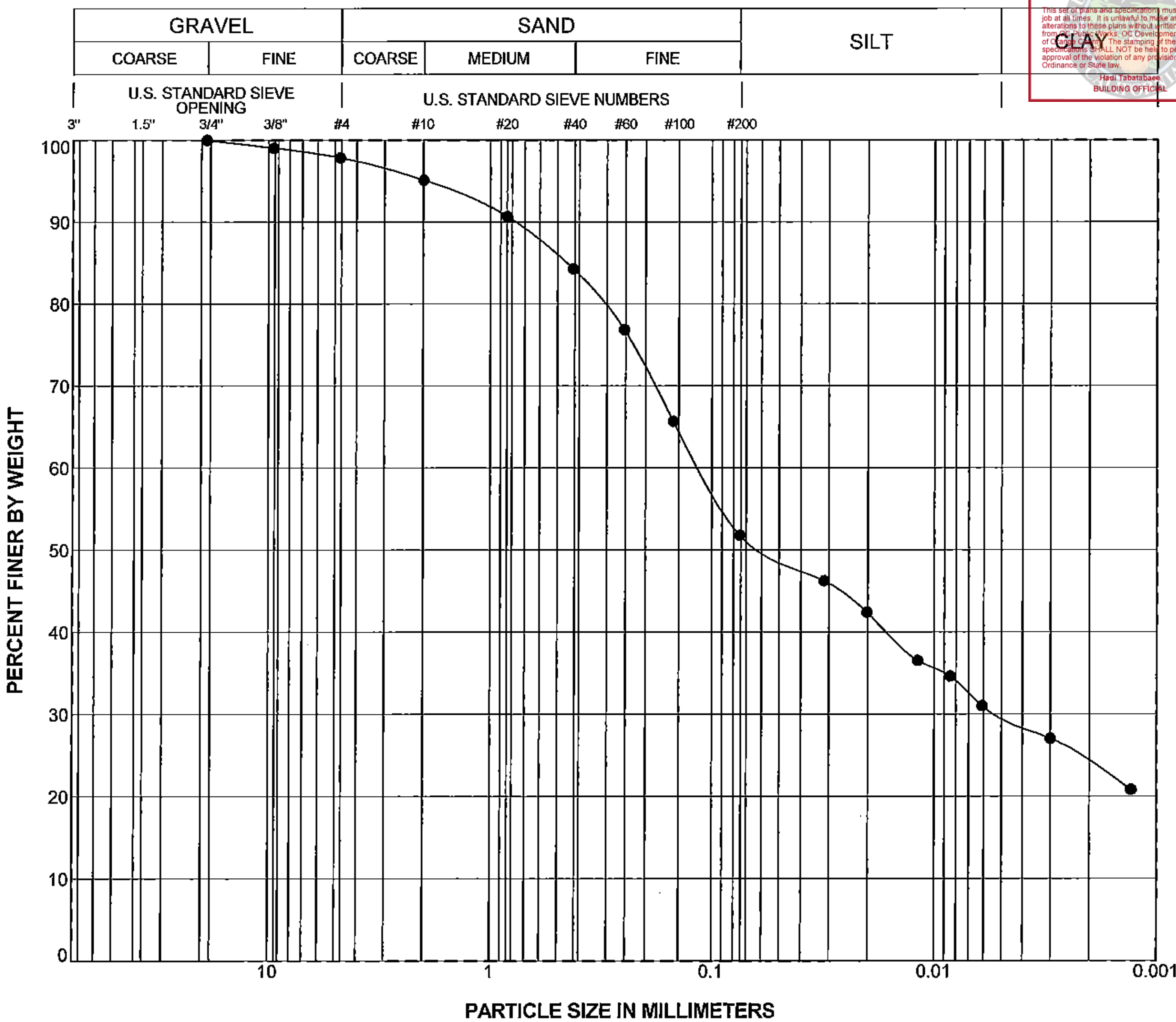

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH- 1	9.0	Qaf	●	41	18	Sandy Lean Clay (CL)

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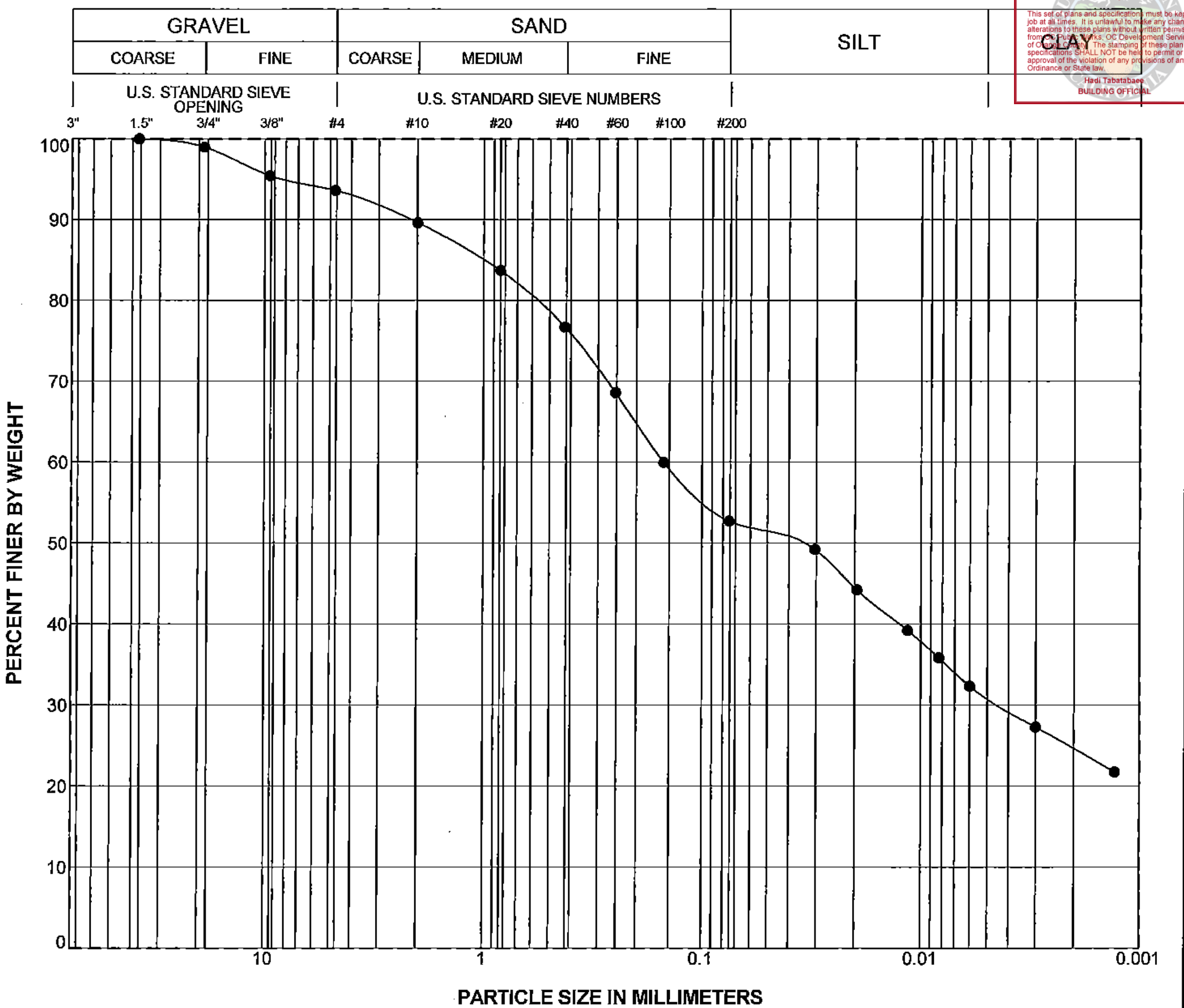

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH- 6	14.0	Qaf	●	38	17	Sandy Lean Clay (CL)

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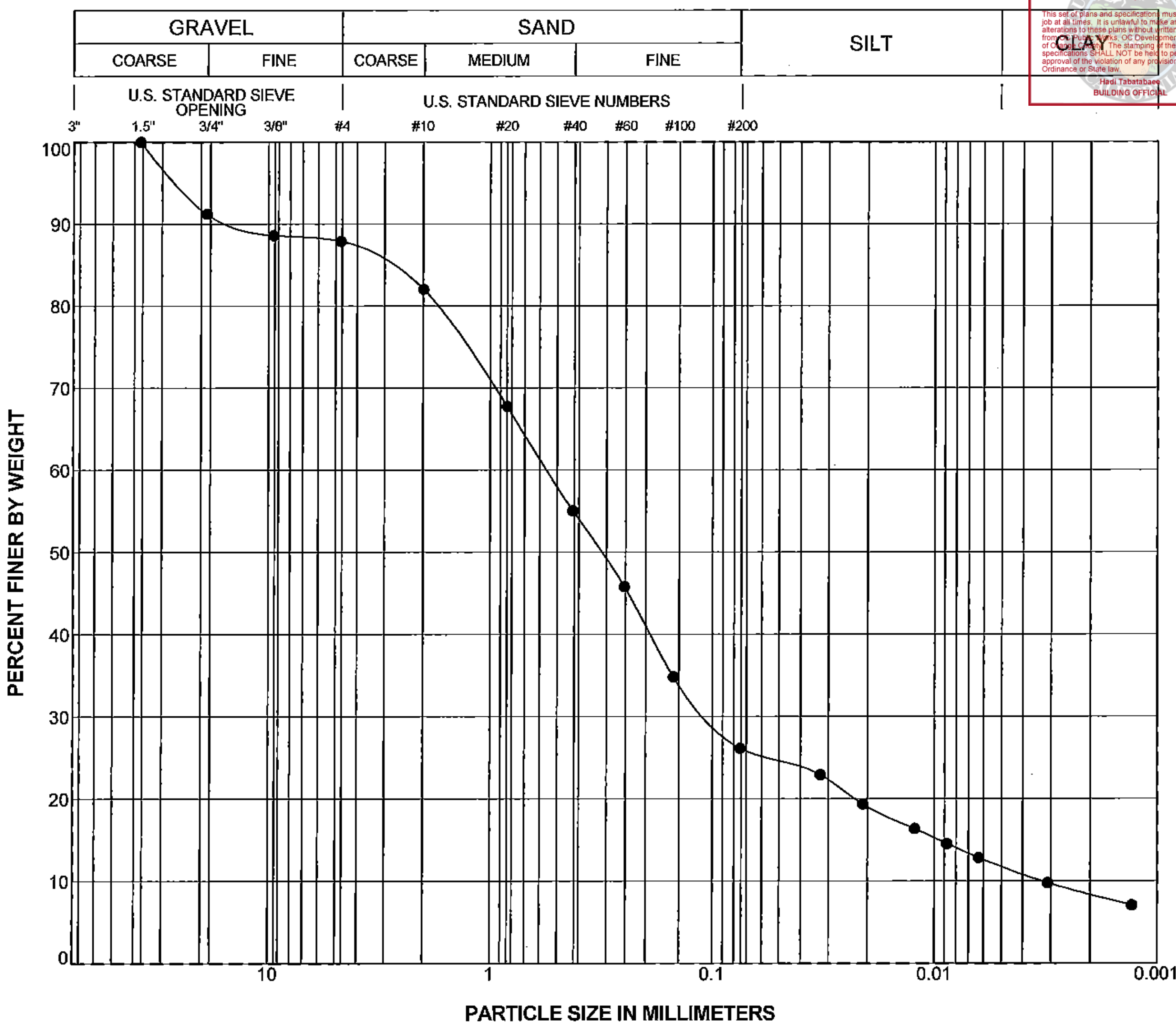

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-12	4.0	Qaf	●	39	18	Silty Sand and Silty Clay (SM/CL)

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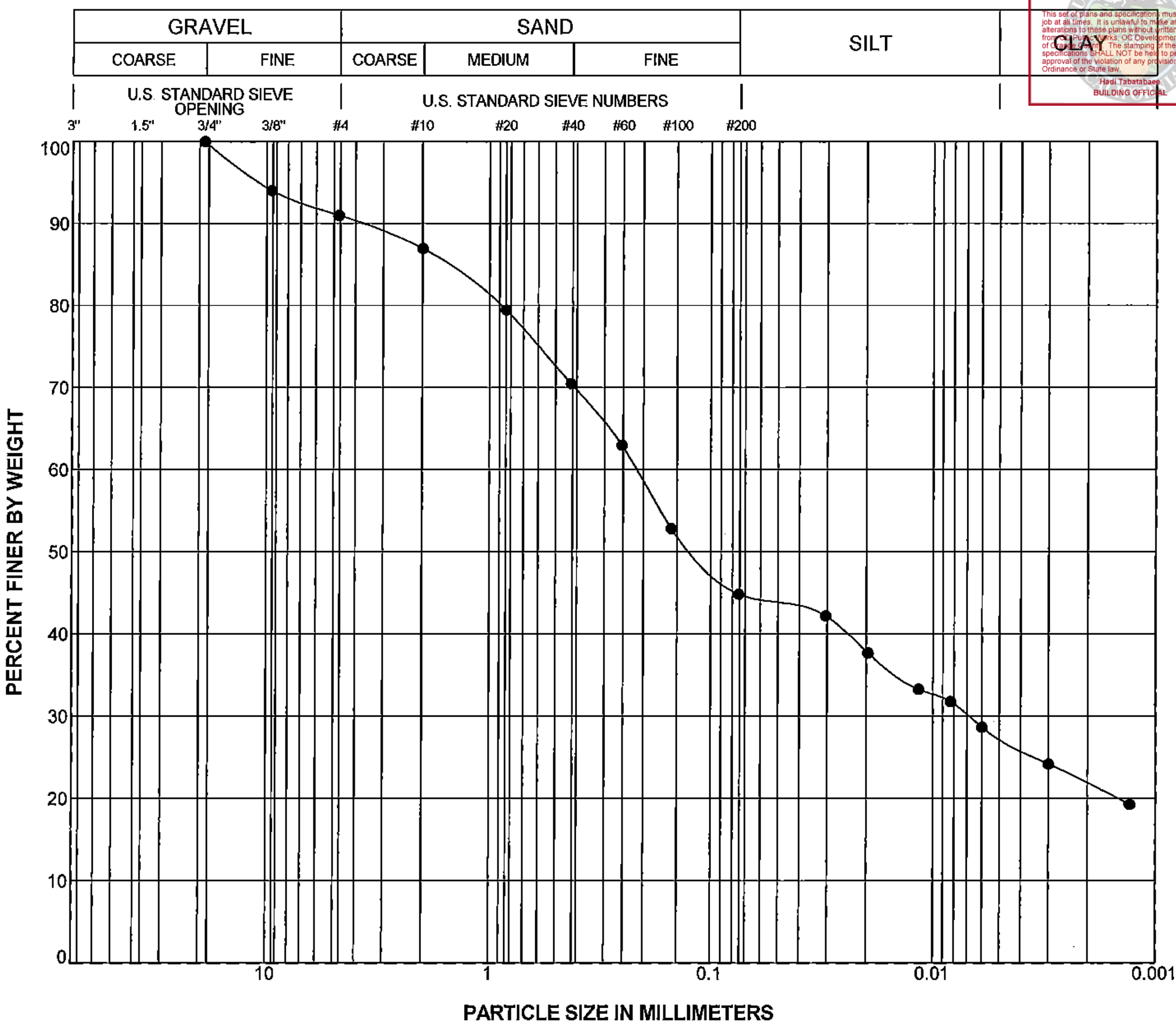

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-12	9.0	Qaf	●	33	13	Clayey Sand (SC)

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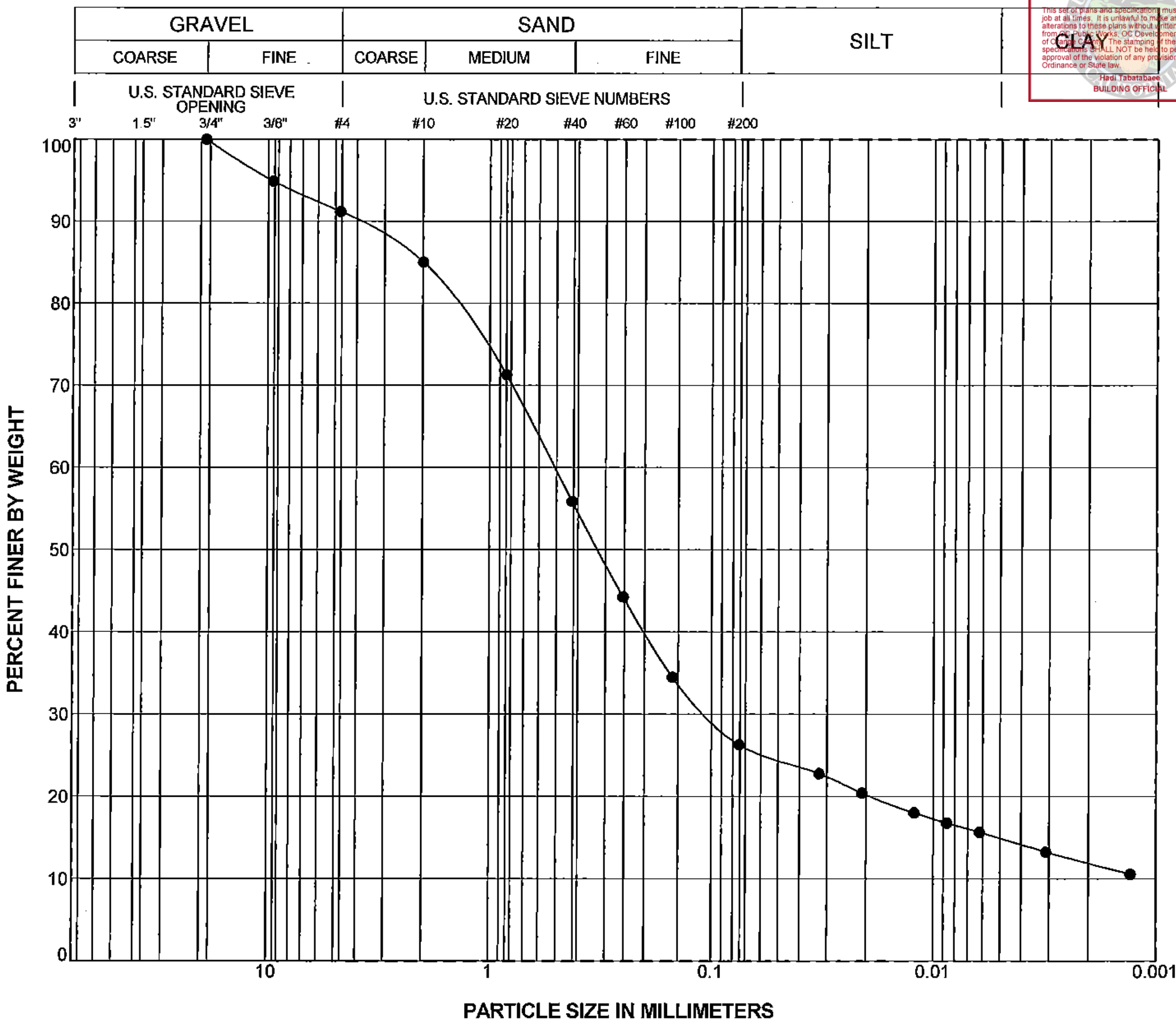

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-13	2.0	Qaf	●	33	11	Clayey Sand (SC)

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Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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GEOTECHNICAL, INC.

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of County of Orange. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
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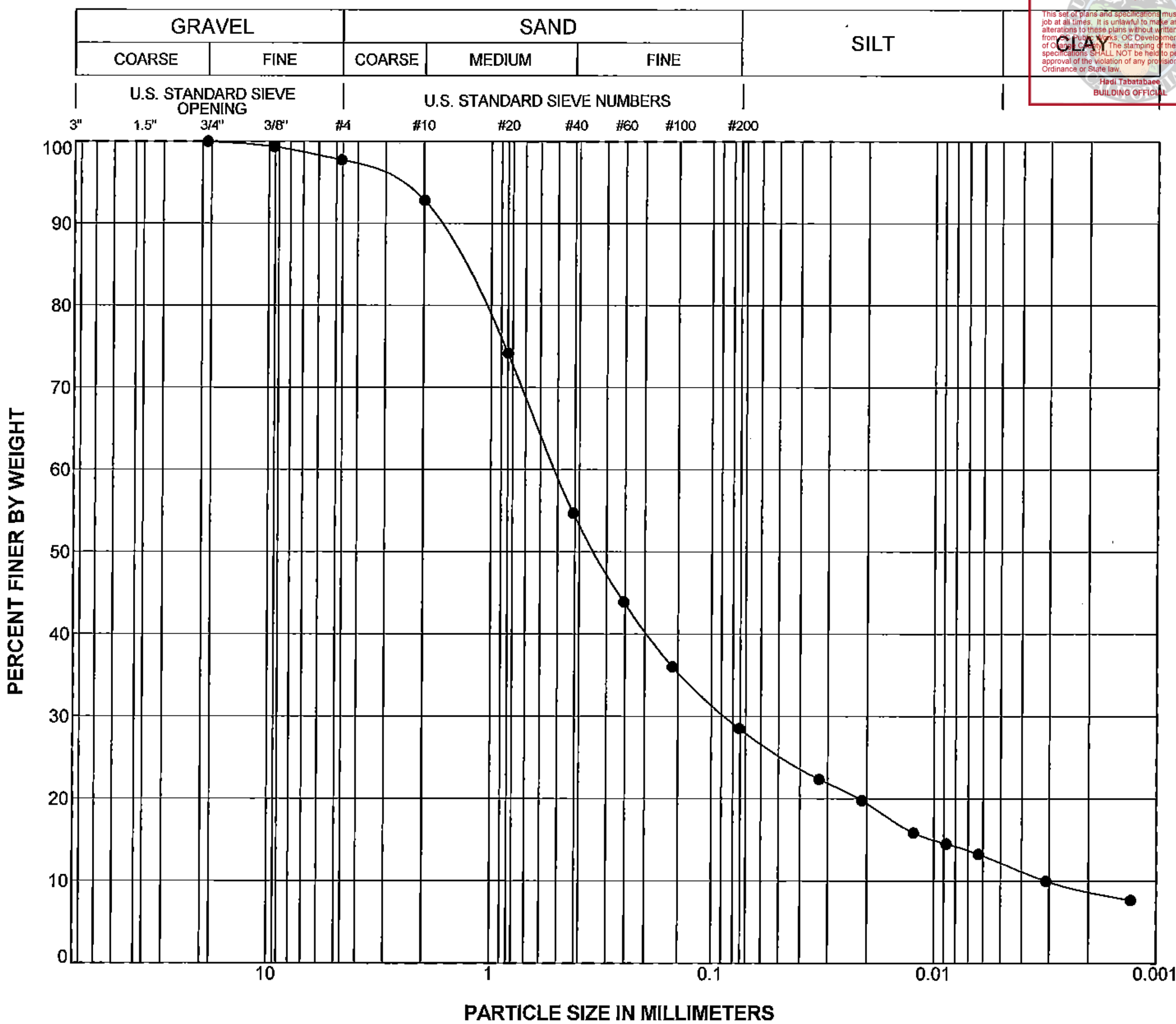

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-14	9.0	Qaf	●	32	9	Clayey Sand (SC)

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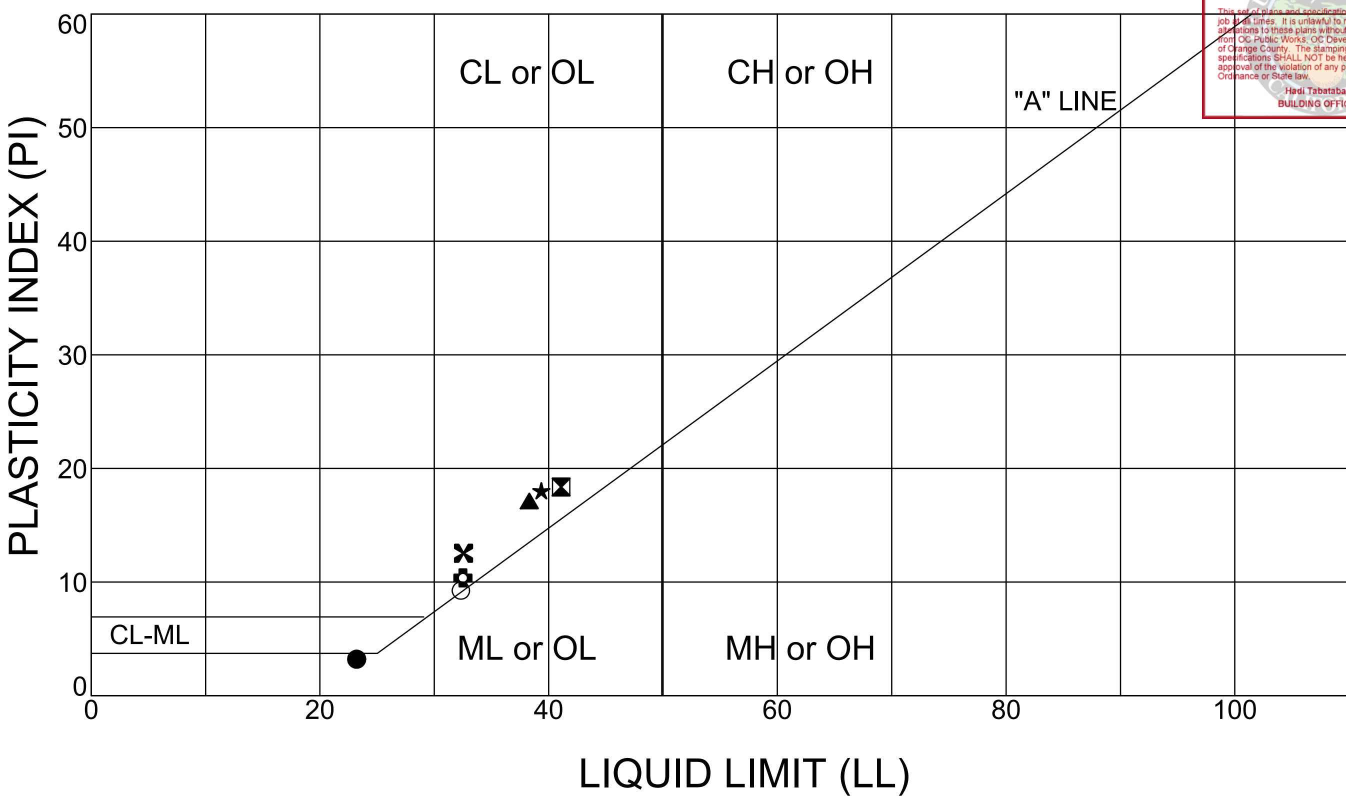

Boring Number	Depth (feet)	Geologic Unit	Test Symbol	Insitu Water Content (%)	LL	PL	PI	Classification
C-4	1.0	Qaf	●		23	20	3	Silty Sand (SM)
DH- 1	9.0	Qaf	⊠	21	41	23	18	Sandy Lean Clay (CL)
DH- 6	14.0	Qaf	▲	26	38	21	17	Sandy Lean Clay (CL)
DH-12	4.0	Qaf	★	17	39	21	18	Silty Sand and Silty Clay (SM/CL)
DH-12	9.0	Qaf	✖	17	33	20	13	Clayey Sand (SC)
DH-13	2.0	Qaf	✿	14	33	22	11	Clayey Sand (SC)
DH-14	9.0	Qaf	○	21	32	23	9	Clayey Sand (SC)

LIMITS 11-161-00 (UPDATED ELEV.).GPJ 2/8/21

ATTERBERG LIMITS

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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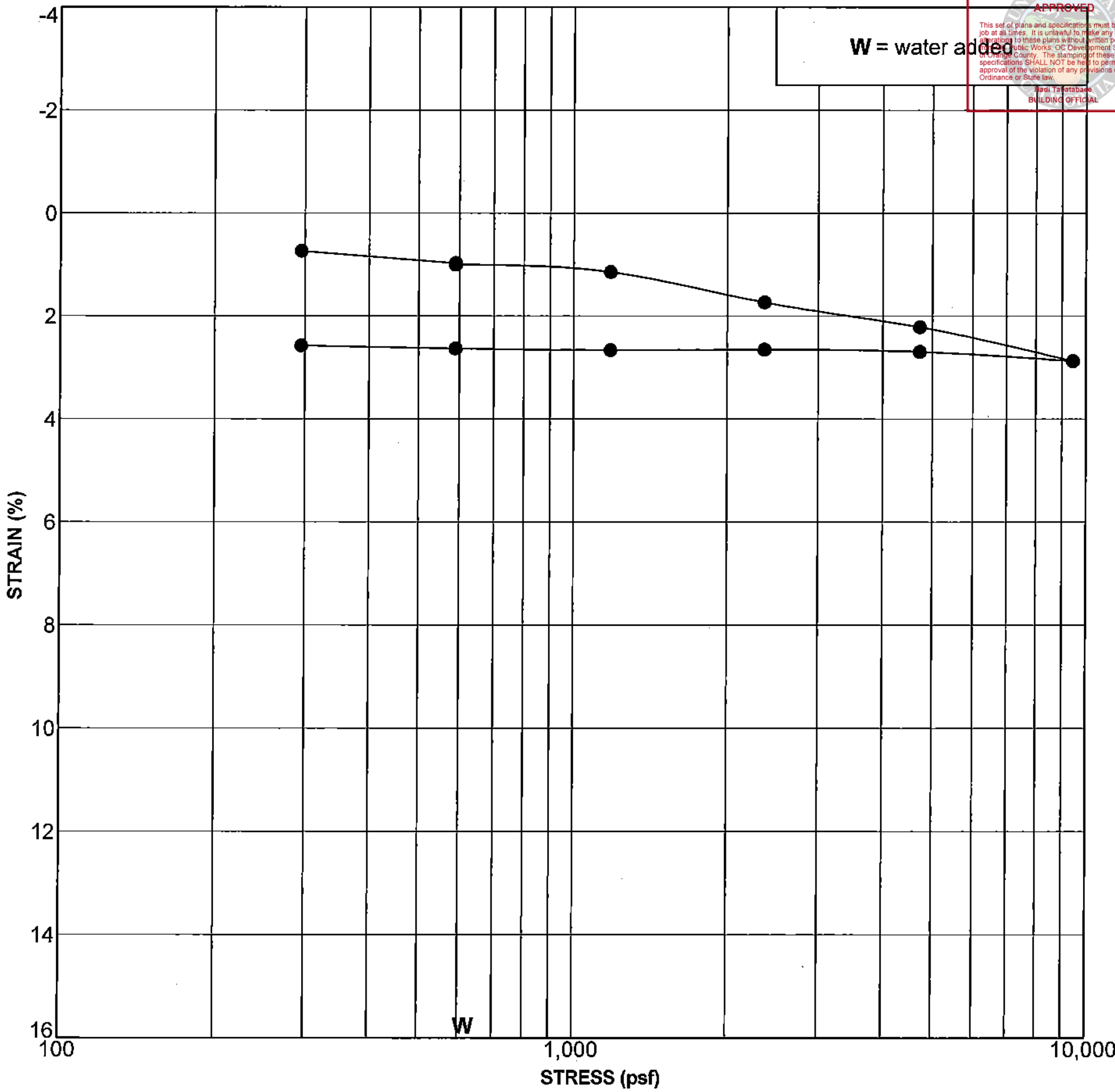

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH- 1	4.0	Qaf	●	In Situ	0.03	Clayey Sand (SC)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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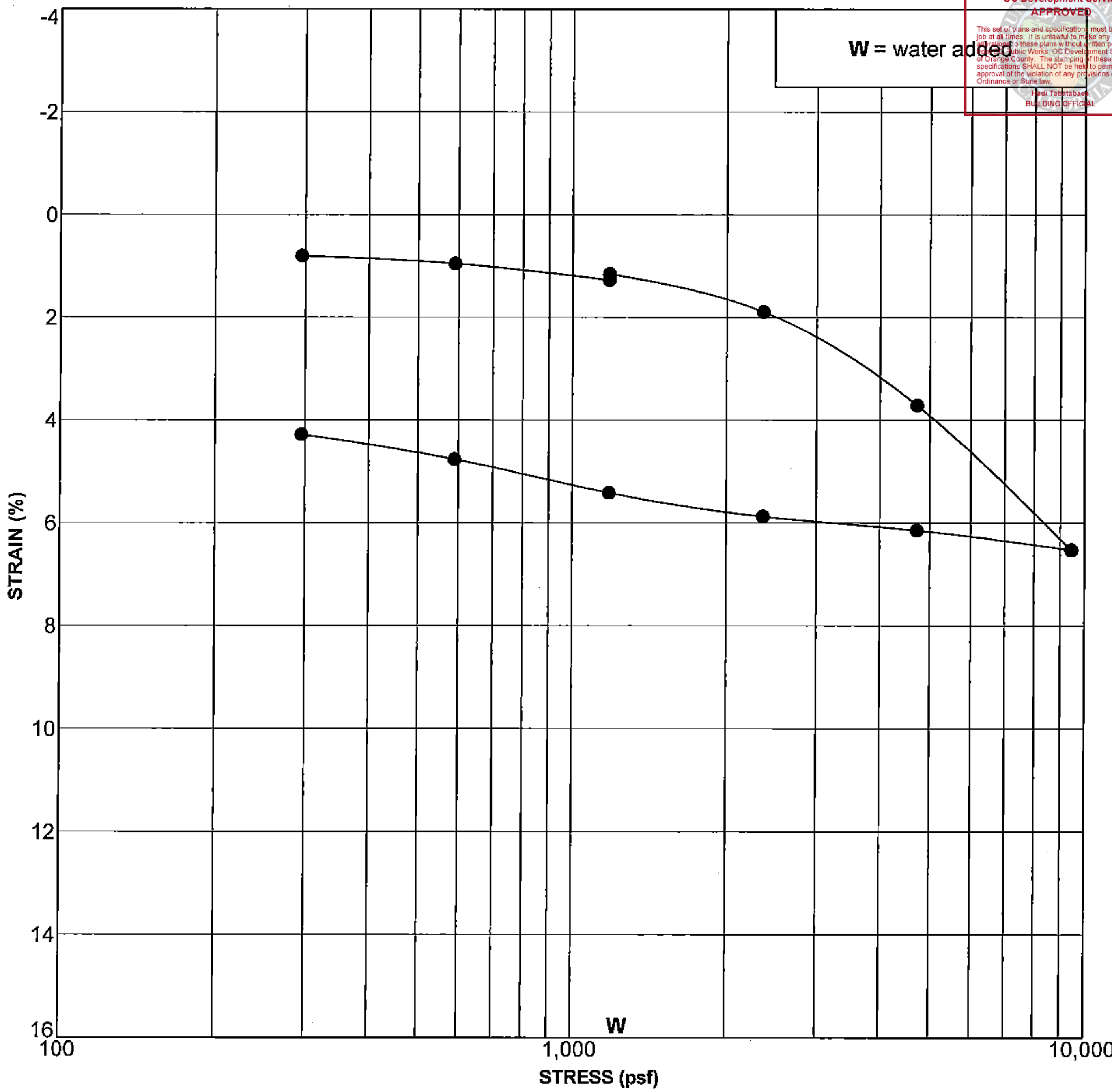

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH- 6	9.0		●	In Situ	-0.12	Sandy Clay to Clayey Sand (CL-SC)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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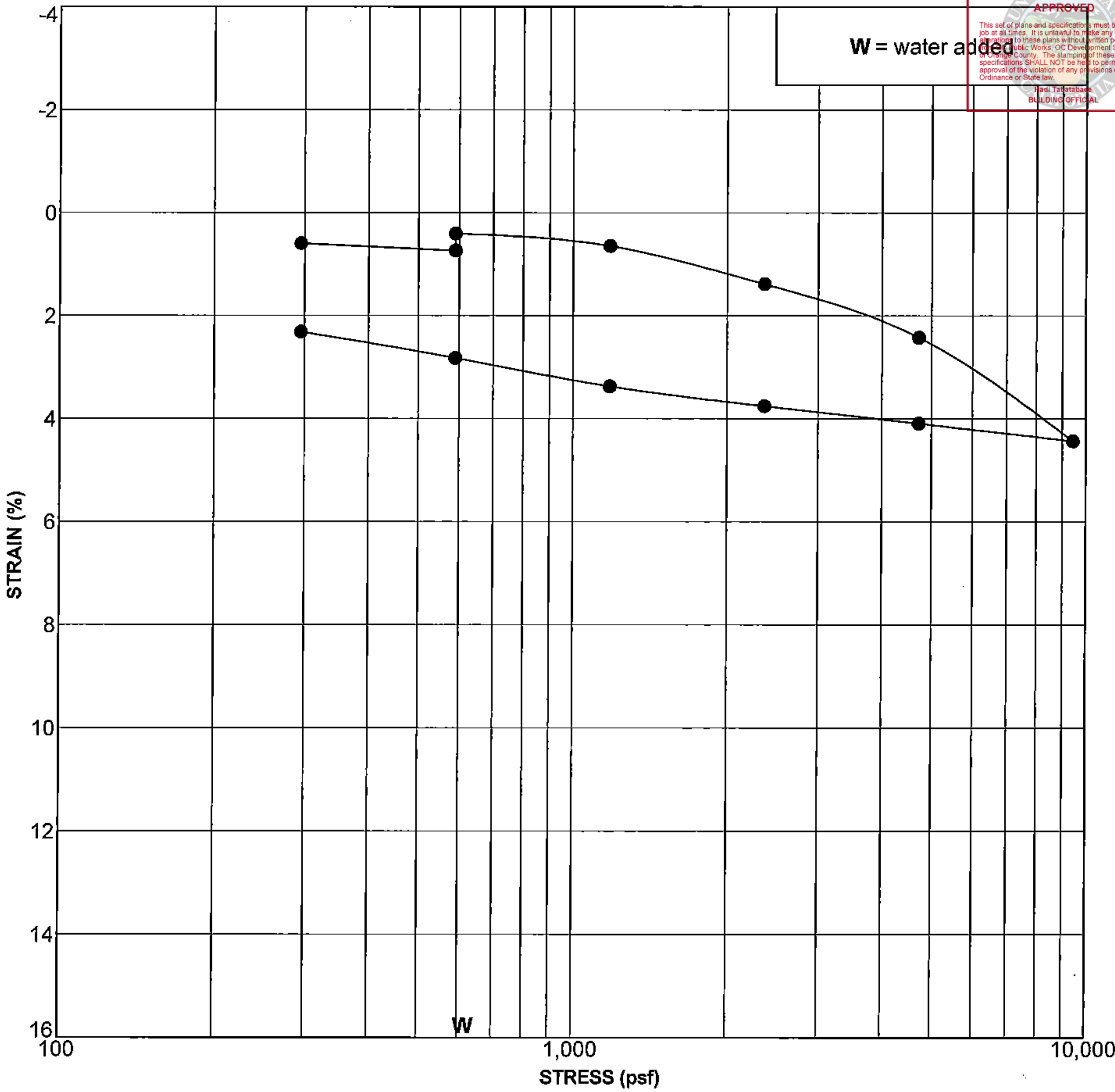

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-12	4.0	Qaf	●	In Situ	0.14	Silty Sand and Silty Clay (SM/CL)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

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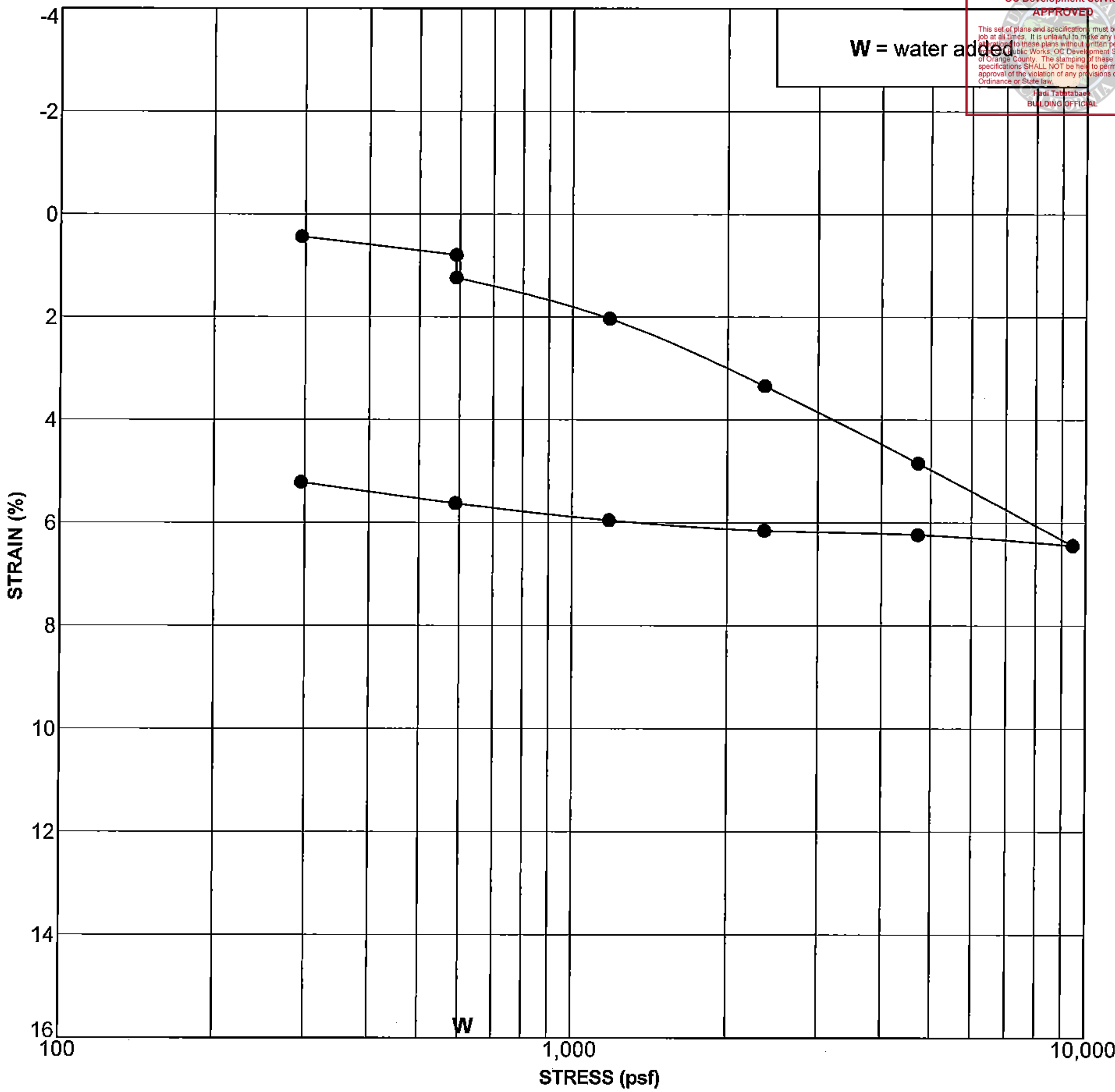

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-14	4.0	Qaf	●	In Situ	0.44	Silty Sand with some Clay (SM)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

CONSOLIDATION TEST DATA

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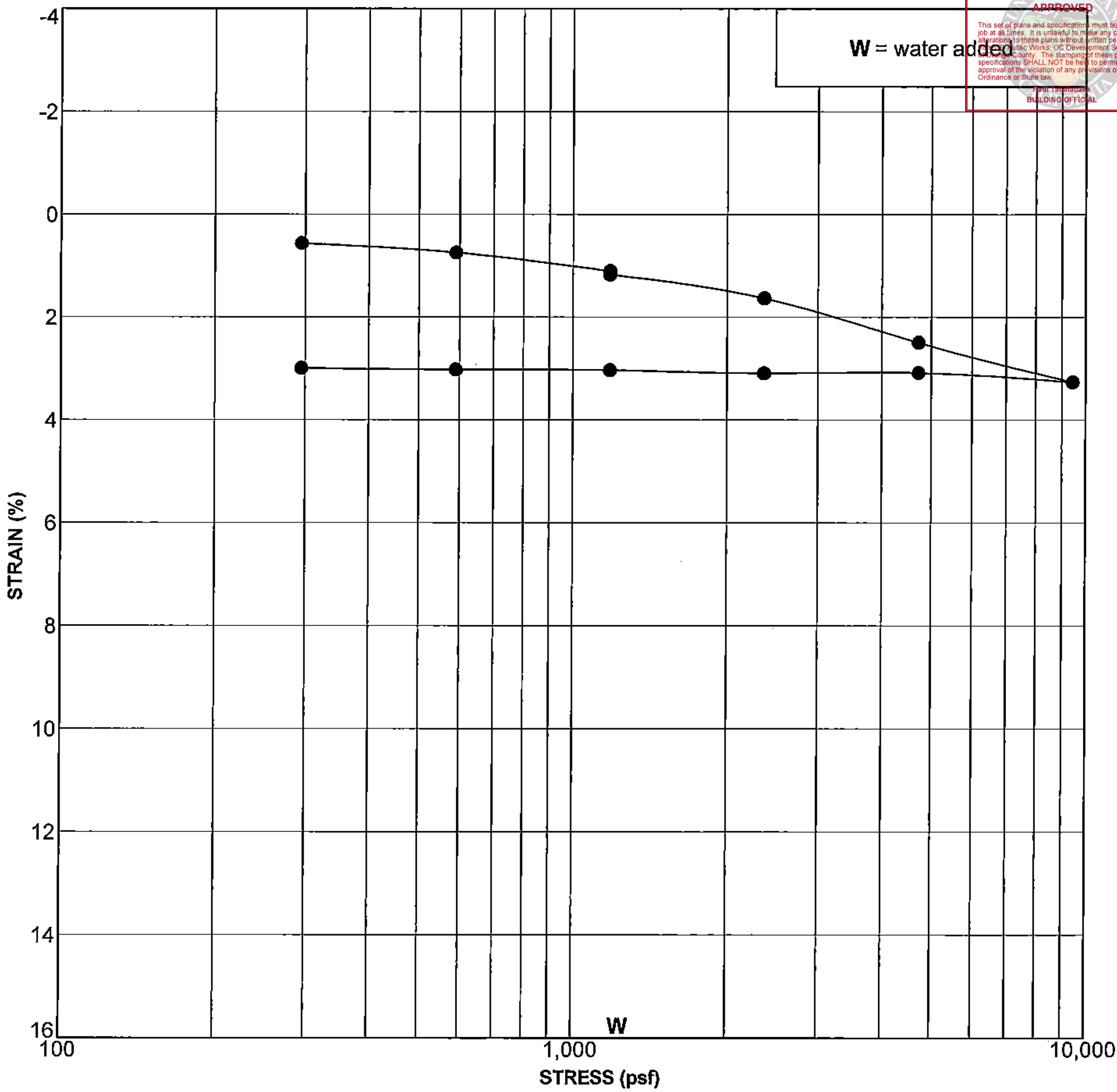

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-15	9.0	Qaf	●	In Situ	0.07	Silty Sand (SM)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
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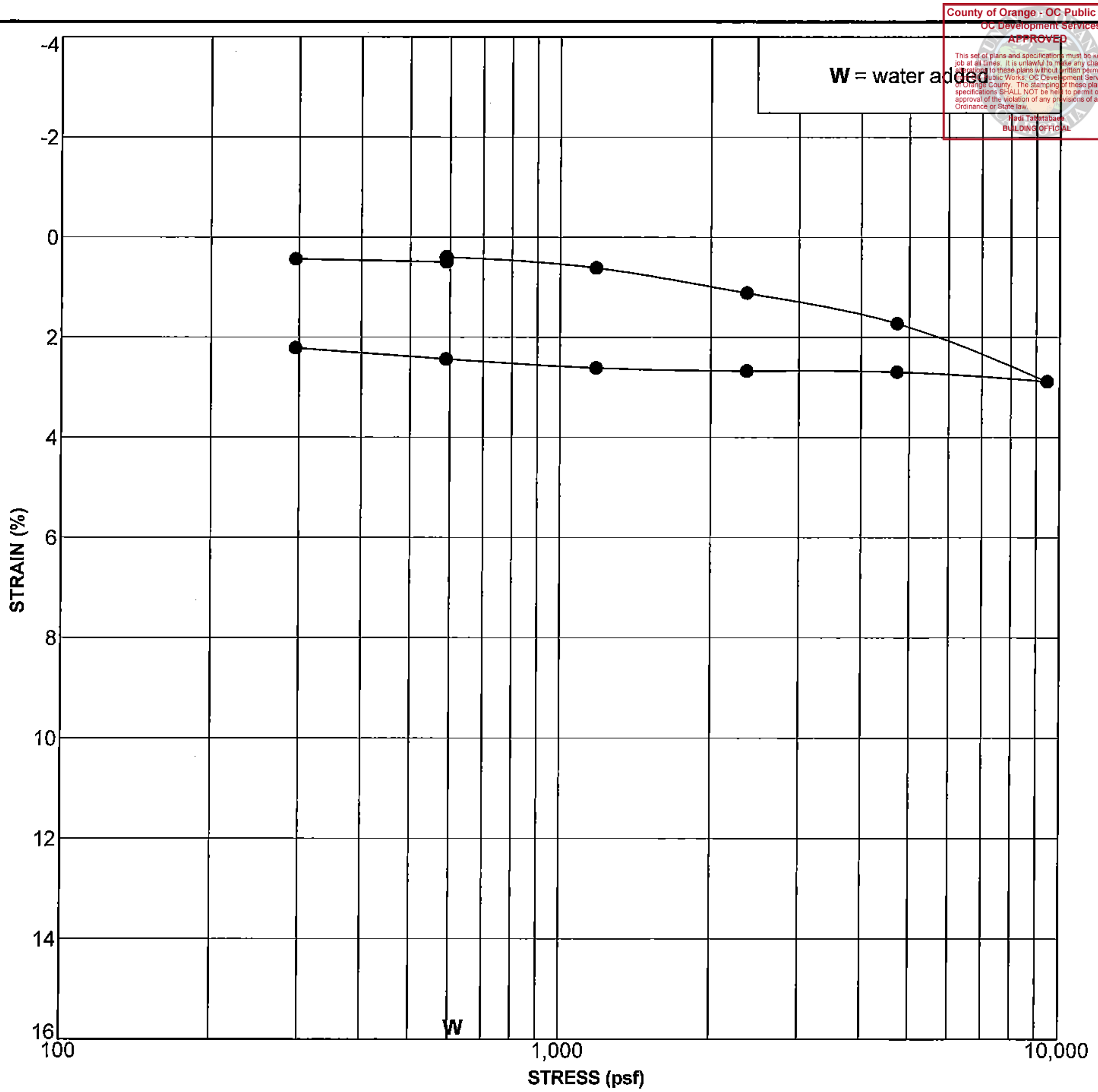

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-17	4.0	Qaf	●	In Situ	-0.1	Silty Sand and Sandy Clay (SM/SC)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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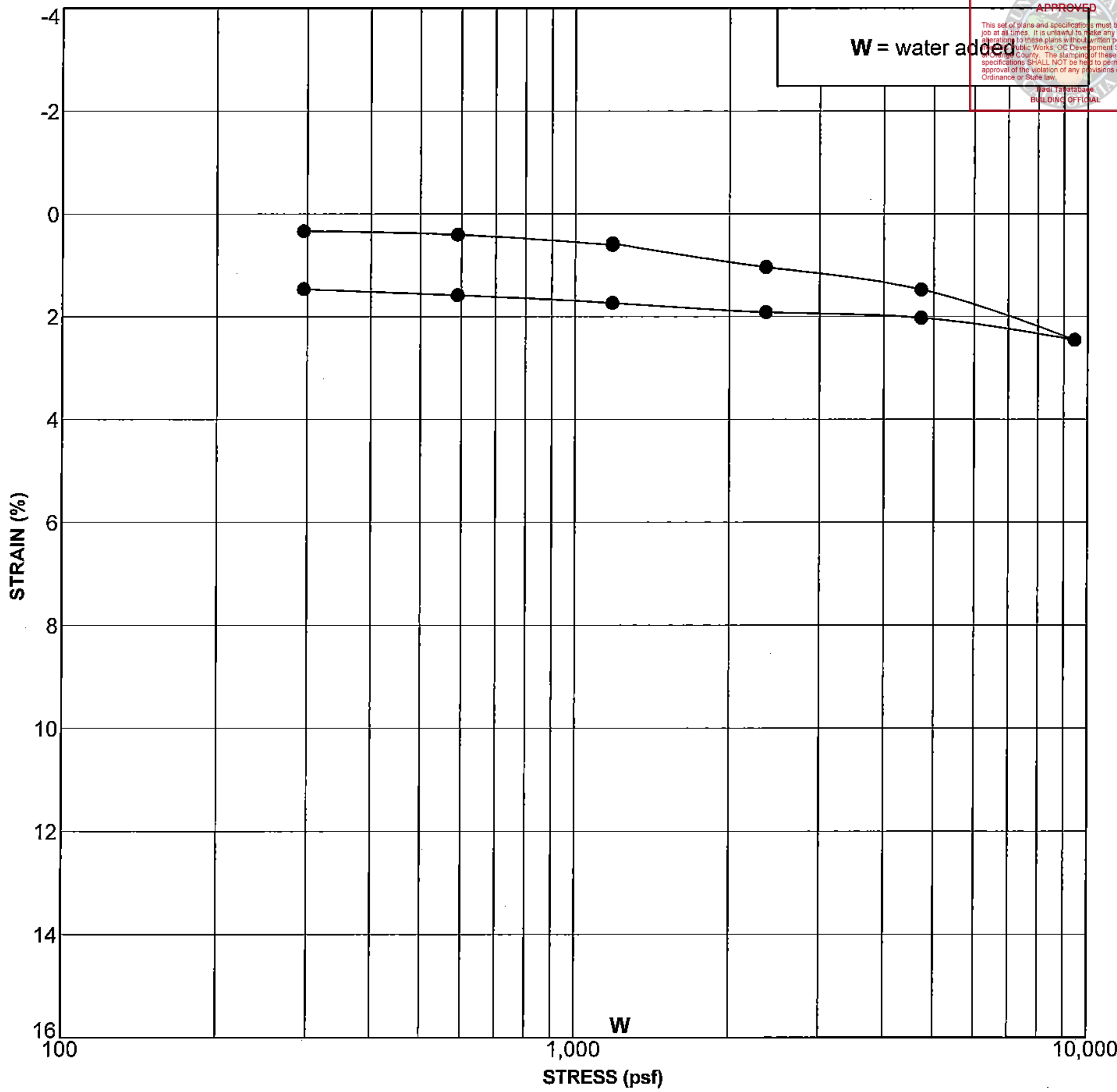

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-19	9.0	Qaf	●	In Situ	-0.03	Silty Clay and Silty Sand (CL/SM)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

GMU_CONSOL 11-161-00.GPJ GM&U.GDT 10/23/12

CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
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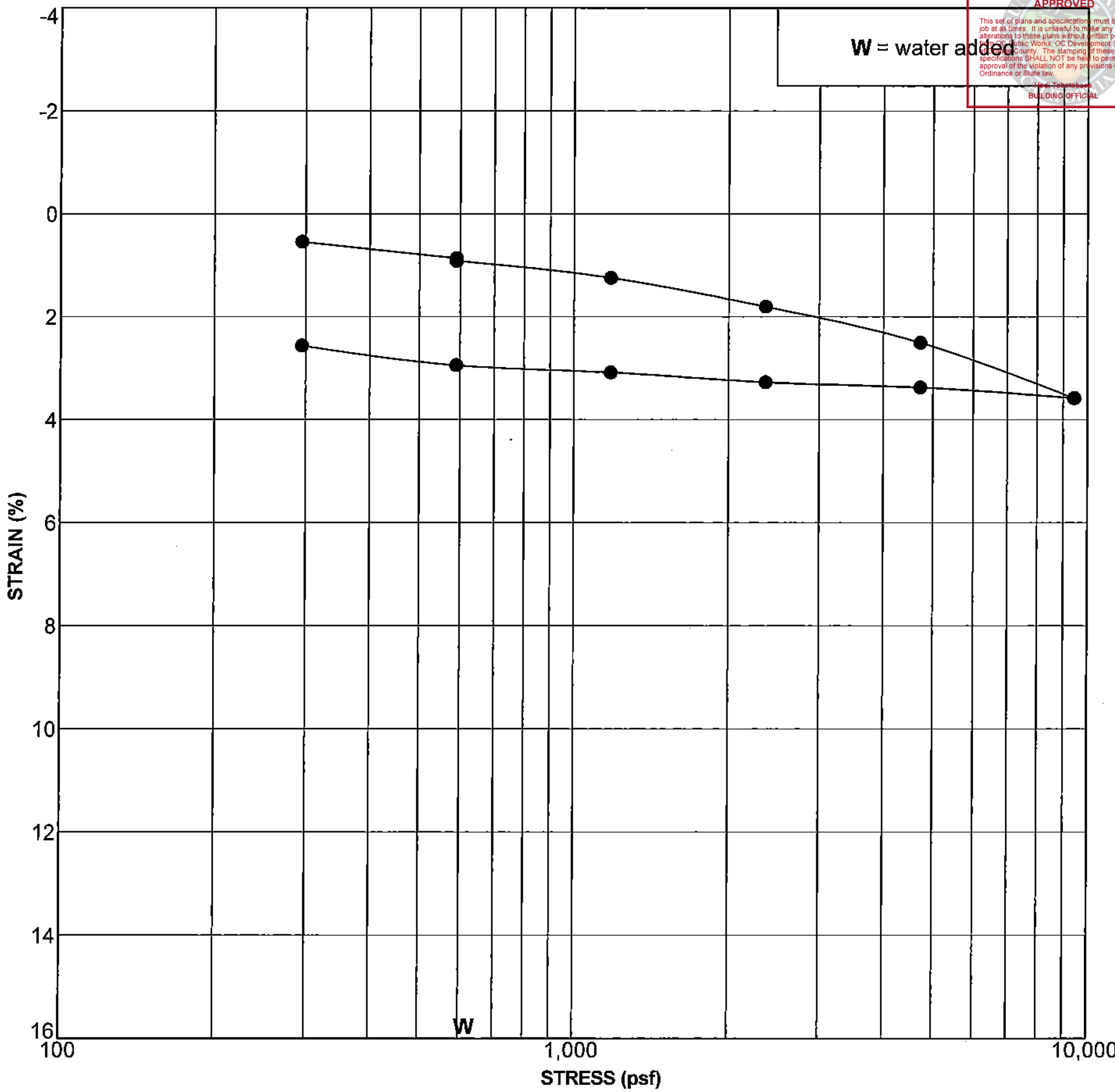

Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-20	2.0	Qaf	●	In Situ	0.05	Clayey Sand (SC)
			⊠	In Situ		
			▲	In Situ		
			★	In Situ		

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CONSOLIDATION TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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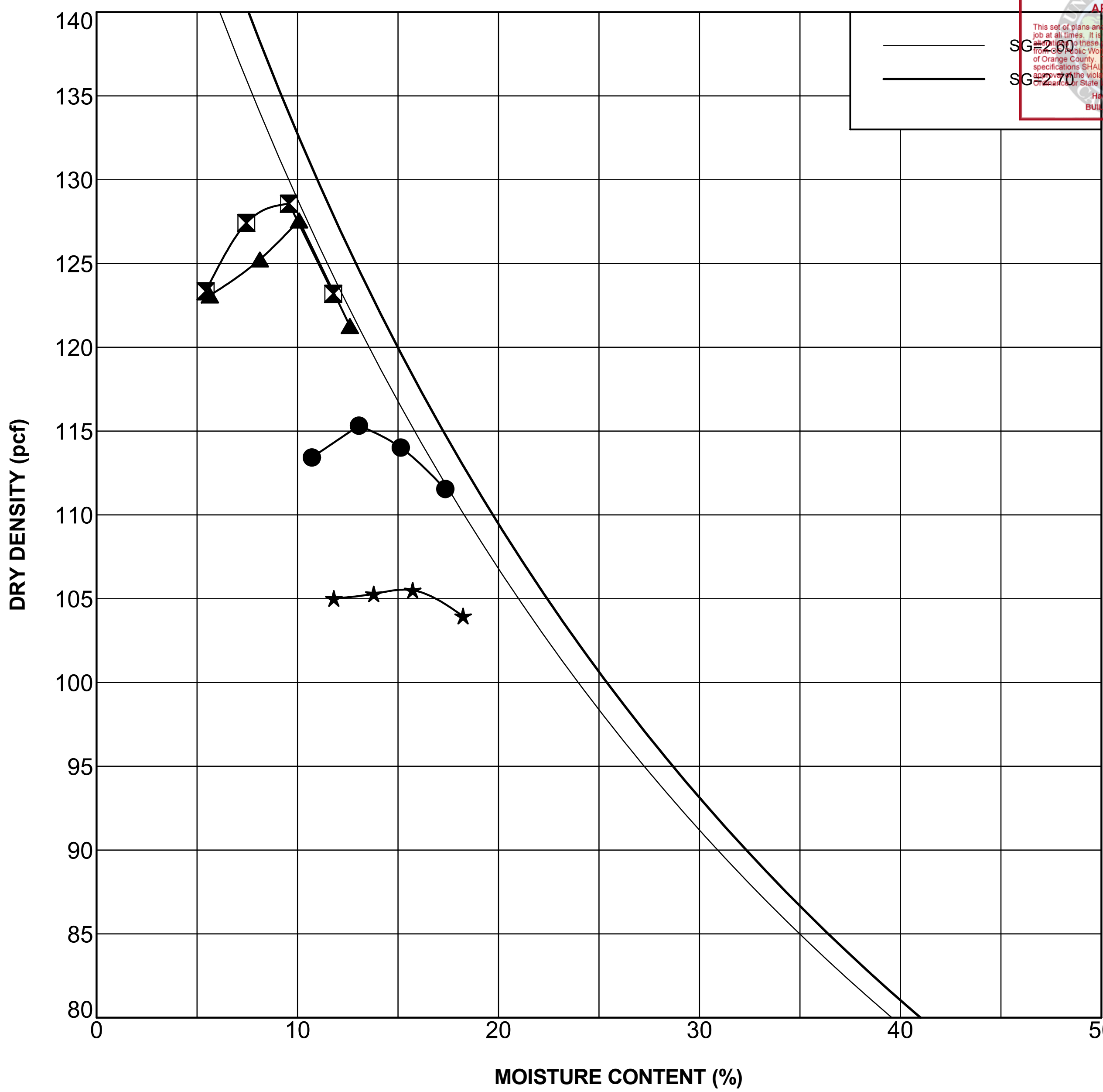

Boring Number	Depth (feet)	Geologic Unit	Symbol	Maximum Dry Density, pcf	Optimum Moisture Content, %	Classification
C-3	1.5	Qaf	●	115.5	13.5	Sandy Silty Clay (CL-ML)
DH-14	0.0	Qaf	⧗	135	8	Clayey Sand w/ some Gravel (SC)
DH-18	0.0	Qaf	▲	127.5	10	Clayey Sand (SC)
DH-20	3.0	Qaf	★	107	14.5	Sandy Clayey Silt (ML-CL)

COMPACTION TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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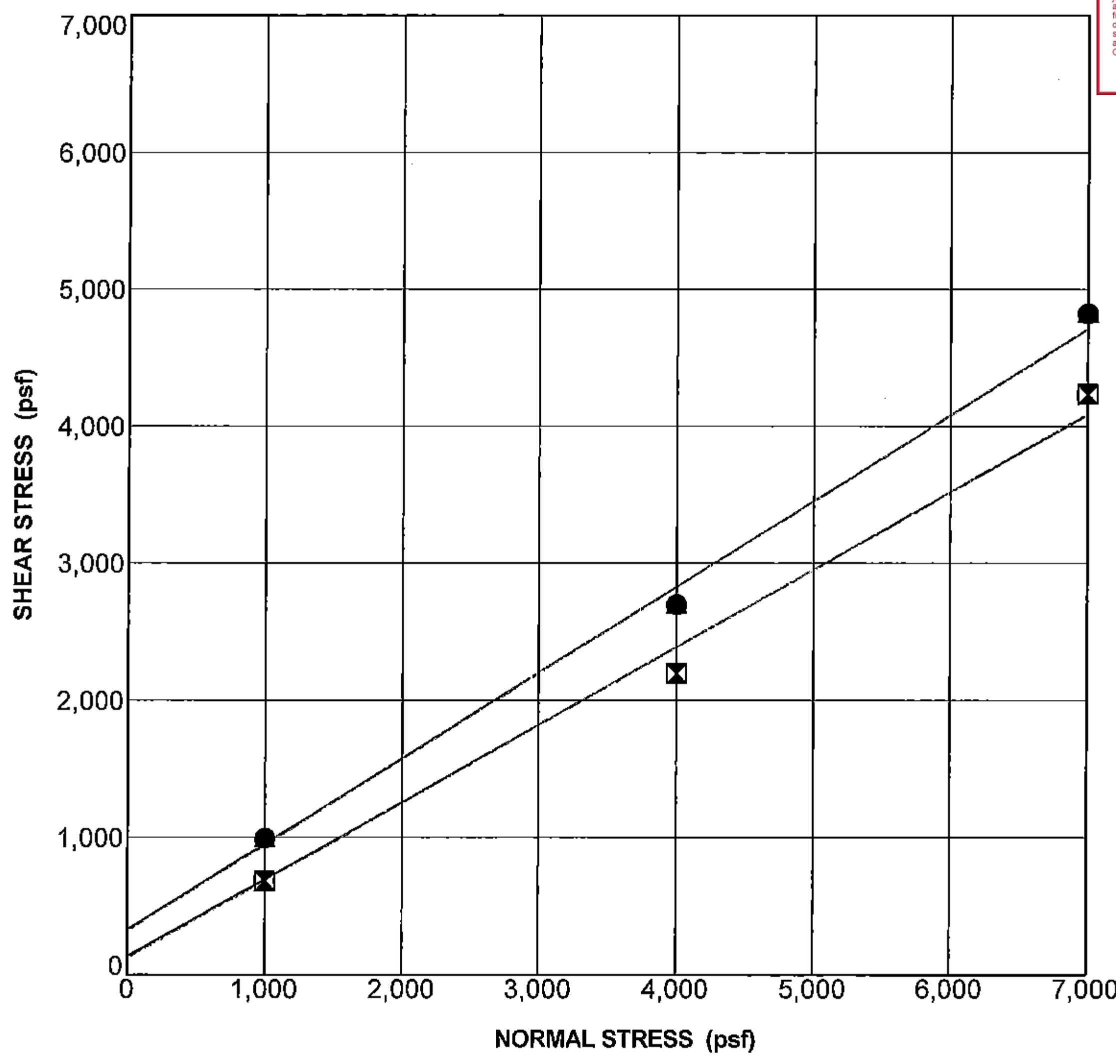

SAMPLE AND TEST DESCRIPTION
Sample Location: DH- 6 @ 4.0 ft **Geologic Unit:** Qaf **Classification:** Sandy Silty Clay (ML-CL)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes:

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	290	32.0
⊠ Ultimate Strength	100	29.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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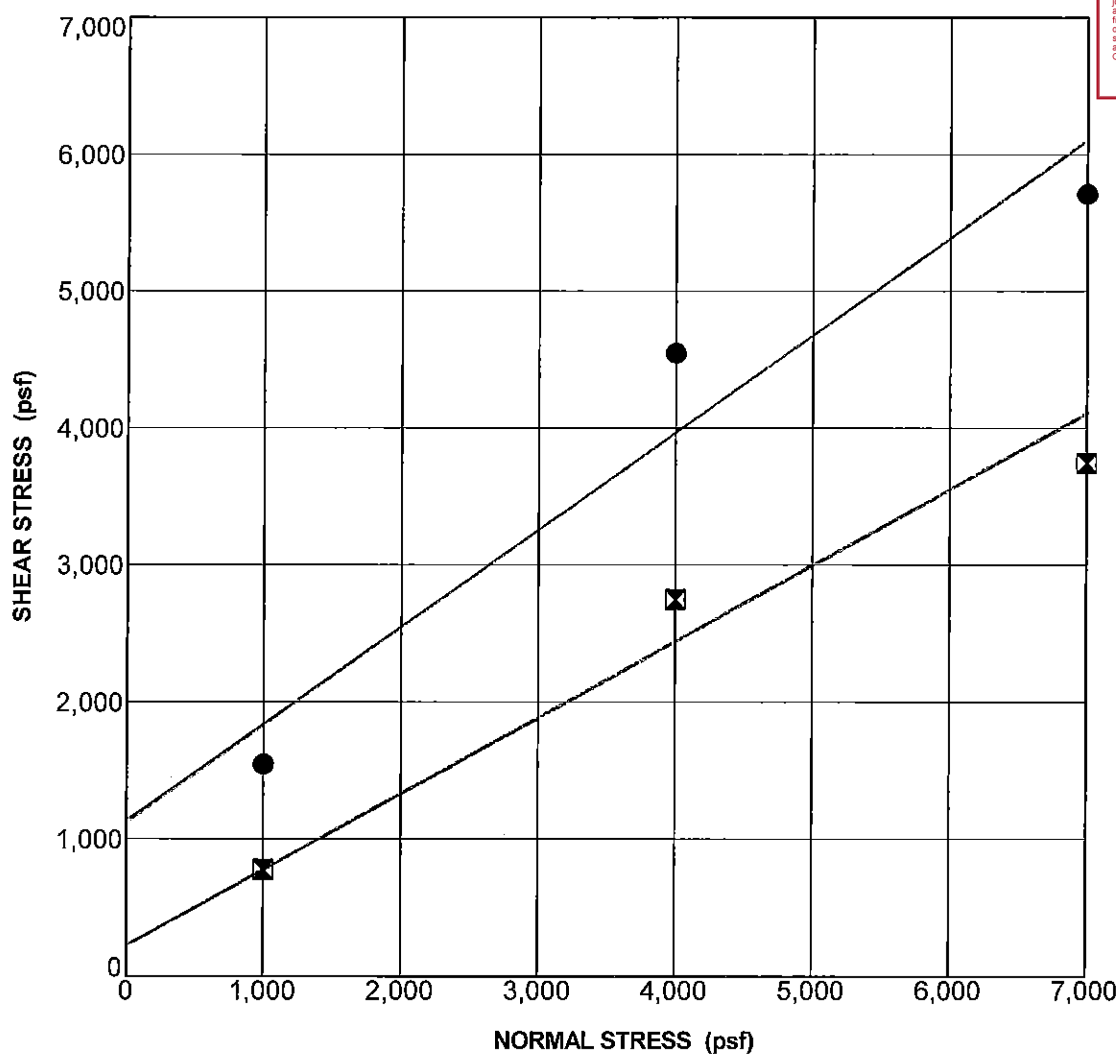
GMU_DIRECT_SHEAR 11-161-00.GPJ GM&U.GDT 10/23/12



SAMPLE AND TEST DESCRIPTION
Sample Location: DH- 6 @ 29.0 ft **Geologic Unit:** Tc **Classification:** Sity Clay and Silty Sand (CL/SM-SP)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes:

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	1160	35.0
⊠ Ultimate Strength	210	29.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

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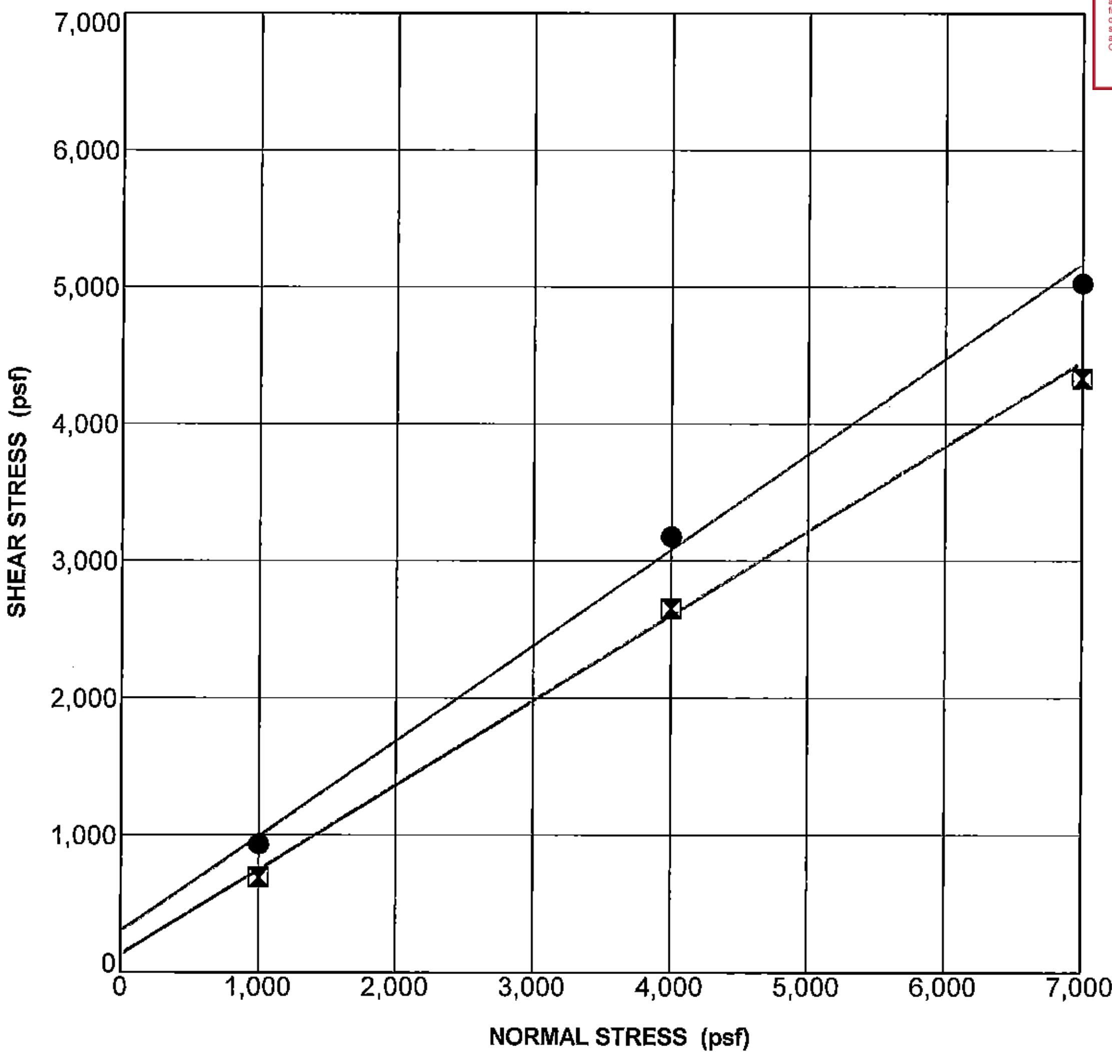
GMU_DIRECT_SHEAR 11-161-00.GPJ GM&U.GDT 10/23/12



SAMPLE AND TEST DESCRIPTION
Sample Location: DH-12 @ 24.0 ft **Geologic Unit:** Tc **Classification:** Poorly Graded Sand with some Clay ($
Strain Rate (in/min): 0.01 **Sample Preparation:** Undisturbed
Notes:

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	320	34.0
⊠ Ultimate Strength	137	31.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
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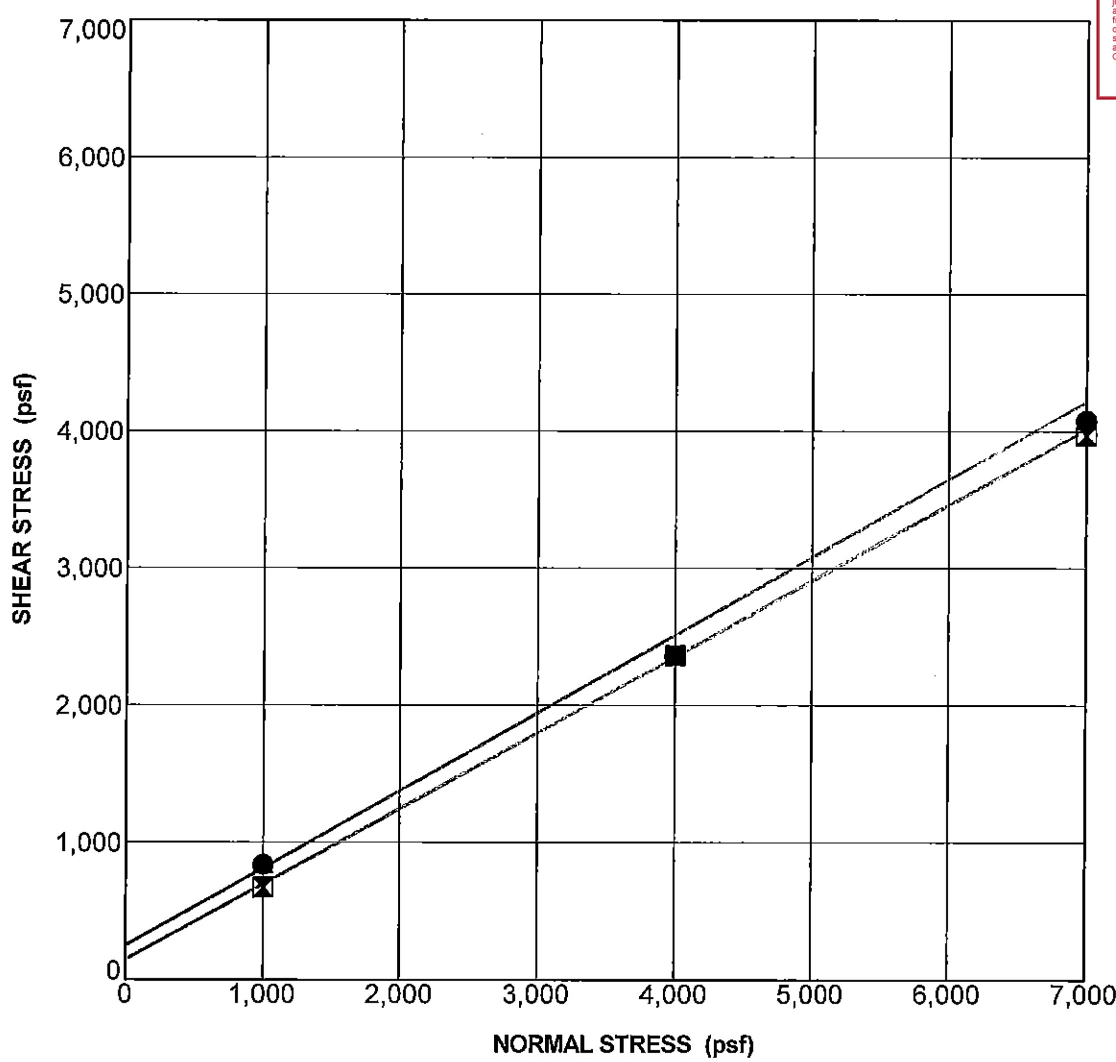


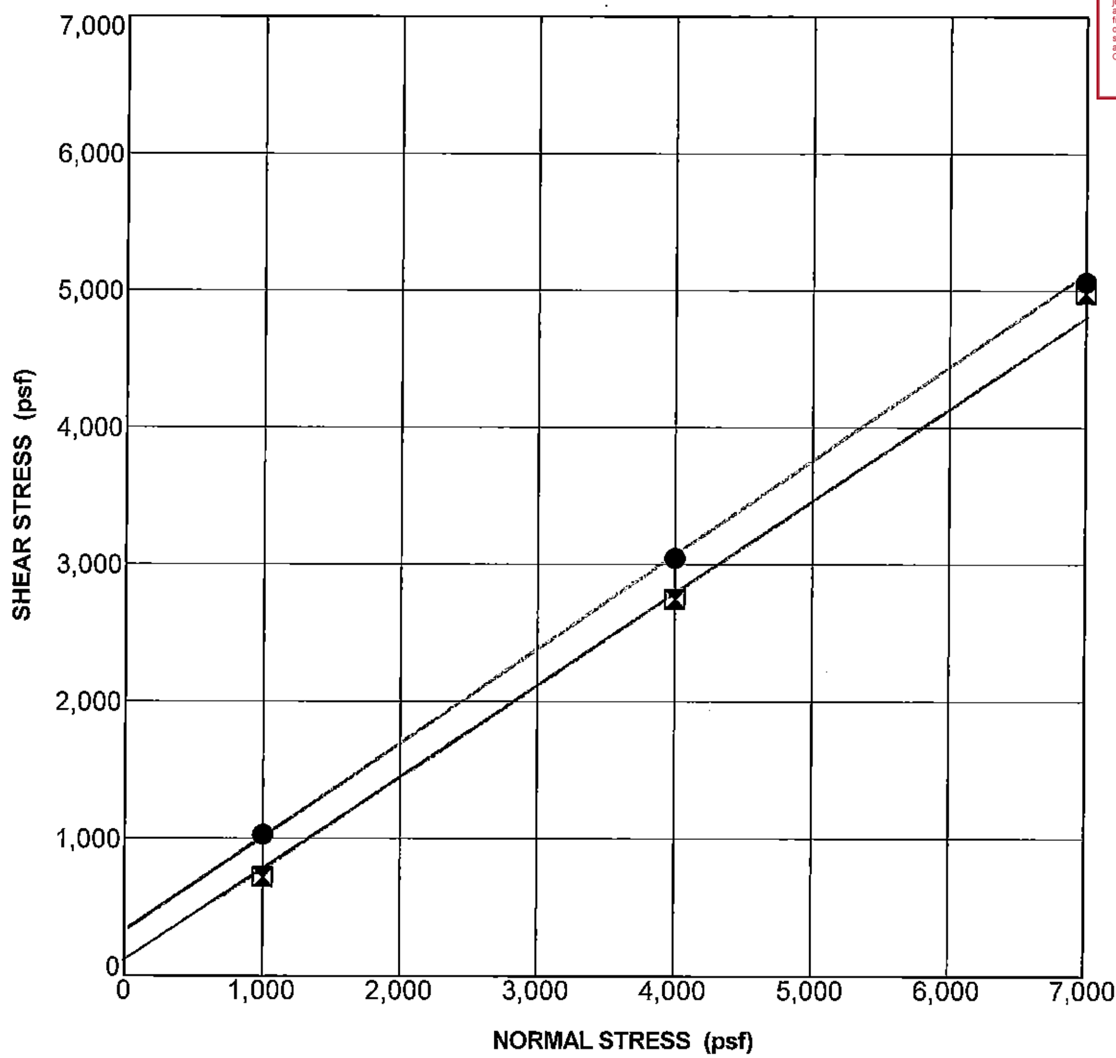
SAMPLE AND TEST DESCRIPTION
Sample Location: DH-14 @ 0.0 ft **Geologic Unit:** Qaf **Classification:** Clayey Sand w/ some Gravel (SC)
Strain Rate (in/min): 0.005 **Sample Preparation:** Remolded
Notes: 90 % Compaction at Optimum

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	268	28.0
⊠ Ultimate Strength	140	28.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

GMU GEOTECHNICAL, INC.



SAMPLE AND TEST DESCRIPTION	
Sample Location: DH-14 @ 19.0 ft **Geologic Unit:** Tc	**Classification:** Silty Clay / Silty Sand (CL/SM)
Strain Rate (in/min): 0.005	**Sample Preparation:** Undisturbed
Notes:	

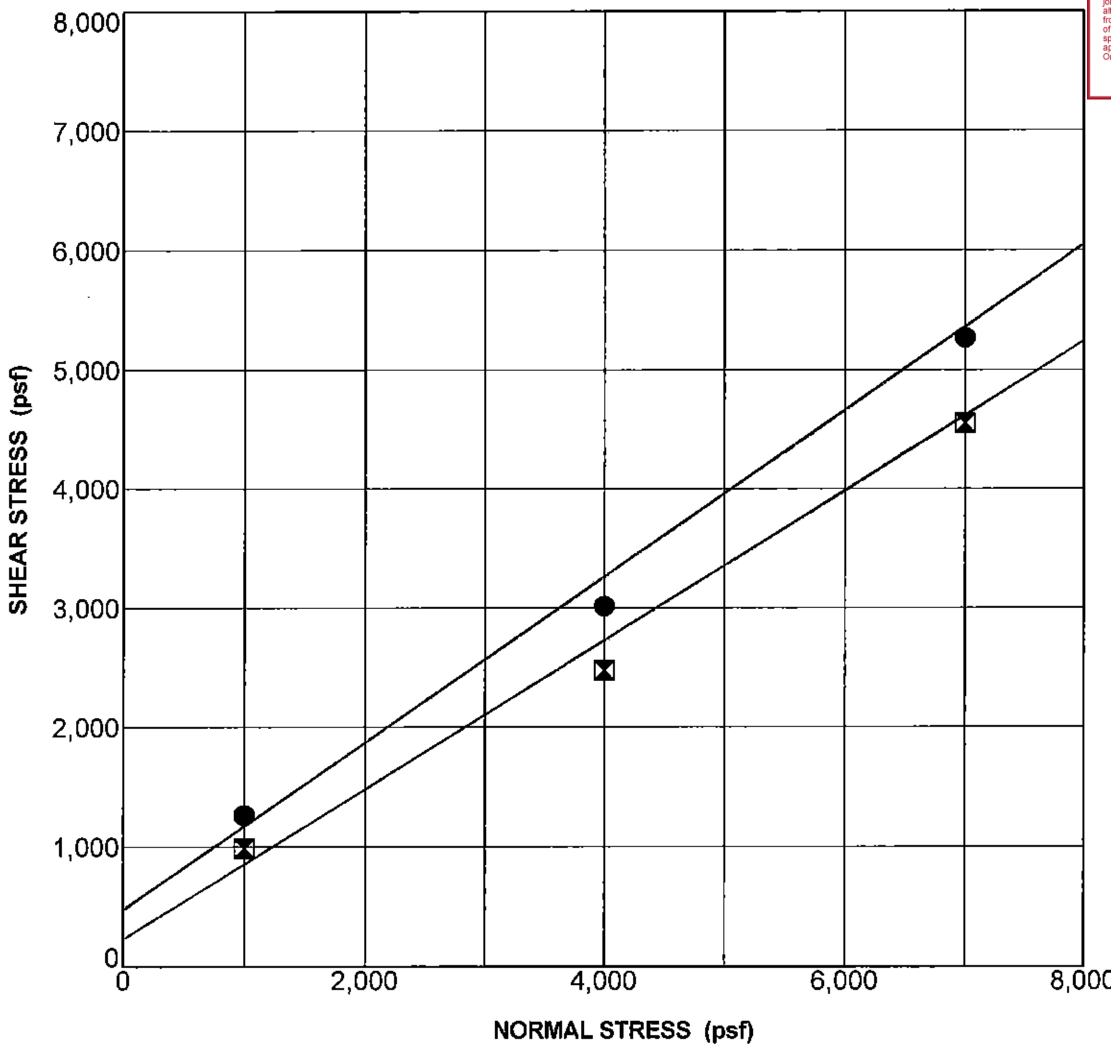
STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	360	34.0
☒ Ultimate Strength	110	34.0

GMU_DIRECT_SHEAR 11-161-00.GPJ GM&U GDT 10/23/12

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

GMU
GEOTECHNICAL, INC.



SAMPLE AND TEST DESCRIPTION
Sample Location: DH-15 @ 4.0 ft **Geologic Unit:** **Classification:** Sandy Silt to Silty Sand (ML-SM)
Strain Rate (in/min): 0.005 **Sample Preparation:** Undisturbed
Notes:

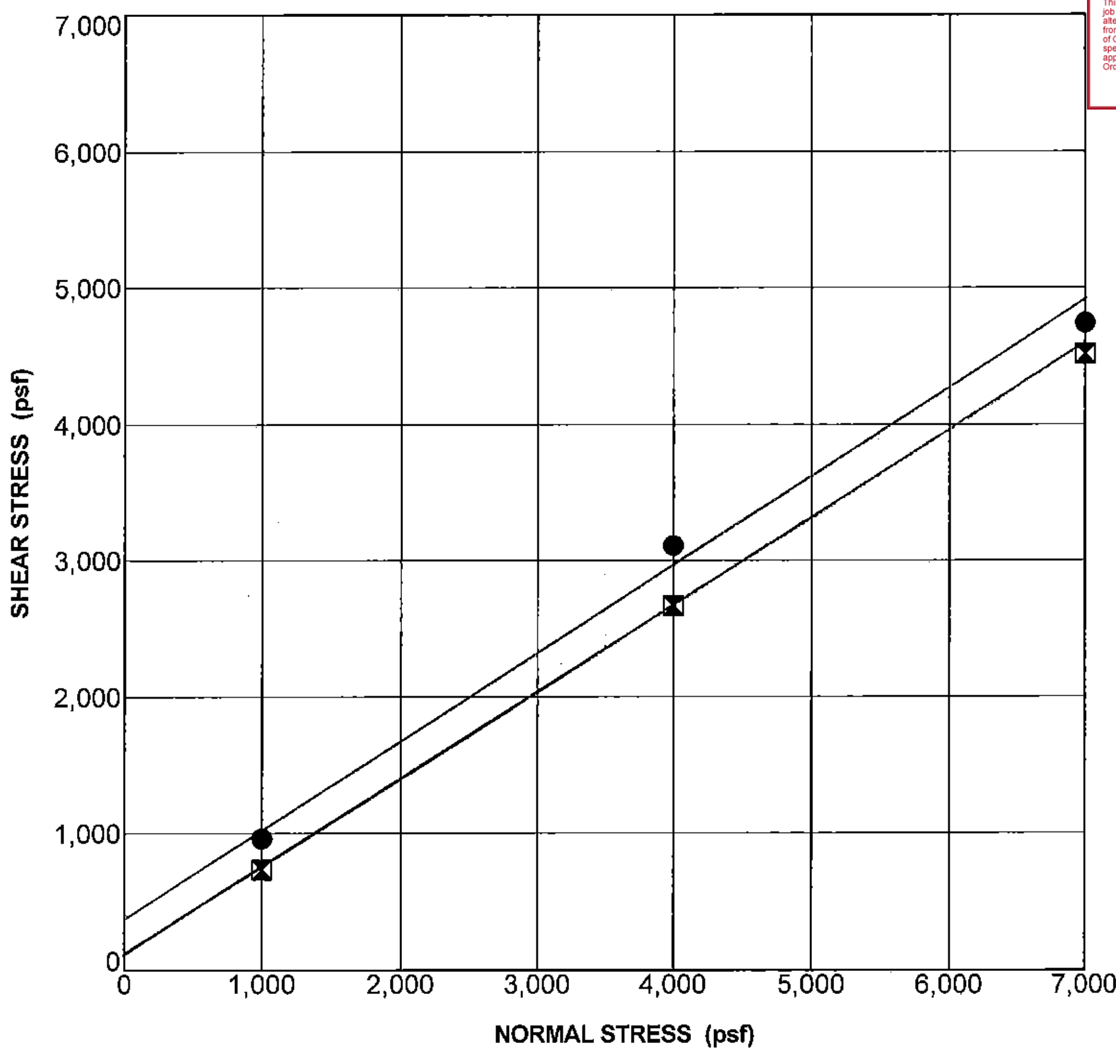
STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	508	34.0
⧗ Ultimate Strength	292	31.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

GMU GEOTECHNICAL, INC.

GMU_DIRECT_SHEAR 11-161-00.GPJ GM&U.GDT 10/8/12



SAMPLE AND TEST DESCRIPTION
Sample Location: DH-18 @ 0.0 ft **Geologic Unit:** **Classification:** Clayey Sand (SC)
Strain Rate (in/min): 0.005 **Sample Preparation:** Remolded
Notes: 90 % Compaction at Optimum

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	416	32.0
☒ Ultimate Strength	116	32.0

SHEAR TEST DATA

Project: Dana Point Harbor Revitalization
Project No. 11-161-00

GMU GEOTECHNICAL, INC.

GMU_DIRECT_SHEAR 11-161-00.GPJ GM&U.GDT 10/8/12

APPENDIX B-2

Previous Laboratory Test Results by Others

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Hadi Tabatabaee
BUILDING OFFICIAL

Leighton Consulting, Inc.

SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

Project Name: WRT / Dana Point
Project No. : 600024-001
Boring No.: B-1
Sample No. : B-1
Visual Soil Identification: Olive Clayey Sand (SC)

Tested By : VJ Date: 11/13/02
Data Input By: FT Date: 11/18/02
Checked By: FT Date: 11/18/02
Depth (ft.) : 1-6

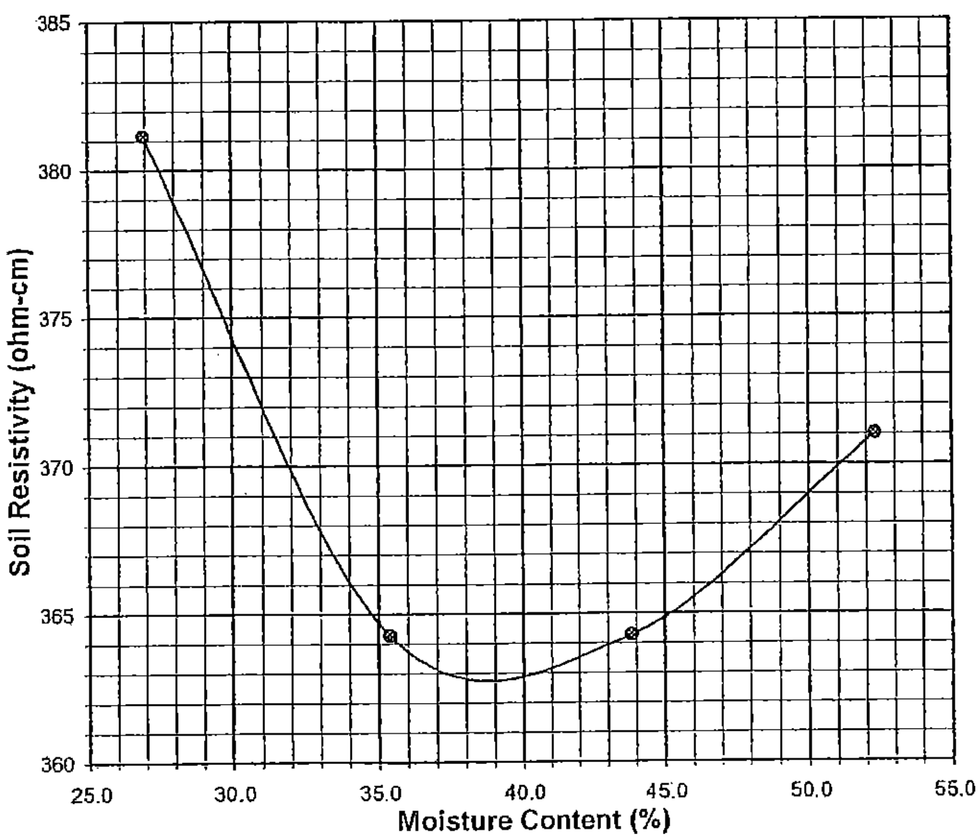
Initial Moisture Content (%)

Wet Wt. of Soil + Cont. (gm	199.50
Dry Wt. of Soil + Cont. (gm.)	187.46
Wt. of Container (gm	67.01
Moisture Content (%) (MC	10.00

Initial Soil Weight (gm)(Wt	1300.00
Box Constant:	6.7460

MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100

Remolded Specimen	Moisture Adjustments				
Water Added (ml) (Wa)	200	300	400	500	
Adj. Moisture Content (MC)	26.92	35.38	43.84	52.30	
Resistance Rdg. (ohm)	57	54	54	55	
Soil Resistivity (ohm-cm)	381	364	364	371	



Minimum Resistivity	Moisture Content	Sulfate Content	Chloride Content	Soil pH
DOT CA Test 532 / 643		DOT CA Test 417 Part	DOT CA Test	DOT CA Test 532/643
363	**38.5**	**764**	**733**	**7.76 @ 21.3 °C**

Figure C-1

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
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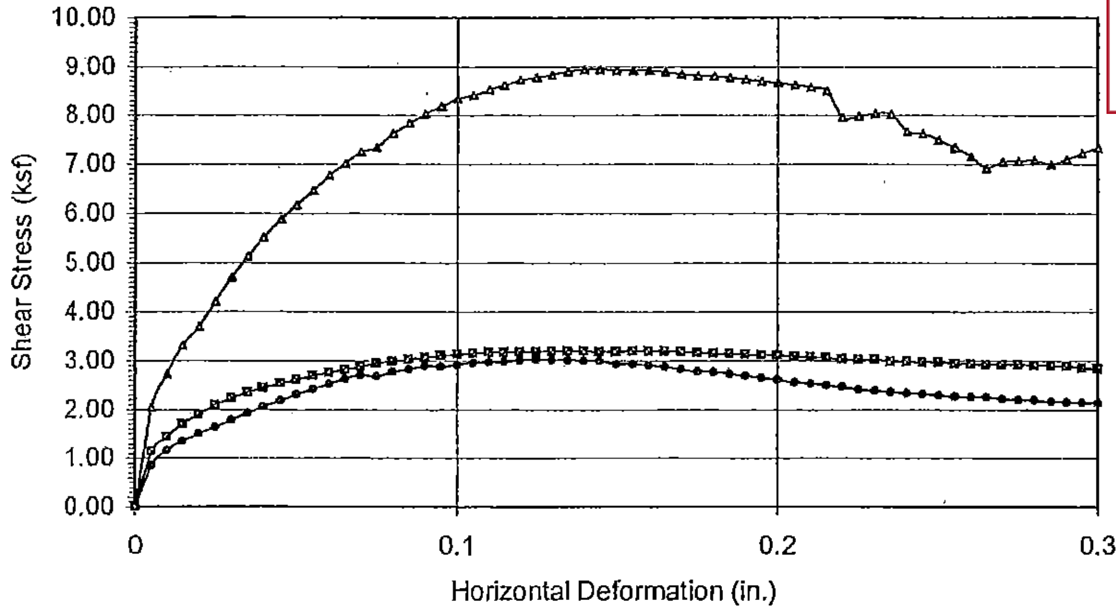
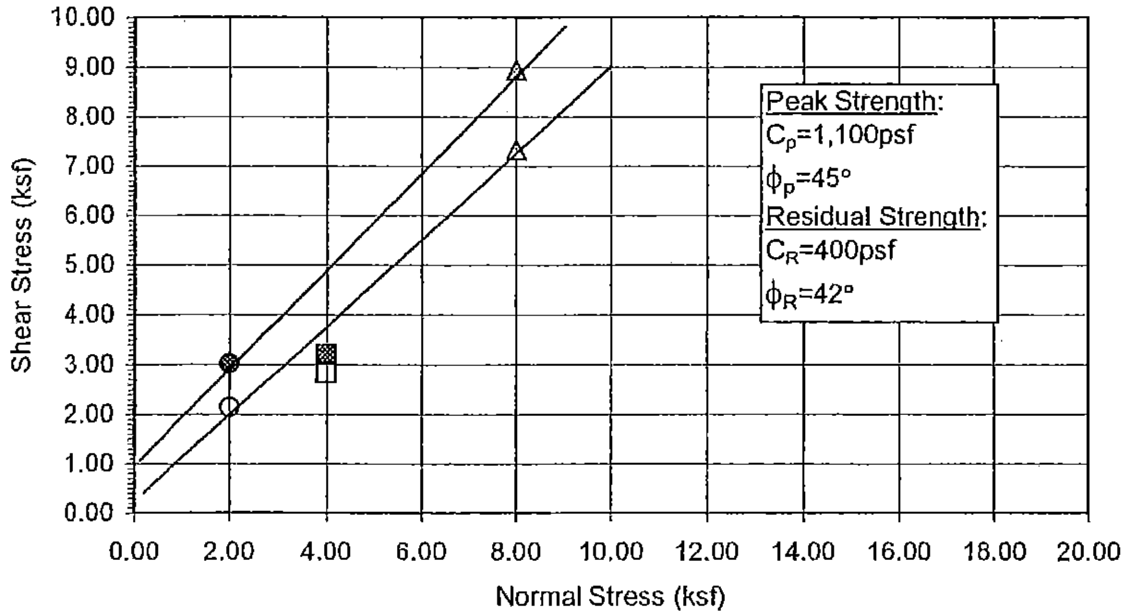
Hadi Tabatabaee
BUILDING OFFICIAL





Normal Stress (kip/ft²)	2.000	4.000	8.000
Peak Shear Stress (kip/ft²)	3.021	3.196	8.948
Shear Stress @ End of Test (ksf)	2.139	2.834	7.342
Deformation Rate (in./min.)	0.050	0.050	0.050
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	12.59	12.59	12.59
Dry Density (pcf)	120.2	120.3	123.3
Saturation (%)	84.5	84.6	92.6
Soil Height Before Shearing (in.)	0.9893	0.9839	0.9740
Final Moisture Content (%)	13.9	13.8	12.4

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Leighton Consulting, Inc.

Boring No.: B-3
Sample No.: R-1
Depth (ft) 5
Soil Description: Grayish Olive Brown Sandy Lean Clay (SC) with 1/2 to 3/4" Sandstone

Project No.: 600024-001

WRT / Dana Point

Figure C-2b 12-02

DS B-3 R-1@5

Leighton Consulting, Inc.

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	WRT / Dana Point	Tested By:	JHW	Date:	11/14/02
Project No. :	600024-001	Checked By:	FT	Date:	11/18/02
Boring No.:	B-1	Depth (ft.)	1-6		
Sample No. :	B-1				

Visual Sample Description: Brown Clayey Sand (SC)

Dry Wt. of Soil + Cont. (gm.)	1000.00
Wt. of Container No. (gm.)	0.00
Dry Wt. of Soil (gm.)	1000.00
Weight Soil Retained on #4 Sieve	0.00
Percent Passing # 4	100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0205
Wt. Comp. Soil + Mold (gm.)	624.80	441.80
Wt. of Mold (gm.)	206.10	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	0	0
Wet Wt. of Soil + Cont. (gm.)	843.70	647.90
Dry Wt. of Soil + Cont. (gm.)	781.90	594.10
Wt. of Container (gm.)	0.00	206.10
Moisture Content (%)	7.90	13.87
Wet Density (pcf)	126.3	130.6
Dry Density (pcf)	117.0	114.7
Void Ratio	0.440	0.470
Total Porosity	0.306	0.320
Pore Volume (cc)	63.3	67.5
Degree of Saturation (%) [S_{meas}]	**48.5**	79.7

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
11/14/02	16:37	1.0	0	0.0785
11/14/02	16:47	1.0	0	0.0780
Add Distilled Water to the Specimen				
11/15/02	8:22	1.0	0	0.0990
11/15/02	10:54	1.0	0	0.0990

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	21.0
Expansion Index (EI) $_{50}$	= $EI_{meas} - (50 - S_{meas})x((65+EI_{meas}) / (220-S_{meas}))$	**20**

Figure C-3b

Leighton Consulting, Inc.

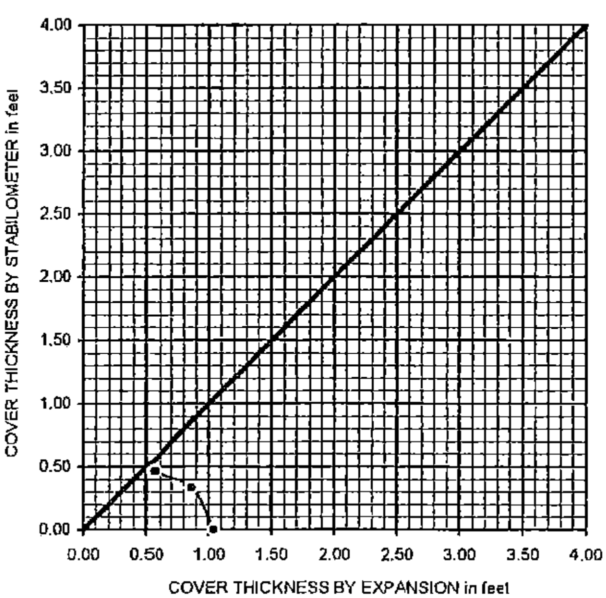
R-VALUE TEST RESULTS

PROJECT NAME:	WRT / Dana Point	PROJECT NUMBER:	600024-001
SAMPLE NUMBER:	B-1	SAMPLE LOCATION:	B-3 1-6'
SAMPLE DESCRIPTION:	Sandy Clay (CLS)	TECHNICIAN:	SCF
		DATE SAMPLED	11/6/2002

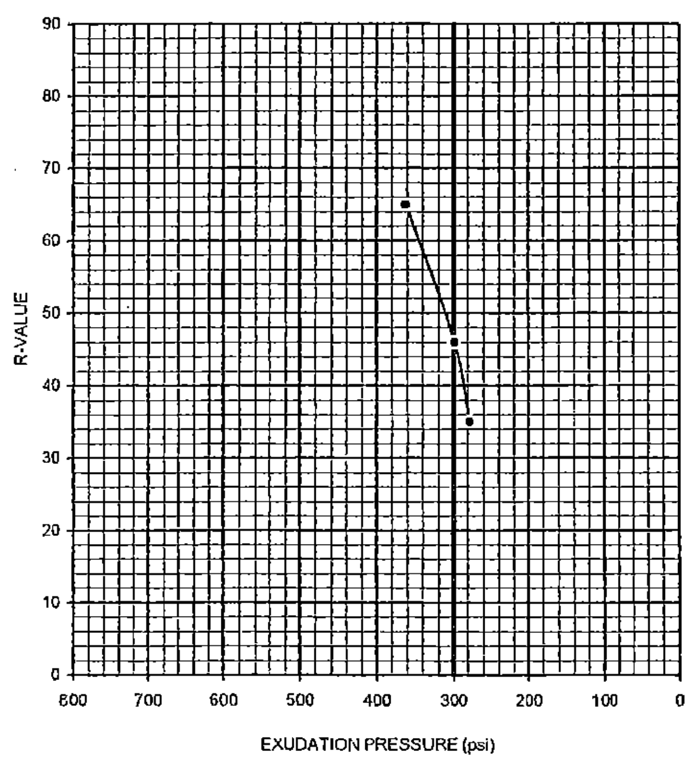
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	11.0	11.5	11.7
HEIGHT OF SAMPLE, Inches	2.47	2.49	2.47
DRY DENSITY, pcf	123.1	122.3	122.3
COMPACTOR AIR PRESSURE, psf	150	100	75
EXUDATION PRESSURE, psf	362	299	278
EXPANSION, Inches x 10exp-4	14	10	0
STABILITY Ph 2,000 lbs (160 psi)	43	68	86
TURNS DISPLACEMENT	3.70	3.91	4.02
R-VALUE UNCORRECTED	65	46	35
R-VALUE CORRECTED	65	46	35

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.56	0.86	1.04
EXPANSION PRESSURE THICKNESS, ft.	0.47	0.33	0.00

EXPANSION PRESSURE CHART



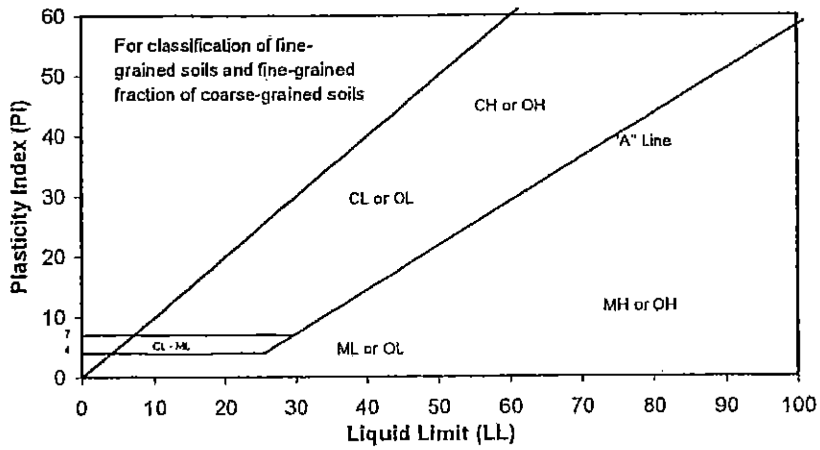
EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	69
R-VALUE BY EXUDATION:	46
EQUILIBRIUM R-VALUE:	46

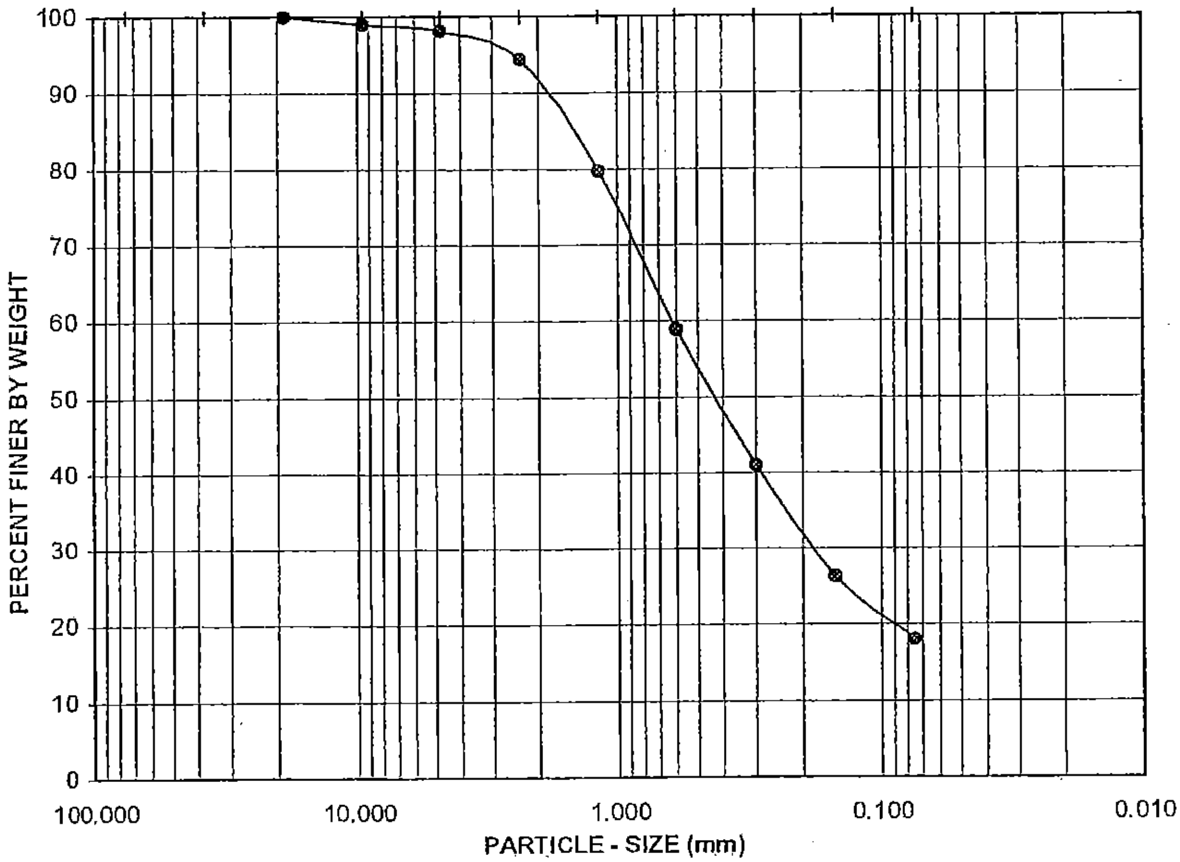
Figure C-4b

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245



GRAVEL		SAND			FINES
COARSE	FINE	CRSE	MEDIUM	FINE	SILT

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER



Boring No.:	Sample No.:	Depth (ft.):	Soil Type	GR:SA:FI	LL,PL,PI
B-3	R-2	6-10	(SC)	2 : 80 : 18	N/A

Project No.: 600024-001

WRT / Dana Point

Visual Sample Description:
Clayey Sand (SC)

ATTERBERG LIMITS, PARTICLE - SIZE CURVE
ASTM D 4318, D 422

Leighton Consulting, Inc.

Figure C-5 12-02

Sieve B-3, B-2@ 6_10

APPENDIX B - LABORATORY TESTING

Diaz•Yourman & Associates (DYA) selected soil samples to be tested and the tests to be performed on the selected samples. Laboratory testing was performed by Hushmand Associates, Inc. Laboratory data are summarized on the boring logs in Appendix A and presented on Plates B1 through B14. We have reviewed and concur with the test results and accept full responsibility for their use in our analysis. A summary of the geotechnical laboratory testing is presented in Table B1. Corrosion potential test results are summarized in Table B2.

Table B1 - LABORATORY TESTING SUMMARY

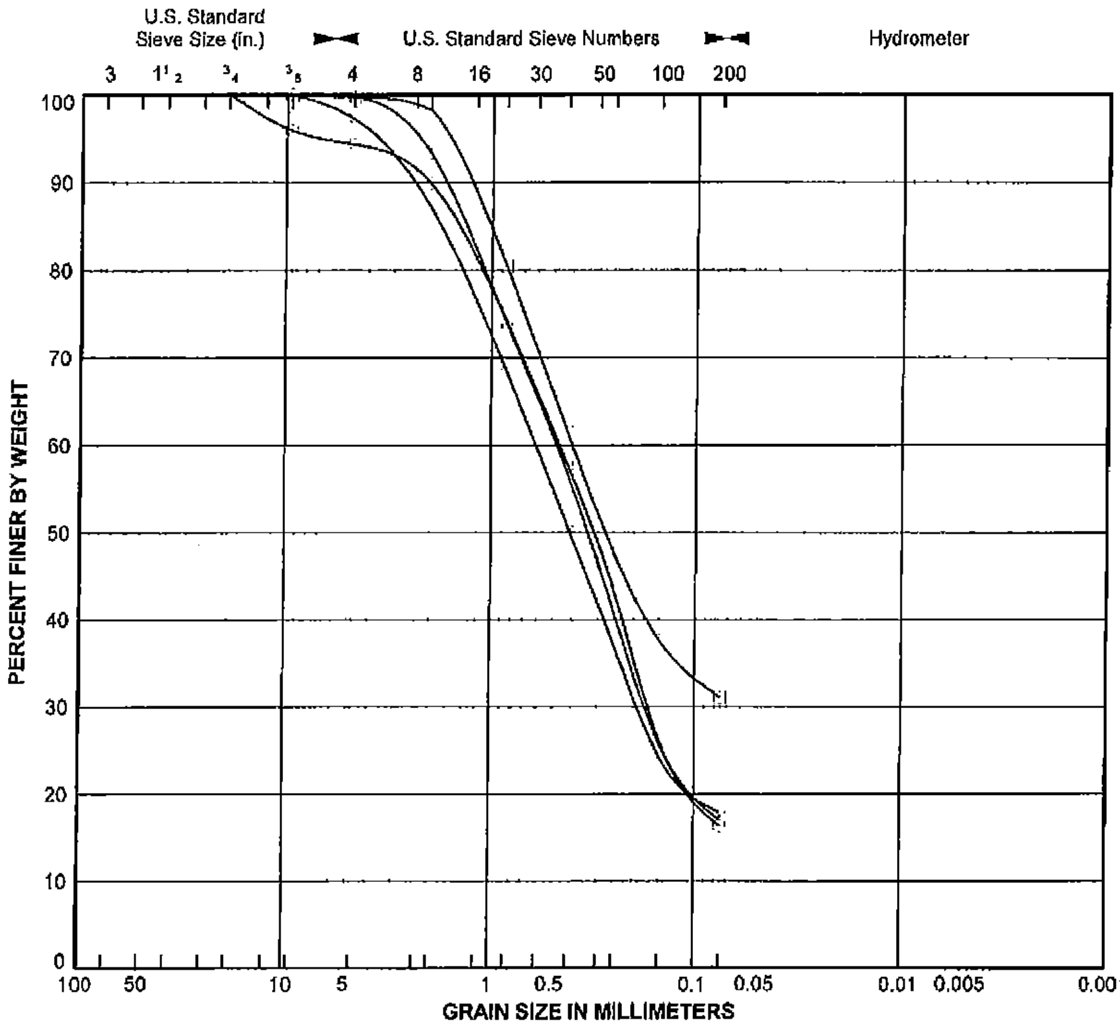
TEST NAME	PROCEDURE	PURPOSE	LOCATION
Percent Passing the No. 200 Sieve	ASTM D1140-92	Classification, index properties	Boring Logs
Moisture Content, Dry Density	ASTM D2216-92	Classification, index properties	Boring Logs
Grain-Size Distribution	ASTM D422-63	Classification, index properties	Plate B1
Atterberg Limits	ASTM D-4318-93	Expansion potential, classification, index properties	Plate B2
Direct Shear	ASTM D3080-90	Shear strength	Plates B3 and B4
Compaction	ASTM D1557-91	Earthwork	Plates B5 and B6
Resistance (R-) Value	ASTM D2844-69 CTM 301	Pavement thickness design	Plates B7 through B10
pH	CTM 532	Corrosion potential	Plates B11 through B14 and Table B2
Resistivity	CTM 532	Corrosion potential	Plates B11 through B14 and Table B2
Soluble Sulfates	CTM 417-B	Corrosion potential	Plates B11 through B14 and Table B2
Soluble Chlorides	CTM 422	Corrosion potential	Plates B11 through B14 and Table B2

Notes:
- ASTM = American Society for Testing and Materials
- CTM = Caltrans Test Method

Table B2 - CORROSION POTENTIAL TEST RESULTS

Boring No.	B-1	B-2	B-3	B-4
Depth (feet)	5	0-5	0-5	0-5
pH	7.52	9.26	7.35	7.41
Water Soluble Sulfate Content (ppm)	291	190	250	471
Water Soluble Chloride Content (ppm)	311	1387	702	2420
Minimum Resistivity/Moisture Content (ohms-cm / %)	666/24.5	341/34	511/34	179/28.6

Template: DY_SIEVE_WIN



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Laboratory Testing by: Hushmand Associates, Inc.

Symbol	Source	Depth (feet)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
	B- 1	5.0	SILTY SAND (SM)	17	NP	NP	16
	B- 2	3.0	SILTY SAND (SM)	10			31
	B- 3	2.5	SILTY SAND (SM)		NP	NP	17
	B- 4	2.0	CLAYEY SAND (SC)	8	30	10	18

PARTICLE SIZE ANALYSIS

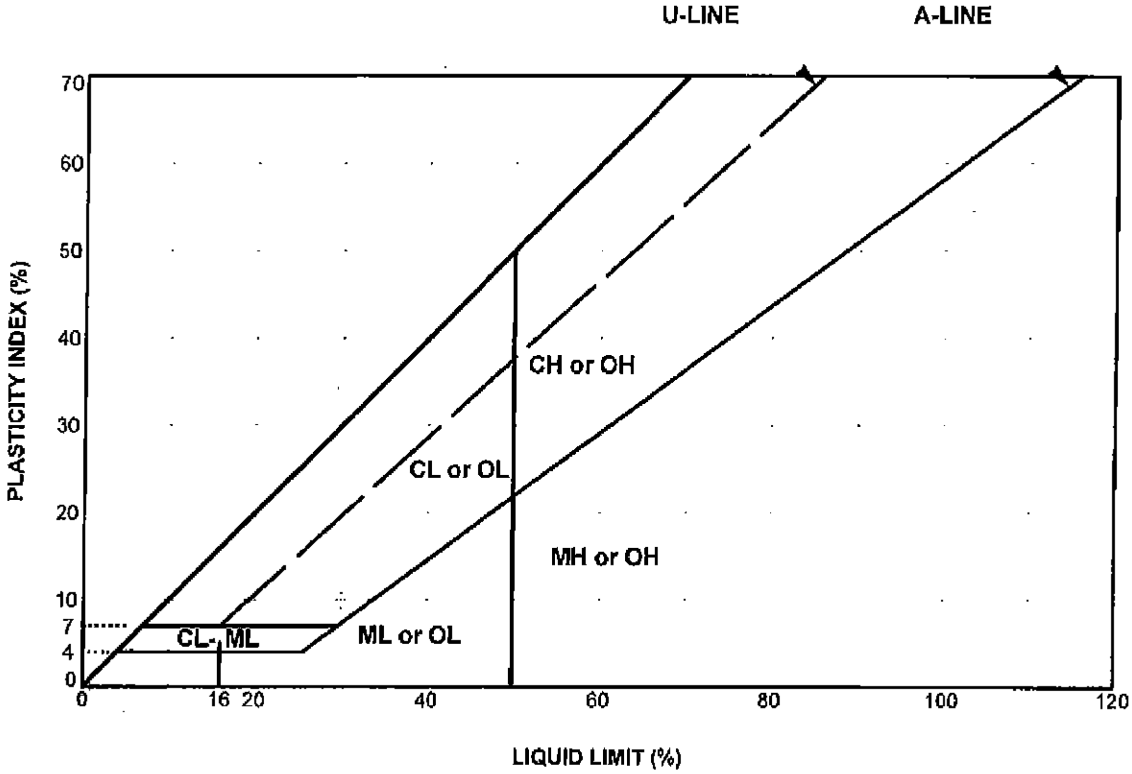
Dana Point Boat Launch

Project No. 2005-022

PLATE

B1

Template: DY_ATTERBERG_CHART_WIN



Laboratory Testing by: Hushmand Associates, Inc.

Symbol	Source	Depth (feet)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
	B- 1	5.0	SILTY SAND (SM)	17	NP	NP	NP	16
	B- 3	2.5	SILTY SAND (SM)		NP	NP	NP	17
	B- 4	2.0	CLAYEY SAND (SC)	8	30	20	10	18

PLASTICITY CHART

Dana Point Boat Launch
Project No. 2005-022

PLATE
B2

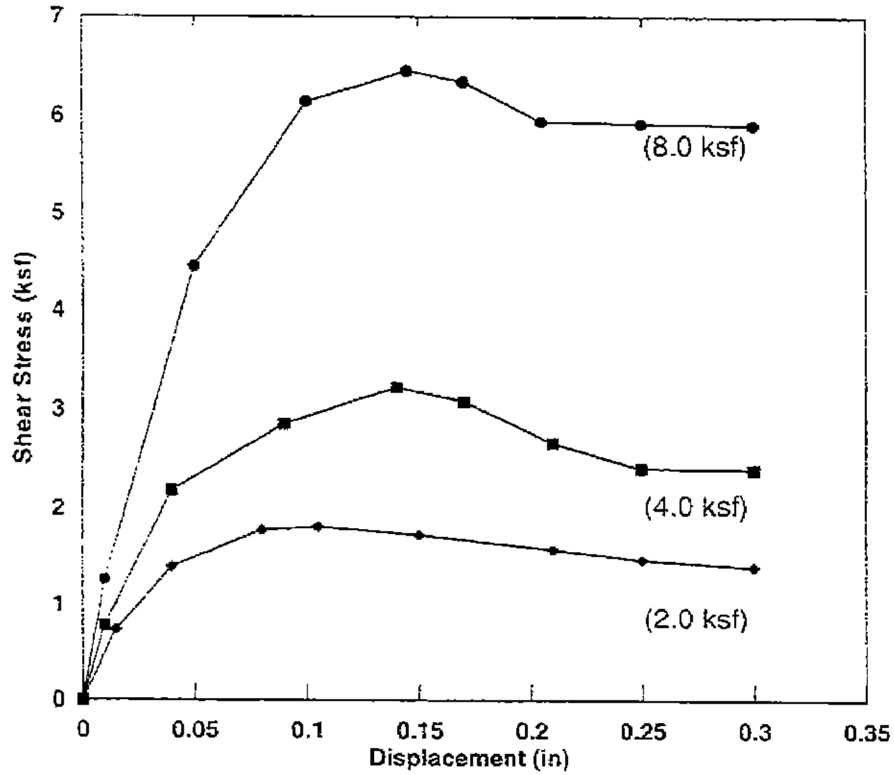
HAI **HUSHMAND ASSOCIATES, INC.**
Geotechnical and Earthquake Engineers

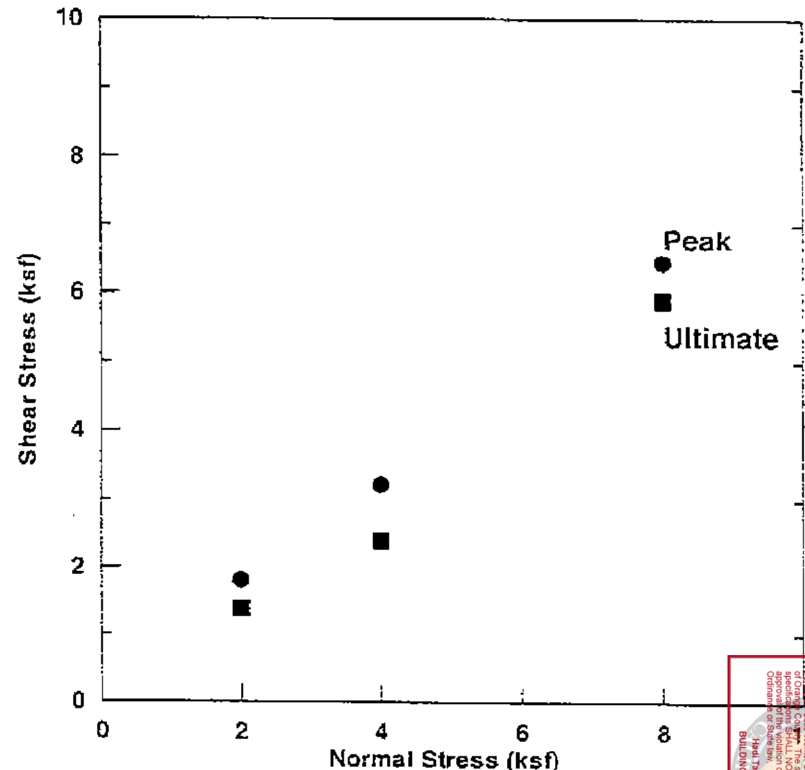
DIRECT SHEAR TEST
(ASTM D3080)

HAI Project No.: 03-0417
Tested by: PM
Checked by: JT
Date: 06/12/05

Client: Diaz Yourman & Associates
Project Name: Dana Point Boat Launch
Project Number: 2005-022
Boring No.: B 1 **Sample No.:** 1 **Depth:** 5'
Sample Description: Olive, Clayey Sand (SC)

Type of test: Consolidated, Drained.
Rate of Displacement: 0.002 in/min.





HAI **HUSHMAND ASSOCIATES, INC.**
Geotechnical and Earthquake Engineers

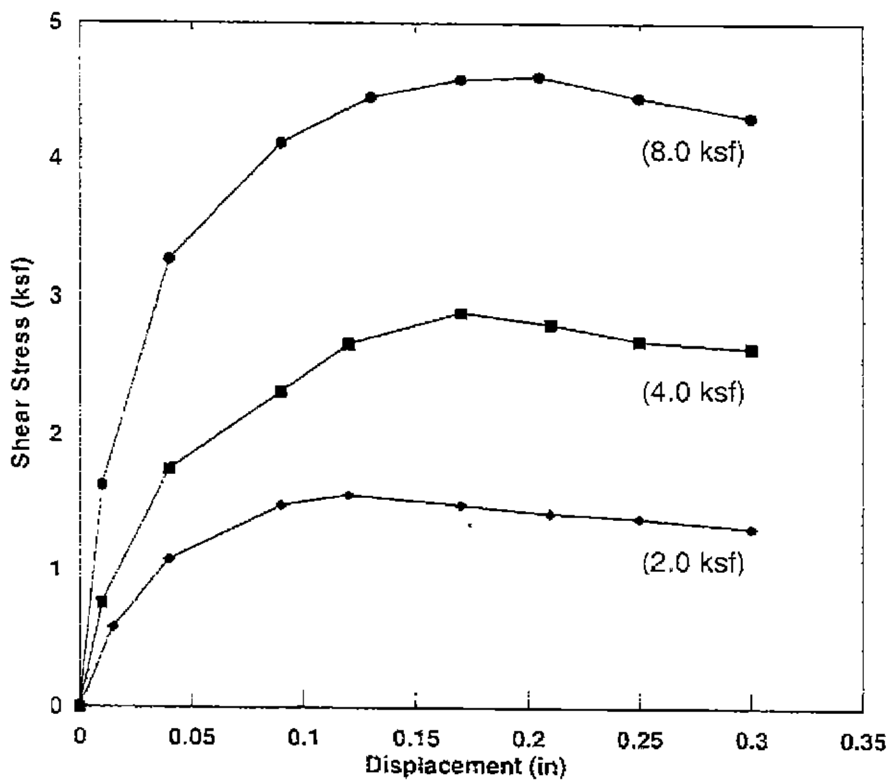
DIRECT SHEAR TEST
(ASTM D3080)

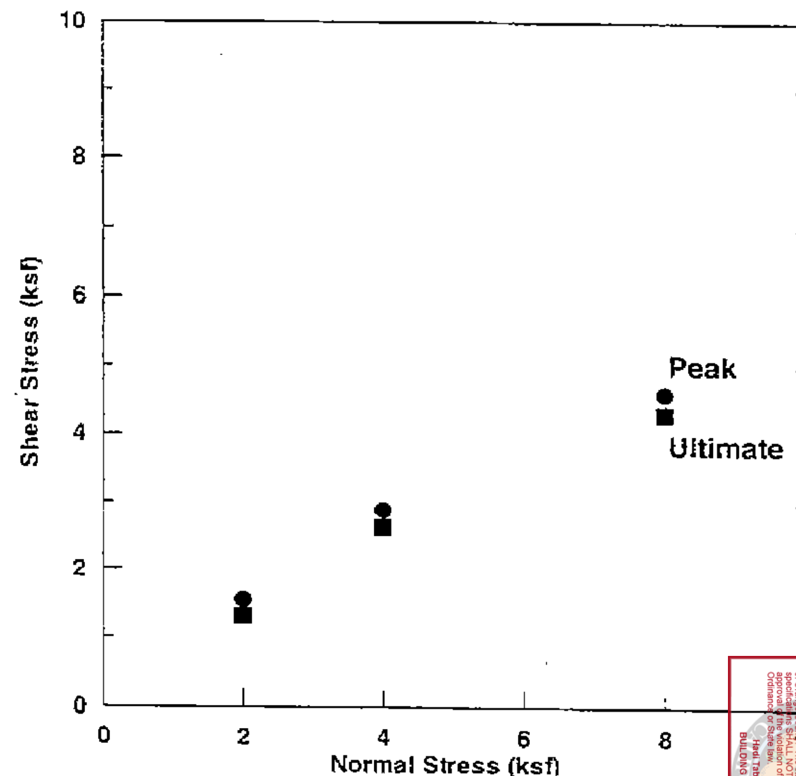
HAI Project No.: 03-0417
Tested by: PM
Checked by: JT
Date: 06/12/05

Client: Diaz Yourman & Associates
Project Name: Dana Point Boat Launch
Project Number: 2005-022

Boring No.: B 2 **Sample No.:** 2 **Depth:** 9'
Sample Description: Dark Olive, Clayey Sand (SC)

Type of test: Consolidated, Drained.
Rate of Displacement: 0.002 in/min.

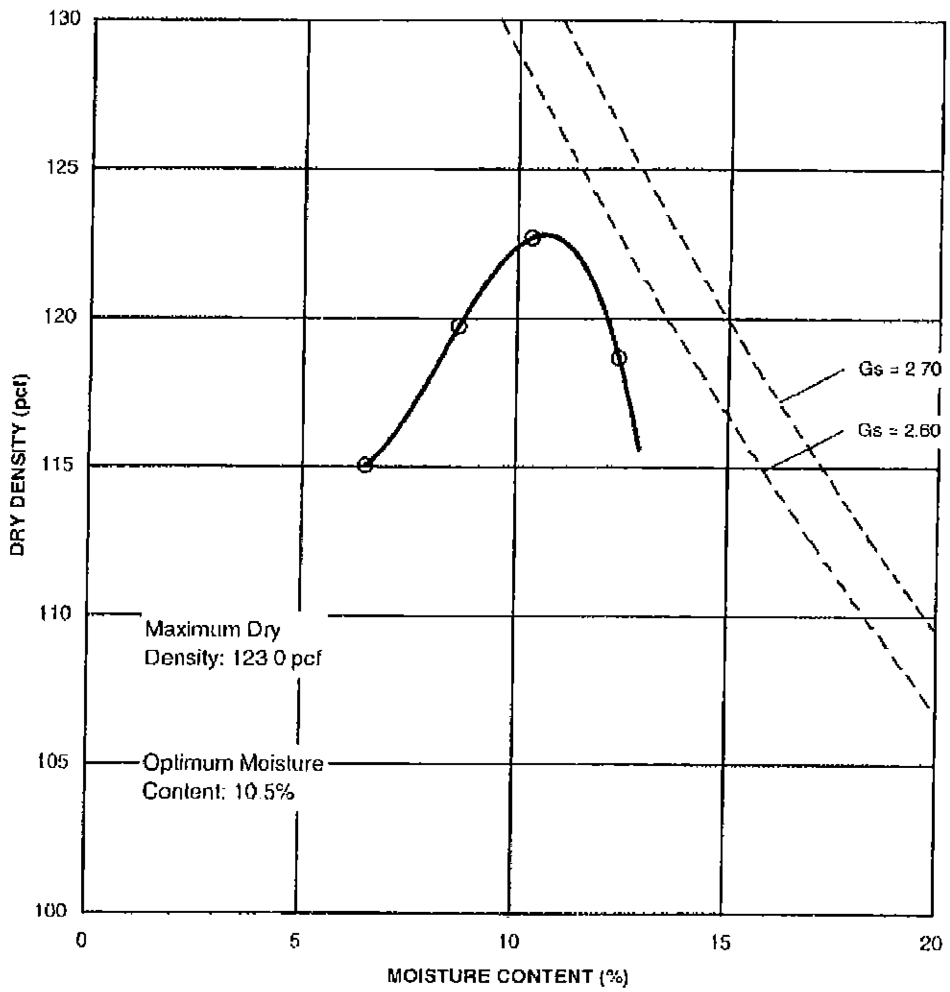




HAI **HUSHMAND ASSOCIATES, INC.**
Geotechnical and Earthquake Engineers

COMPACTION CURVE
ASTM D1557

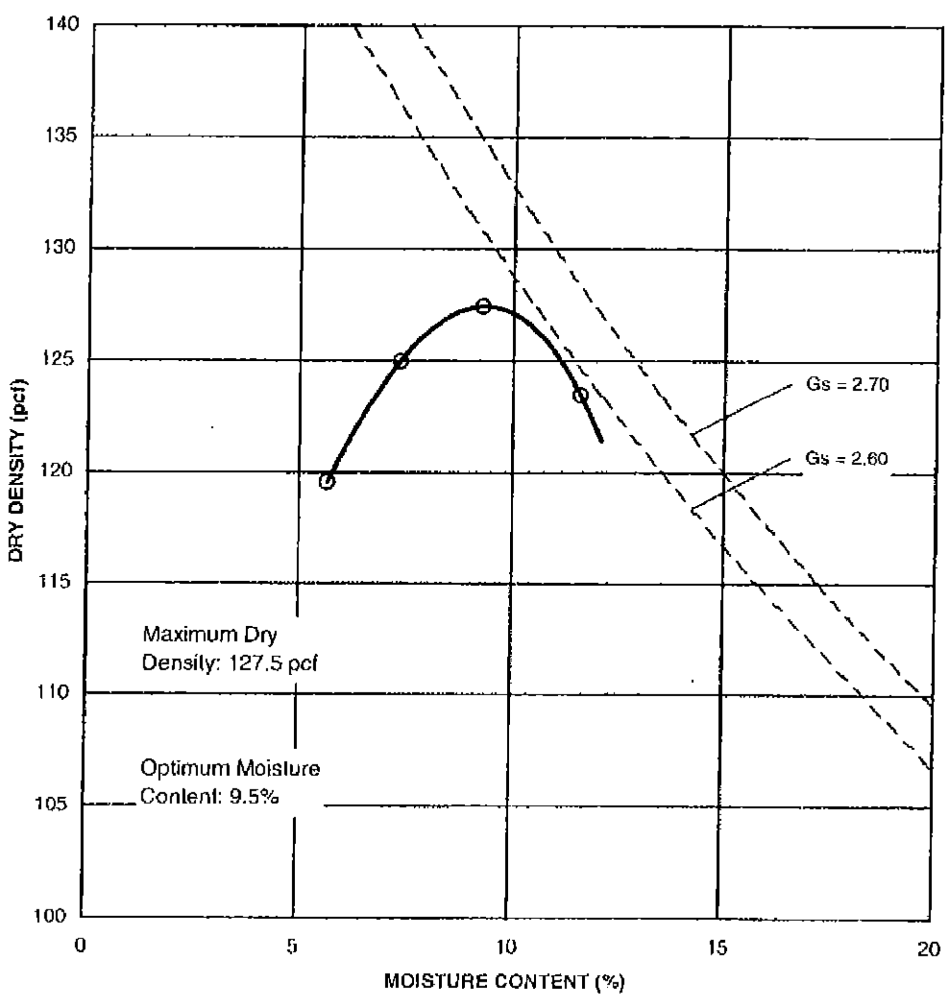
Client :	Diaz Yourman & Associates	***HAI Project No.:***	03-0417
Project Name:	Dana Point Boat Launch	***Tested by:***	PM
Project No.:	2005-022	***Checked by:***	JT
Boring No.:	B 3	***Date:***	6/11/2005
Sample No.:	Bulk ***Depth:*** ---	***Procedure:***	A
Soil Description:	Light Olive, Silty Sand (SM)	***Mold Size:***	4 in



HAI **HUSHMAND ASSOCIATES, INC.**
Geotechnical and Earthquake Engineers

COMPACTION CURVE ASTM D1557

Client :	Diaz Yourman & Associates	***HAI Project No.:***	03-0417
Project Name:	Dana Point Boat Launch	***Tested by:***	PM
Project No.:	2005-022	***Checked by:***	JT
Boring No.:	**B 4**	***Date:***	6/11/2005
Sample No.:	**Bulk** ***Depth:*** ---	***Procedure:***	A
Soil Description:	Light Olive, Clayey Sand (SC)	***Mold Size:***	4 in



R - VALUE DATA SHEET

P.N. 2005-022
Boat Launch

PROJECT NUMBER 32230 BORING NUMBER: B-2 Dana Point

SAMPLE DESCRIPTION: Brown Clayey Sand

Item	SPECIMEN		
	a	b	c
Mold Number	13	14	15
Water added, grams	52	37	31
Initial Test Water, %	13.9	12.6	12.0
Compact Gage Pressure,psi	150	285	350
Exudation Pressure, psi	216	351	484
Height Sample, Inches	2.54	2.56	2.49
Gross Weight Mold, grams	3199	3209	3185
Tare Weight Mold, grams	2089	2080	2076
Sample Wet Weight, grams	1110	1129	1109
Expansion, Inches x 10exp-4	21	43	48
Stability 2,000 lbs (160psi)	31 / 69	27 / 59	26 / 55
Turns Displacement	4.50	4.25	4.03
R-Value Uncorrected	42	50	54
R-Value Corrected	42	51	54
Dry Density, pcf	116.2	118.7	120.5
	DESIGN CALCULATION DATA		
Traffic Index Given:	12.0	12.0	12.0
G.E. by Stability	1.78	1.51	1.41
G. E. by Expansion	0.70	1.43	1.60

Equilibrium R-Value 48 by EXUDATION

Examined & Checked: 8 /26/ 05

REMARKS:
Gf = 1.25
1.1% Retained on the 3/4" sieve.

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 32230-R2
P.N. 2005-022

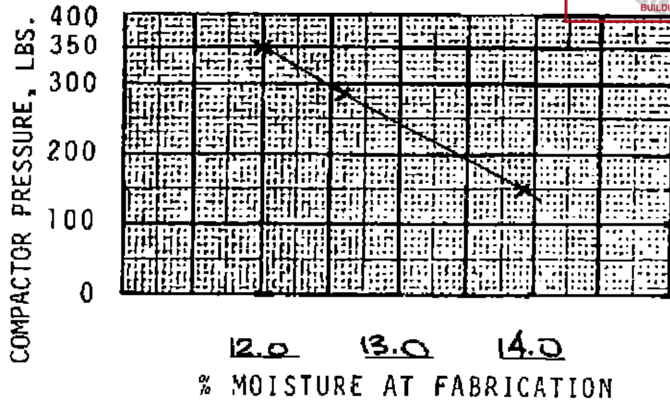
BORING NO. B-2 Dana Pt. Boat launch

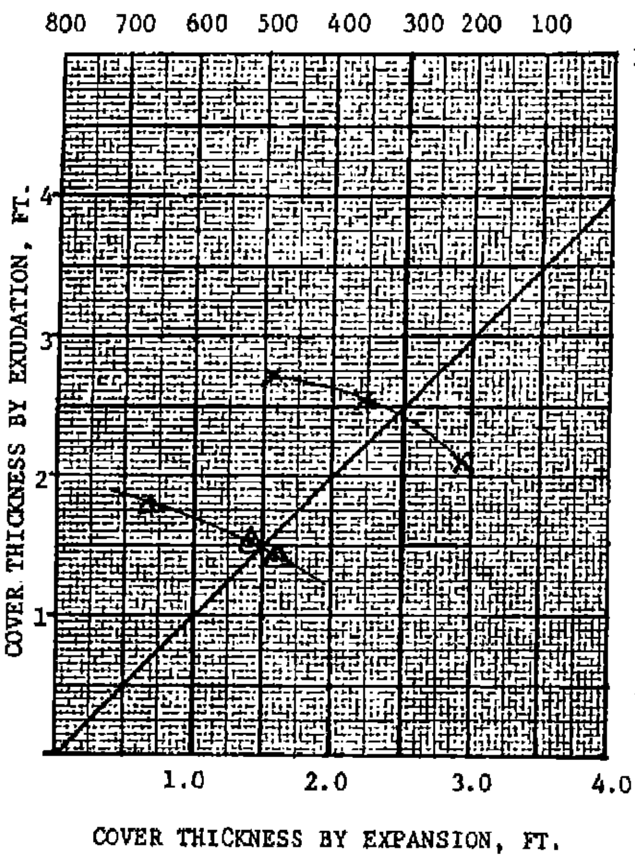
DATE 8.26.05

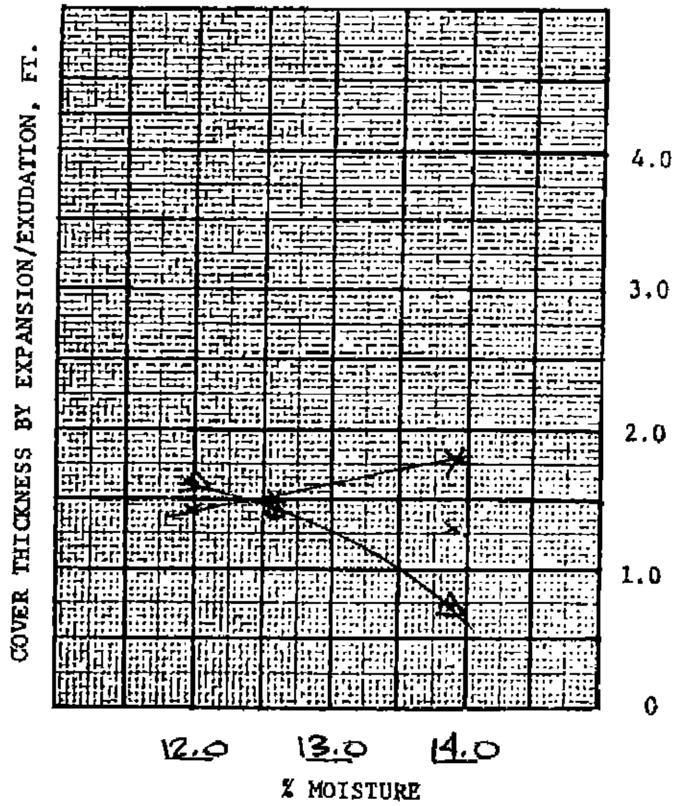
TRAFFIC INDEX Given 12.0

R-VALUE BY EXUDATION 48

R-VALUE BY EXPANSION ~







R-VALUE vs. EXUD. PRES. T by EXUDATION

EXUD. T vs. EXPAN. T T by EXPANSION

REMARKS

GE=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

R - VALUE DATA SHEET

P.N. 2005-022
Boat Launch

PROJECT NUMBER 32230 BORING NUMBER: B-3&4 Dana Point

SAMPLE DESCRIPTION: Brown Slightly Clayey Sand

Item	SPECIMEN a	SPECIMEN b	SPECIMEN c
Mold Number	10	11	12
Water added, grams	42	50	33
Initial Test Water, %	10.6	11.3	9.8
Compact Gage Pressure,psi	350	160	350
Exudation Pressure, psi	283	168	548
Height Sample, Inches	2.55	2.63	2.55
Gross Weight Mold, grams	3265	3269	3255
Tare Weight Mold, grams	2123	2101	2117
Sample Wet Weight, grams	1142	1168	1138
Expansion, Inches x 10exp-4	7	2	17
Stability 2,000 lbs (160psi)	20 / 39	26 / 51	17 / 33
Turns Displacement	4.16	4.53	4.11
R-Value Uncorrected	65	54	70
R-Value Corrected	65	58	70
Dry Density, pcf	122.7	120.9	123.2
DESIGN CALCULATION DATA			
Traffic Index Given:	12.0	12.0	12.0
G.E. by Stability	1.08	1.29	0.92
G. E. by Expansion	0.23	0.07	0.57

Equilibrium R-Value 66 by EXUDATION

Examined & Checked: 8 /26/ 05

REMARKS:
Gf = 1.25
0.0% Retained on the 3/4" sieve.

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 32230 P.N. 2005-022

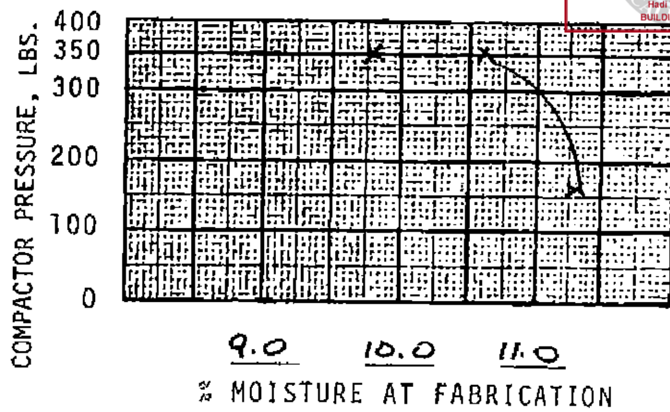
BORING NO. B-3 & 4 Dana Point Boat Launch

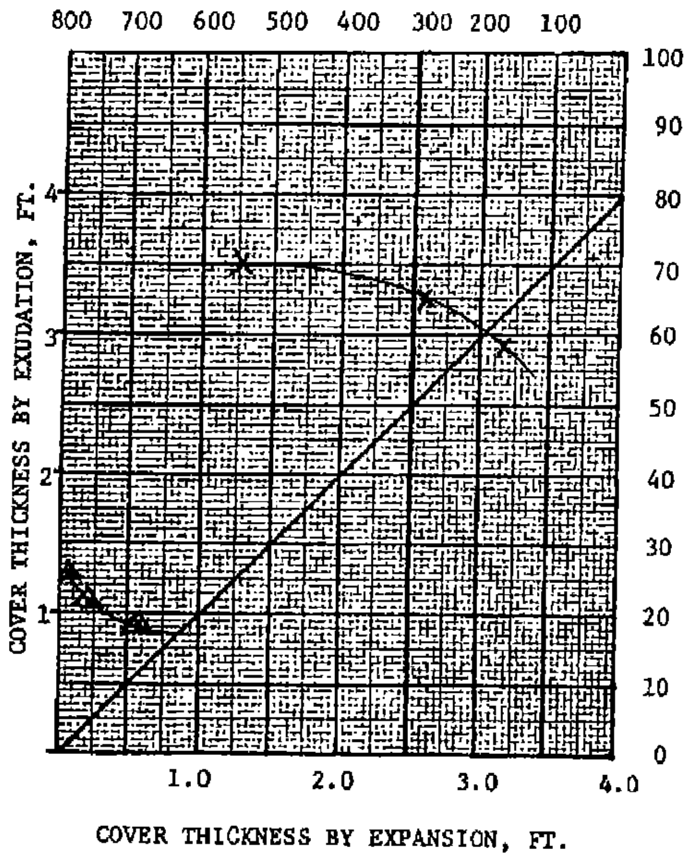
DATE 8-26-05

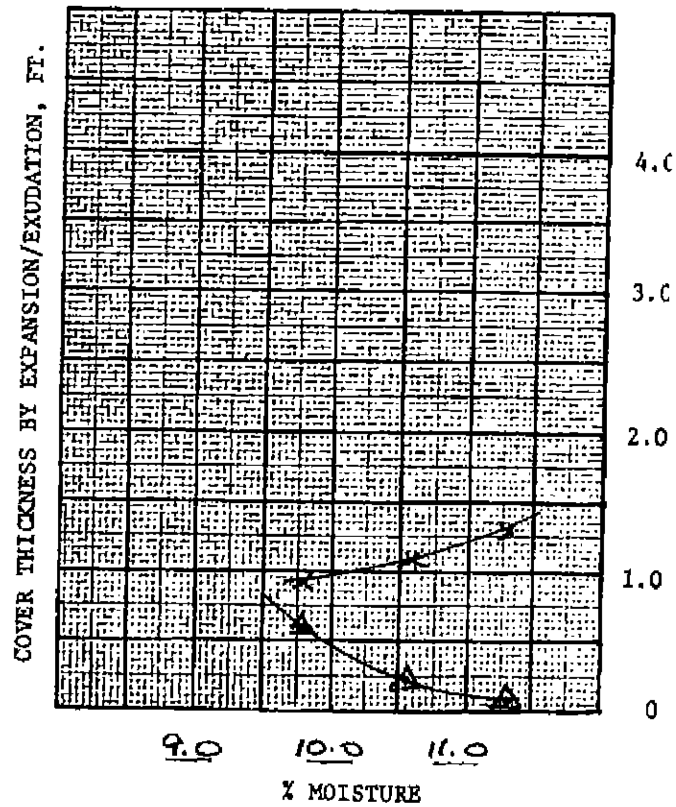
TRAFFIC INDEX Given 12.0

R-VALUE BY EXUDATION 66

R-VALUE BY EXPANSION —







R-VALUE vs. EXUD. PRES.

T by EXUDATION

EXUD. T vs. EXPAN. T

T by EXPANSION

REMARKS

GF=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

HAI HUSHMAND ASSOCIATES, INC.
Geotechnical and Earthquake Engineers

SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

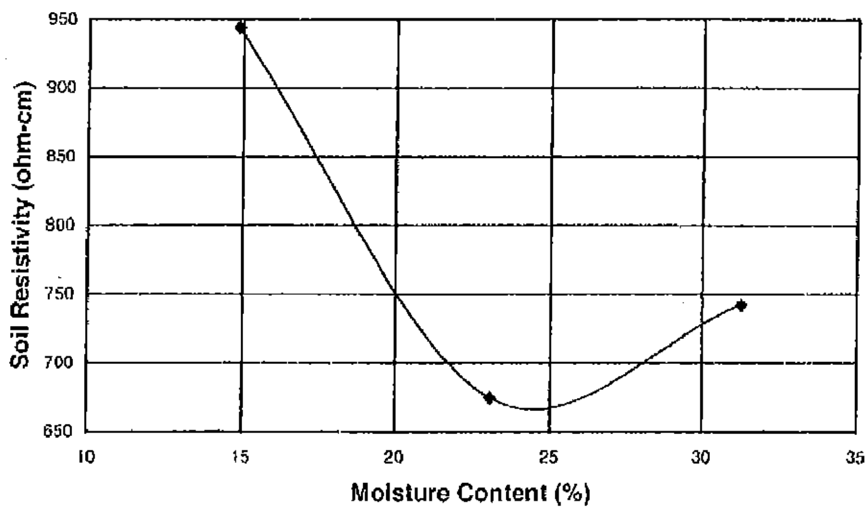
Client : Diaz Yourman & Associates
Project Name: Dana Point Boat Launch
Project No.: 2005-022
Boring No.: B 1
Sample No.: 1
Depth: 5'
Soil Description: Olive, Clayey Sand (SC)

HAI Project No.: 03-0417
Checked by: JT
Date: 6/15/2005

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	14.86	140	944
2	200	23.06	100	675
3	300	31.26	110	742
4				
5				

Moisture Content (%) (MCI)	6.65
Wet WT. of Soil + Cont. (g)	134.04
Dry Wt. of Soil + Cont. (g)	129.72
Wt. of Container (g)	64.78
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC=(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
666	24.5	291	311	7.52	22



HAI HUSHMAND ASSOCIATES, INC.
Geotechnical and Earthquake Engineers

SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

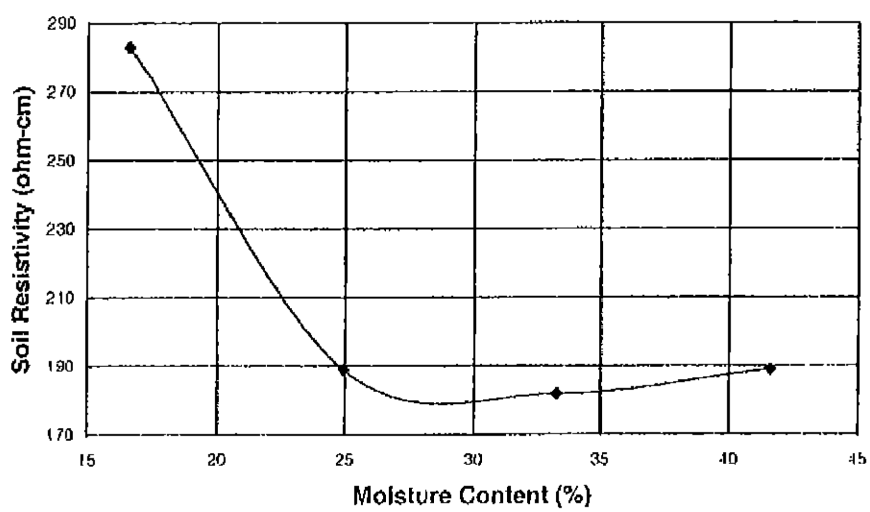
Client : Diaz Yourman & Associates
Project Name: Dana Point Boat Launch
Project No.: 2005-022
Boring No.: B 4
Sample No.: Bulk
Depth: --
Soil Description: Light Brown, Clayey Sand (SC)

HAI Project No.: 03-0417
Checked by: JT
Date: 6/15/2005

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	16.60	42	283
2	200	24.93	28	189
3	300	33.26	27	182
4	400	41.59	28	189
5				

Moisture Content (%) (MCI)	8.28
Wet WT. of Soil + Cont. (g)	108.62
Dry Wt. of Soil + Cont. (g)	105.31
Wt. of Container (g)	65.31
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC=(((1+Mcl/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
179	28.6	471	2420	7.41	21.8



HAI HUSHMAND ASSOCIATES, INC.
Geotechnical and Earthquake Engineers

SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

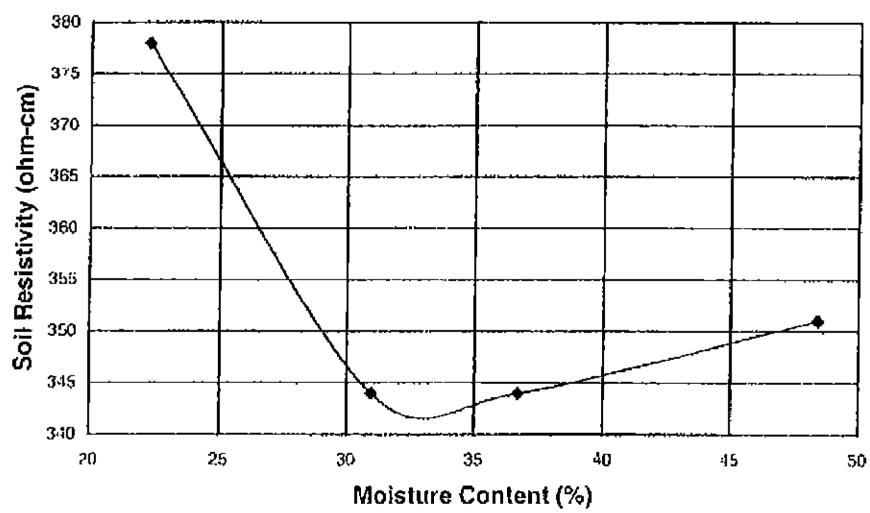
Client : Diaz Yourman & Associates
Project Name: Dana Point Boat Launch
Project No.: 2005-022
Boring No.: B 2
Sample No.: Bulk
Depth: --
Soil Description: Light Brown, Clayey Sand (SC)

HAI Project No.: 03-0417
Checked by: JT
Date: 6/15/2005

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	22.22	56	378
2	200	30.96	51	344
3	300	36.69	51	344
4	400	48.42	52	351
5				

Moisture Content (%) (MCi)	13.49
Wet WT. of Soil + Cont. (g)	168.04
Dry Wt. of Soil + Cont. (g)	152.52
Wt. of Container (g)	37.51
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC=(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
341	**34**	**190**	**1387**	**9.26**	**21.9**



HAI **HUSHMAND ASSOCIATES, INC.**
Geotechnical and Earthquake Engineers

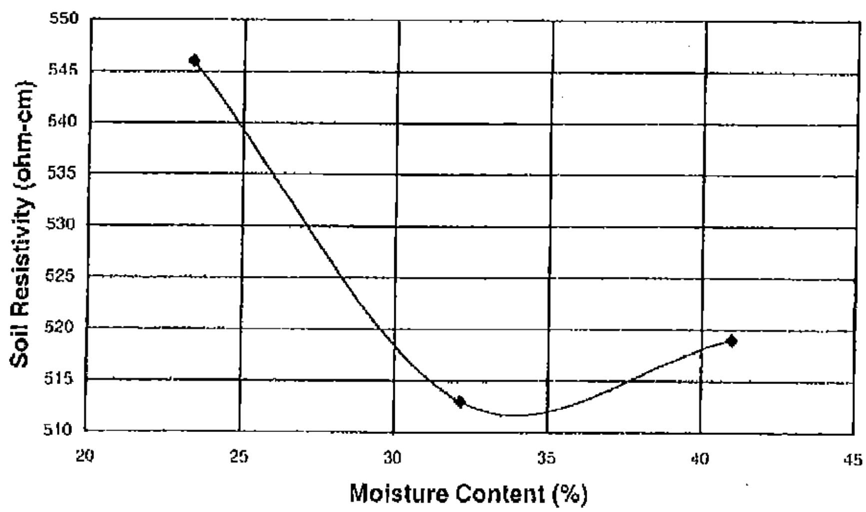
SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

Client :	Diaz Yourman & Associates	***HAI Project No.:***	03-0417
Project Name:	Dana Point Boat Launch		
Project No.:	2005-022	***Checked by:***	JT
Boring No.:	B 3	***Date:***	6/15/2005
Sample No.:	Bulk		
Depth:	--		
Soil Description:	Light Brown, Silty Sand (SM)		

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	23.35	81	546
2	200	32.17	76	513
3	300	40.98	77	519
4				
5				

Moisture Content (%) (MCi)	14.54
Wet WT. of Soil + Cont. (g)	168.63
Dry Wt. of Soil + Cont. (g)	155.57
Wt. of Container (g)	65.77
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC=(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
511	34	250	702	7.35	21.8



Boring No.	B-5	B-6	B-6	B-6	B-7	B-8		
Sample No.	R-3	R-3	S-2	R-5	S-3	S-2		
Depth (ft.)	15	7.5	20	25	30	20		
Sample Type	Drive	Drive	SPT	Drive	SPT	SPT		
Soil Identification	Olive gray (SM)	Grayish brown (SM)	Pale olive (SP-SC)	Gray (SP)	Pale olive (SC)	Light olive gray (SC)		
Moisture Correction								
Wet Weight of Soil + Container (g)	0.00	0.00	0.00	0.00	0.00	0.00		
Dry Weight of Soil + Container (g)	0.00	0.00	0.00	0.00	0.00	0.00		
Weight of Container (g)	1.00	1.00	1.00	1.00	1.00	1.00		
Moisture Content (%)	0.00	0.00	0.00	0.00	0.00	0.00		
Sample Dry Weight Determination								
Weight of Sample + Container (g)	412.50	451.70	740.70	414.80	766.40	561.50		
Weight of Container (g)	144.80	137.70	110.80	140.20	108.40	108.70		
Weight of Dry Sample (g)	267.70	314.00	629.90	274.60	658.00	452.80		
Container No.:								
After Wash								
Method (A or B)	B	B	B	B	B	B		
Dry Weight of Sample + Cont. (g)	376.10	405.00	702.70	411.00	687.10	473.00		
Weight of Container (g)	144.80	137.70	110.80	140.20	108.40	108.70		
Dry Weight of Sample (g)	231.30	267.30	591.90	270.80	578.70	364.30		
% Passing No. 200 Sieve	**13.6**	**14.9**	**6.0**	**1.4**	**12.1**	**19.5**		
% Retained No. 200 Sieve	86.4	85.1	94.0	98.6	87.9	80.5		

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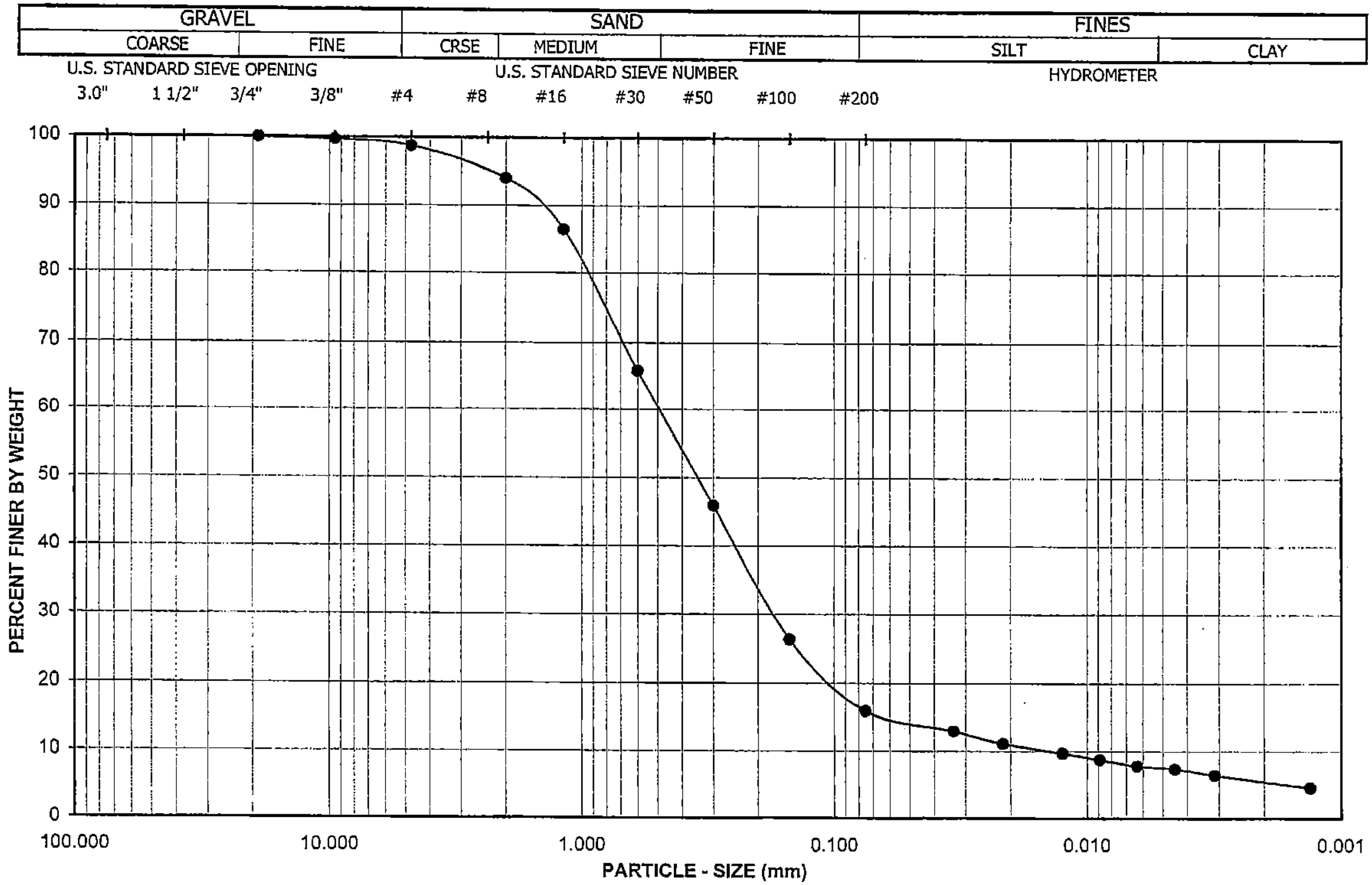
PERCENT PASSING
No. 200 SIEVE
ASTM D 1140

Project Name: Dana Point Harbor Renovation
Project No.: 600024-004
Client Name: LCI / Irvine
Tested By: A. Santos Date: 11/15/07



Project Name: Dana Point Harbor Renovation

Project No.: 600024-004

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 422

Exploration No.: B-8 Sample No.: R-4

Depth (feet) : 15.0 Soil Type : SM

Soil Identification: Pale olive silty sand (SM)

GR:SA:FI : (%) 1 : 83 : 16

Leighton

ATTERBERG LIMITS

ASTM D 4318

Project Name:	Dana Point Harbor Renovation	Tested By:	A. Santos	Date:	11/28/07
Project No. :	600024-004	Input By:	LF	Date:	11/29/07
Boring No.:	B-8	Checked By:	LF		
Sample No.:	R-2	Depth (ft.)	5.0		
Soil Identification:	Brownish gray sandy lean clay s(CL)				

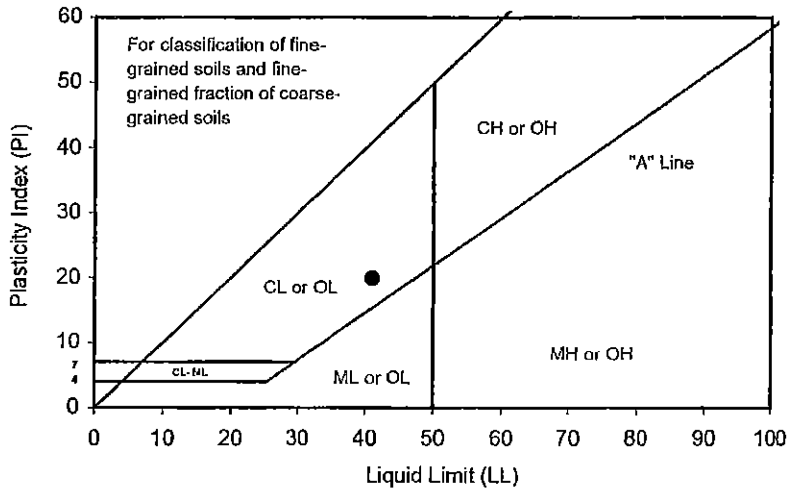
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			27	19	13	
Wet Wt. of Soil + Cont. (g)	9.81	9.17	18.38	18.91	19.88	
Dry Wt. of Soil + Cont. (g)	8.29	7.76	13.37	13.56	13.98	
Wt. of Container (g)	1.10	1.04	1.08	1.08	1.04	
Moisture Content (%) [Wn]	21.14	20.98	40.76	42.87	45.60	

Liquid Limit	**41**
Plastic Limit	**21**
Plasticity Index	**20**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) | 15.33

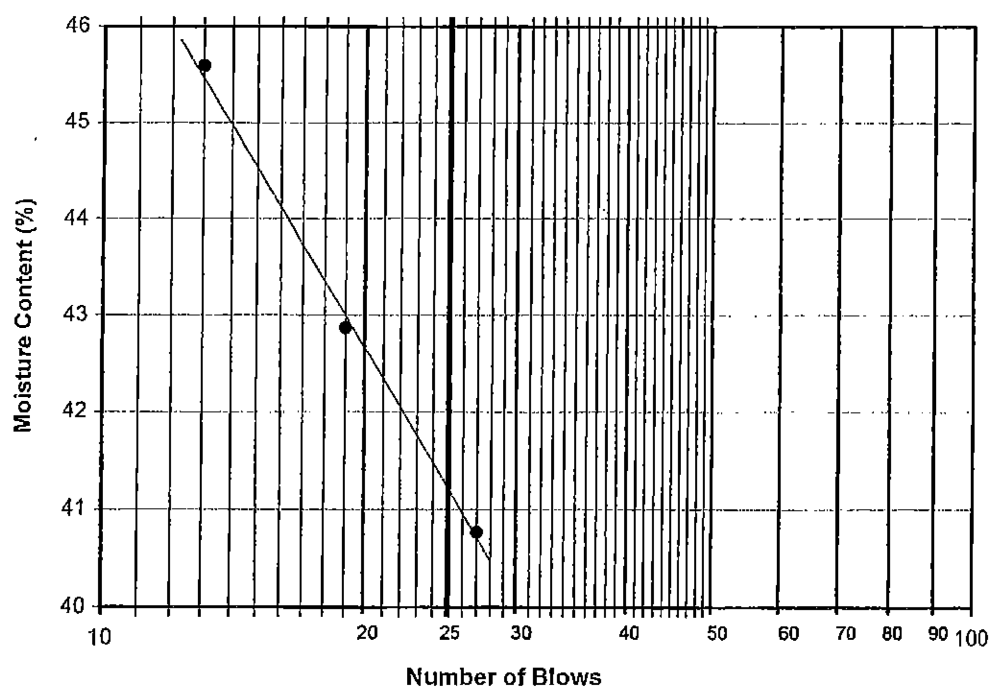
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.12}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [x] Dry Preparation
  Multipoint - Dry
- [x] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



Leighton

ATTERBERG LIMITS

ASTM D 4318

Project Name:	Dana Point Harbor Renovation	Tested By:	V. Juliano	Date:	11/27/07
Project No. :	600024-004	Input By:	LF	Date:	11/28/07
Boring No.:	B-8	Checked By:	LF		
Sample No.:	R-3	Depth (ft.)	7.5		
Soil Identification:	Grayish brown lean clay (CL)				

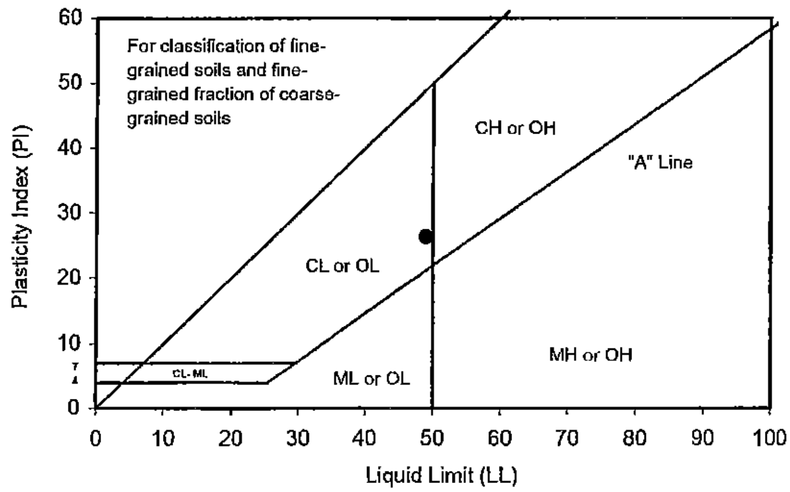
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			30	23	16	
Wet Wt. of Soil + Cont. (g)	11.66	12.08	14.54	15.00	16.69	
Dry Wt. of Soil + Cont. (g)	9.70	10.04	10.13	10.38	11.40	
Wt. of Container (g)	1.02	1.06	1.06	1.05	1.07	
Moisture Content (%) [Wn]	22.58	22.72	48.62	49.52	51.21	

Liquid Limit	**49**
Plastic Limit	**23**
Plasticity Index	**26**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) | 21.17 |

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.12}$



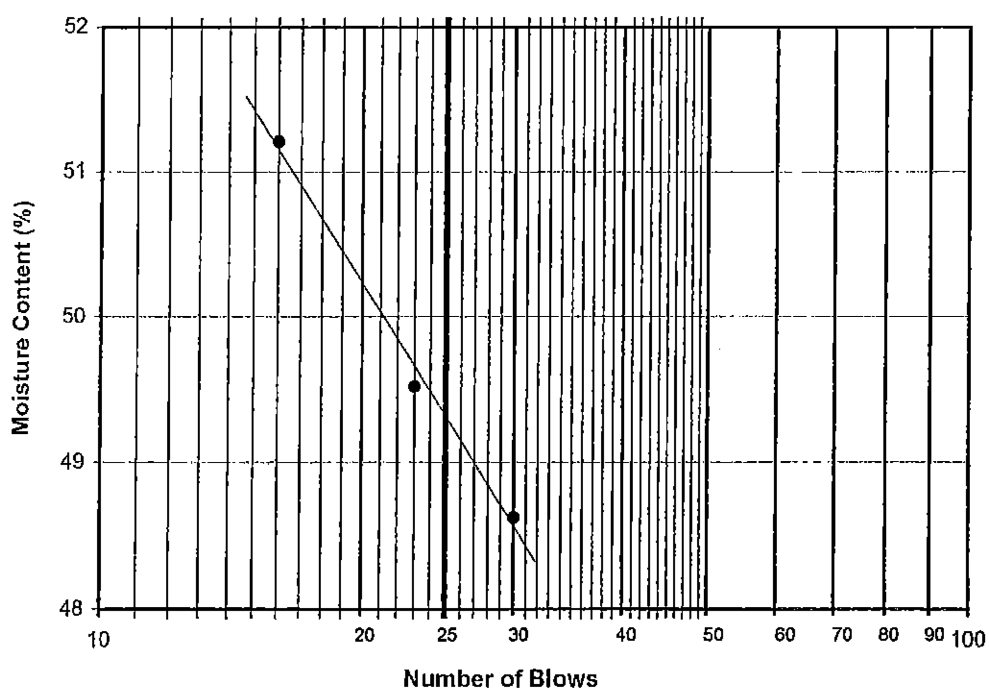
PROCEDURES USED

[ ] Wet Preparation
Multipoint - Wet

[X] Dry Preparation
Multipoint - Dry

[X] Procedure A
Multipoint Test

[ ] Procedure B
One-point Test



Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Dana Point Harbor Renovation	Tested By:	G. Berdy	Date:	11/14/07
Project No. :	600024-004	Checked By:	LF	Date:	11/20/07
Boring No.:	B-8	Depth (ft.)	0-5		
Sample No. :	Bag-1				
Soil Identification:	Olive clayey sand (SC)				

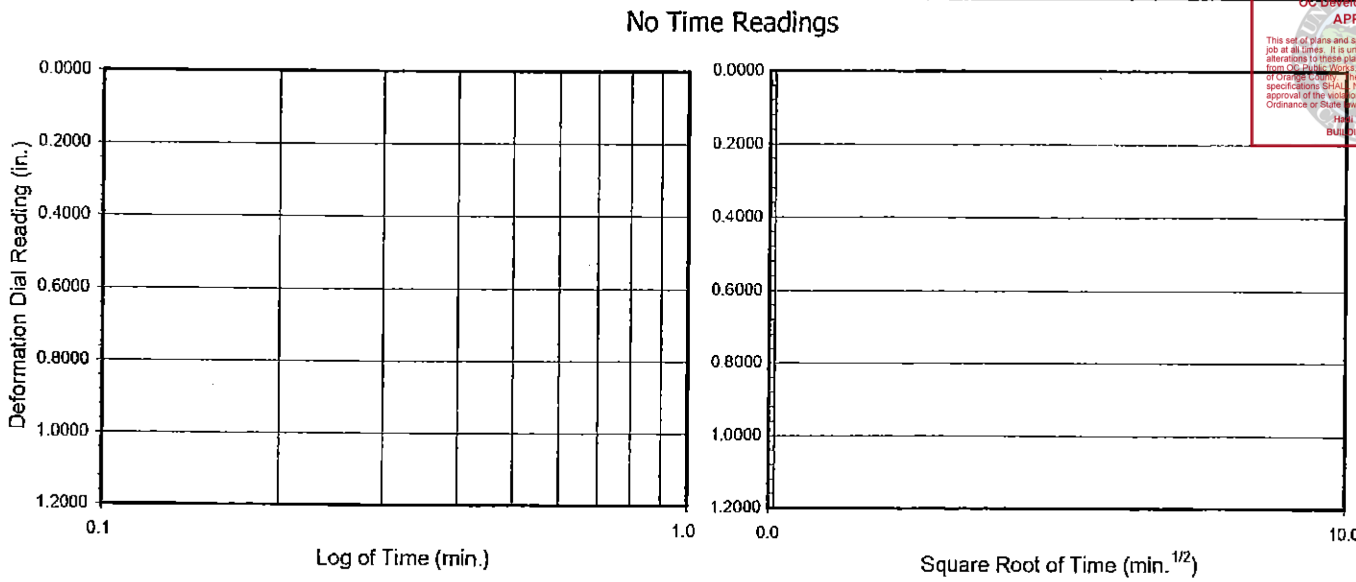
Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

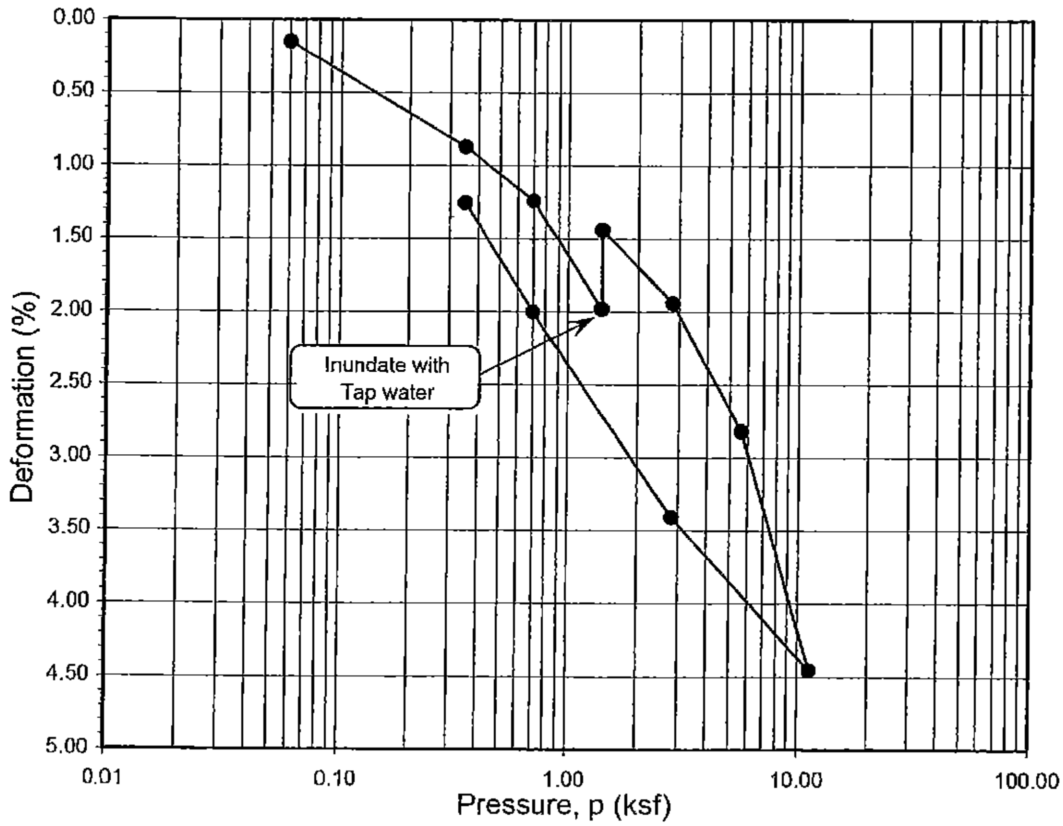
MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0420
Wt. Comp. Soil + Mold	(g)	586.40	421.30
Wt. of Mold	(g)	204.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	741.90	626.10
Dry Wt. of Soil + Cont.	(g)	656.60	542.50
Wt. of Container	(g)	0.00	204.80
Moisture Content	(%)	12.99	24.76
Wet Density	(pcf)	115.1	122.0
Dry Density	(pcf)	101.9	97.8
Void Ratio		0.655	0.724
Total Porosity		0.396	0.420
Pore Volume	(cc)	81.9	90.6
Degree of Saturation (%) [S_{meas}]		**53.6**	92.3

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
11/14/07	13:39	1.0	0	0.2400
11/14/07	13:49	1.0	10	0.2395
Add Distilled Water to the Specimen				
11/14/07	13:54	1.0	5	0.2450
11/15/07	7:29	1.0	1060	0.2820
11/15/07	8:33	1.0	1124	0.2820

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	42.5
Expansion Index (EI)$_{50}$	= EI_{meas} - (50 - S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**45**

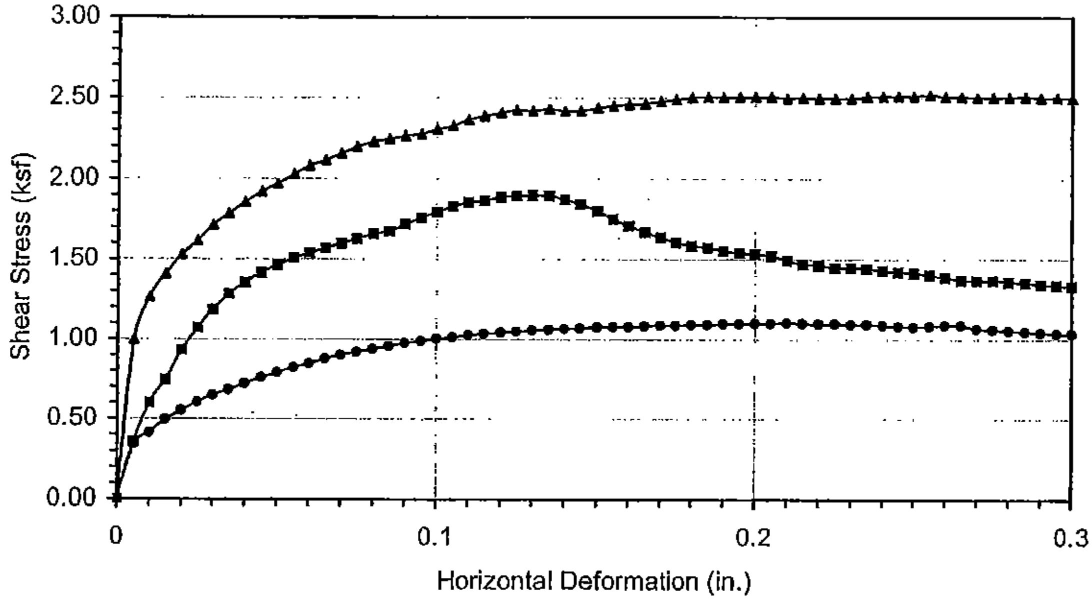


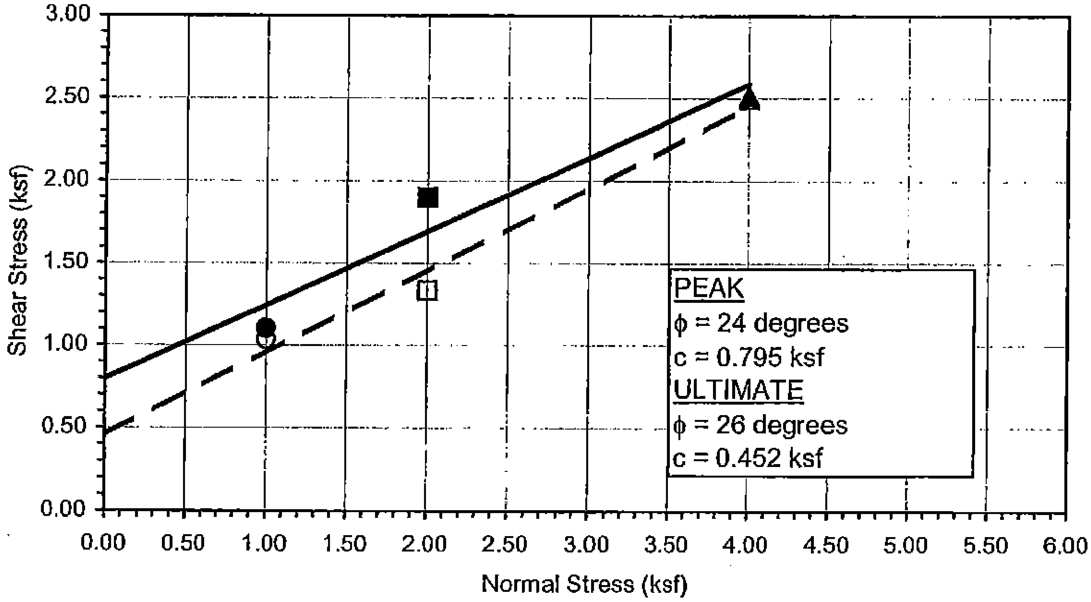


Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-8	**R-3**	**7.5**	**25.7**	**25.3**	**99.1**	**101.0**	**0.700**	**0.679**	**99**	**100**

Soil Identification: Grayish brown lean clay (CL)

Leighton	**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS** **(ASTM D 2435)**	Project No.: 600024-004 Dana Point Harbor Renovation 11-07





Boring No.	**B-8**
Sample No.	**R-2**
Depth (ft)	**5**
Sample Type: Drive	
Soil Identification: Brownish gray sandy lean clay s(CL)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.103	■ 1.899	▲ 2.515
Shear Stress @ End of Test (ksf)	○ 1.034	□ 1.333	△ 2.496
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	23.79	23.79	23.79
Dry Density (pcf)	97.1	101.1	101.0
Saturation (%)	87.3	96.2	95.9
Soil Height Before Shearing (in.)	0.9997	0.9858	0.9604
Final Moisture Content (%)	27.6	25.6	22.0

Leighton

DIRECT SHEAR TEST RESULTS
Consolidated Undrained

Project No.: 600024-004

Dana Point Harbor Renovation

11-07

Leighton

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

ASTM D 2850

Project Name:	Dana Point Harbor Renovation	Tested by:	ACS	Date:	11/26/07
Project No:	600024-004	Checked by:	LF	Date:	11/28/07
Boring No.:	B-6	Sample Type:		Drive	
Sample No.:	R-4	Depth(ft):	15		
Sample Description:	Pale olive poorly graded sand with clay (SP-SC)				

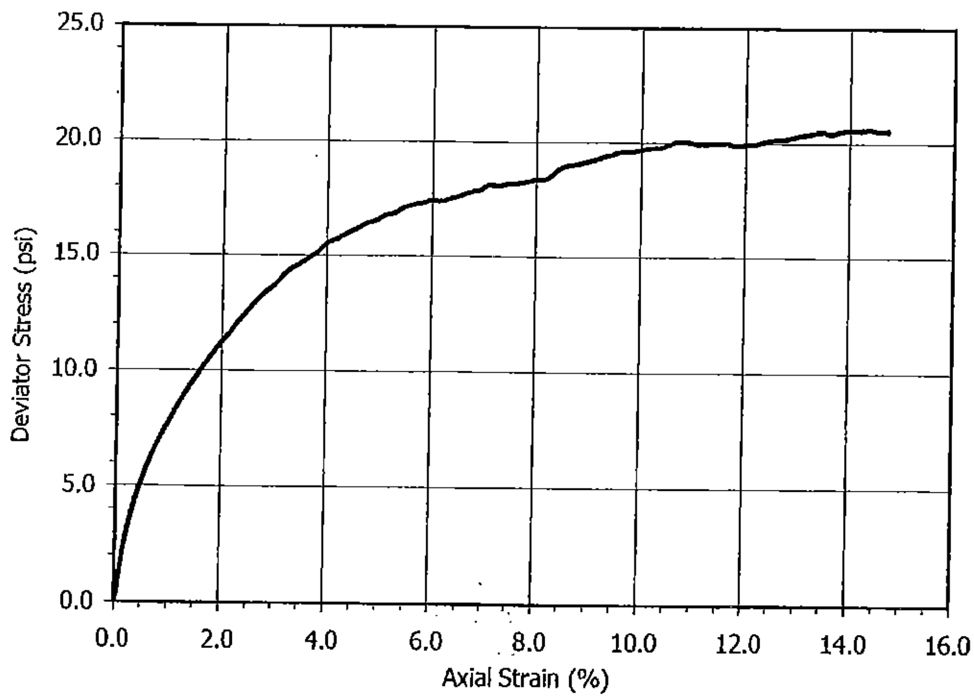
Diameter (in)	1	2.413
	2	2.41
	3	2.409
	Average	2.411
Height (in)	1	5.504
	2	5.506
	3	5.495
	Average	5.502
Weight of Sample + Tube / Rings (g)		881.30
Weight of Tube / Rings (g)		0.00
Weight of Wet Sample + Container (g)		987.60
Weight of Dry Sample + Container (g)		881.20
Weight of Container (g)		107.80
Specific Gravity (assumed)		2.70
Confining Pressure (psi)		5.5
Rate of Deformation (in/min)		0.045

Sample Properties	
Moisture Content (%)	13.76
Dry Density (pcf)	117.7
Void Ratio	0.432
% Saturation	86.0

At Failure*	
Deviator stress (psi)	**20.60**
Minor principal total stress (psi)	**5.50**
Major principal total stress (psi)	**26.10**
Axial strain (%)	**14.36**

* Stress values have been corrected for membrane effects

Stress - Strain Curve



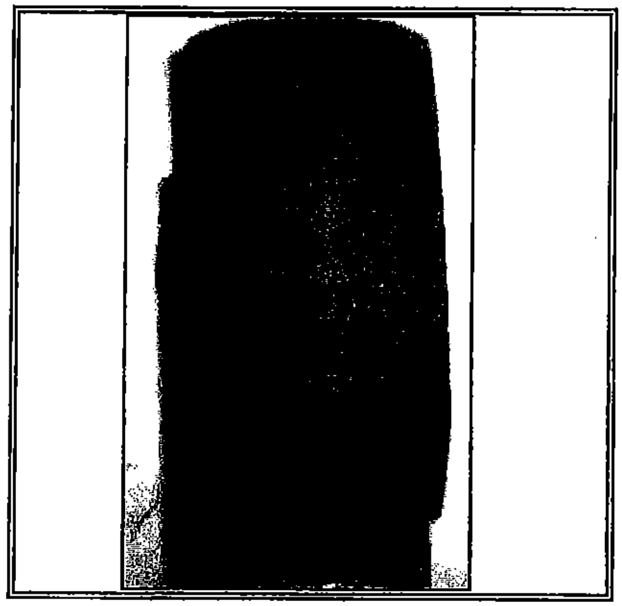
Leighton

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

ASTM D 2850

Project Name:	Dana Point Harbor Renovation	Tested by: ACS	Date: 11/26/07
Project No:	600024-004	Checked by: LF	Date: 11/28/07
Boring No.:	B-7	Sample Type:	Drive
Sample No.:	R-7	Depth(ft):	45
Sample Description:	Gray silty sand (SM)		

Diameter (in)	1	2.415
	2	2.41
	3	2.410
	Average	2.412
Height (in)	1	5.545
	2	5.566
	3	5.543
	Average	5.551
Weight of Sample + Tube / Rings (g)		905.70
Weight of Tube / Rings (g)		0.00
Weight of Wet Sample + Container (g)		1010.00
Weight of Dry Sample + Container (g)		894.80
Weight of Container (g)		108.10
Specific Gravity (assumed)		2.70
Confining Pressure (psi)		12.0
Rate of Deformation (in/min)		0.045

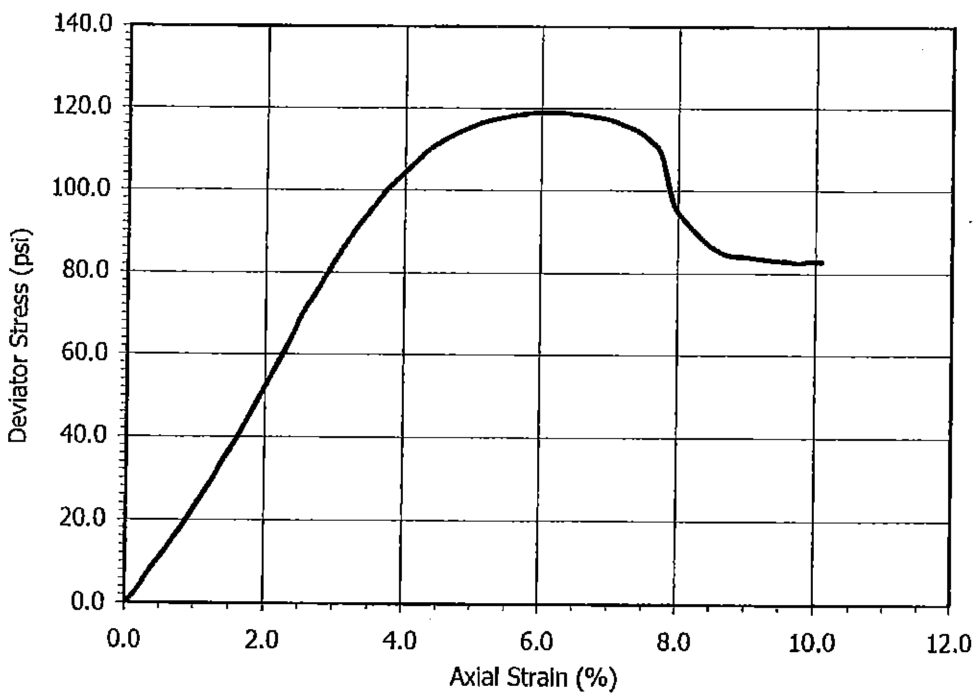


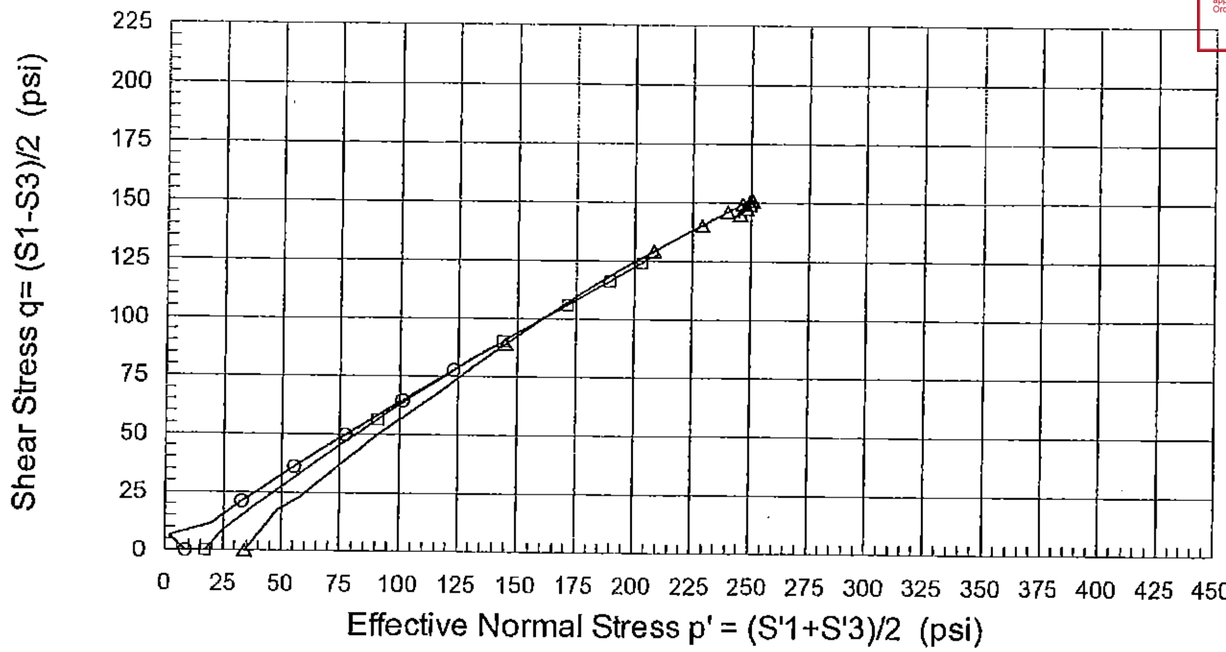
Sample Properties	
Moisture Content (%)	14.64
Dry Density (pcf)	118.9
Void Ratio	0.417
% Saturation	94.8

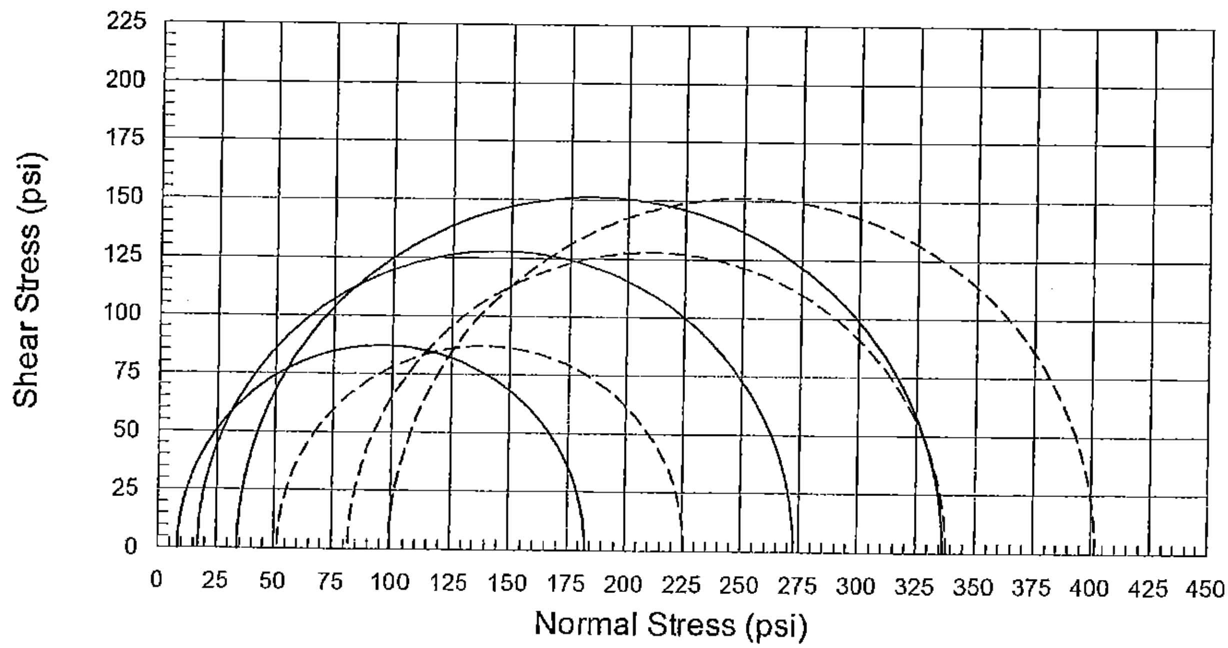
At Failure*	
Deviator stress (psi)	**119.03**
Minor principal total stress (psi)	**12.00**
Major principal total stress (psi)	**131.03**
Axial strain (%)	**6.13**

* Stress values have been corrected for membrane effects

Stress - Strain Curve







	Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
○	B-8	R-6	35.0	8.5	174.2
□	B-8	R-6	35.0	17.0	255.8
△	B-8	R-6	35.0	34.0	302.5

———— Mohr Circle based on Total Stress
– – – – – Mohr Circle based on Effective Stress

Leighton

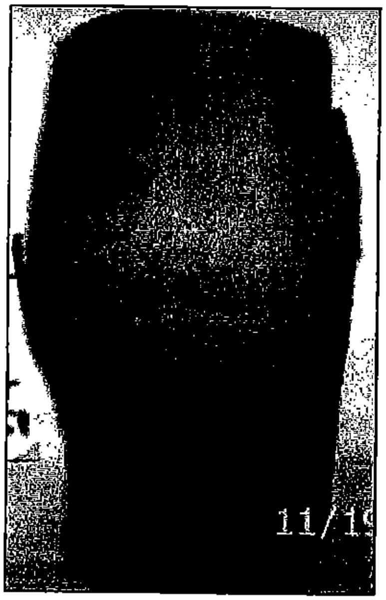
Project No.: 600024-004
Dana Point Harbor Renovation

Consolidated Undrained Triaxial Compression Test (Three Stage)
ASTM D 4767 mod.

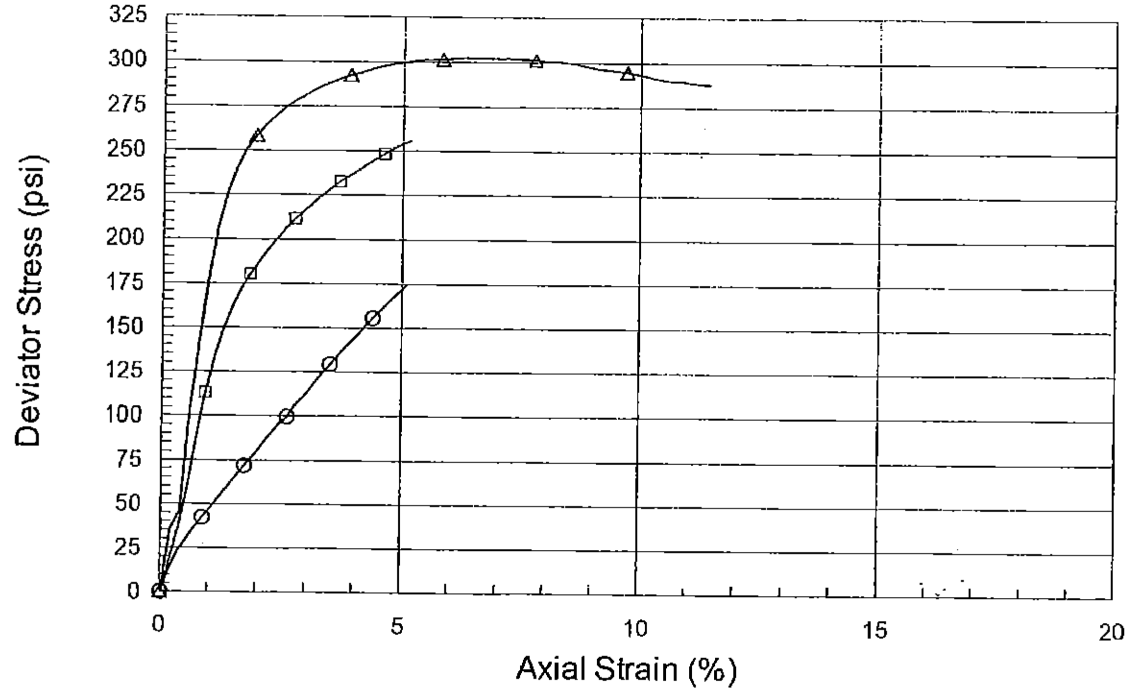
11-07

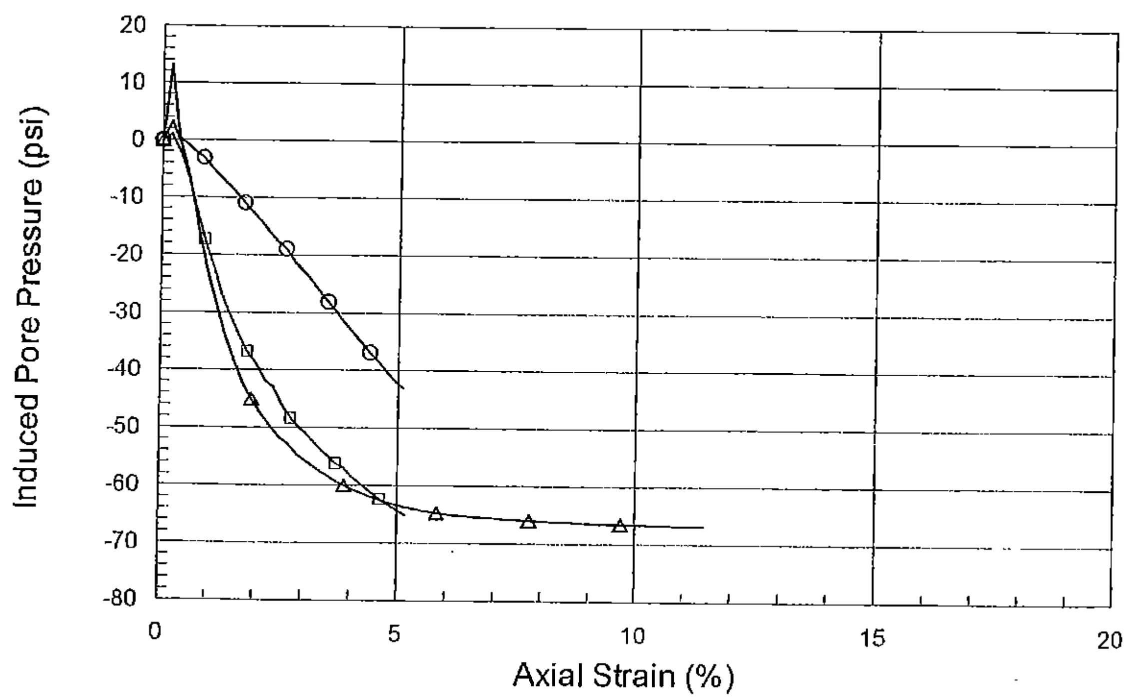
CONSOLIDATED UNDRAINED TRIAXIAL TEST
Three Stage (ASTM D 4767 mod.)

Project Name:	Dana Point Harbor Renovation	Tested By:	A. Santos	Date:	11/13/07
roject No:	600024-004	Checked By:	J. Ward	Date:	11/26/07
Boring No.:	B-8				
Sample No.:	R-6				
Depth (ft.):	35				
Sample Type:	Drive				



34 psi





Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
○ B-8	R-6	35.0	8.5	174.2
□ B-8	R-6	35.0	17.0	255.8
△ B-8	R-6	35.0	34.0	302.5

Leighton

Project No.: 600024-004
Dana Point Harbor Renovation

Consolidated Undrained Triaxial Compression Test (Three Stage)
ASTM D 4767 mod.

11-07

Leighton

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

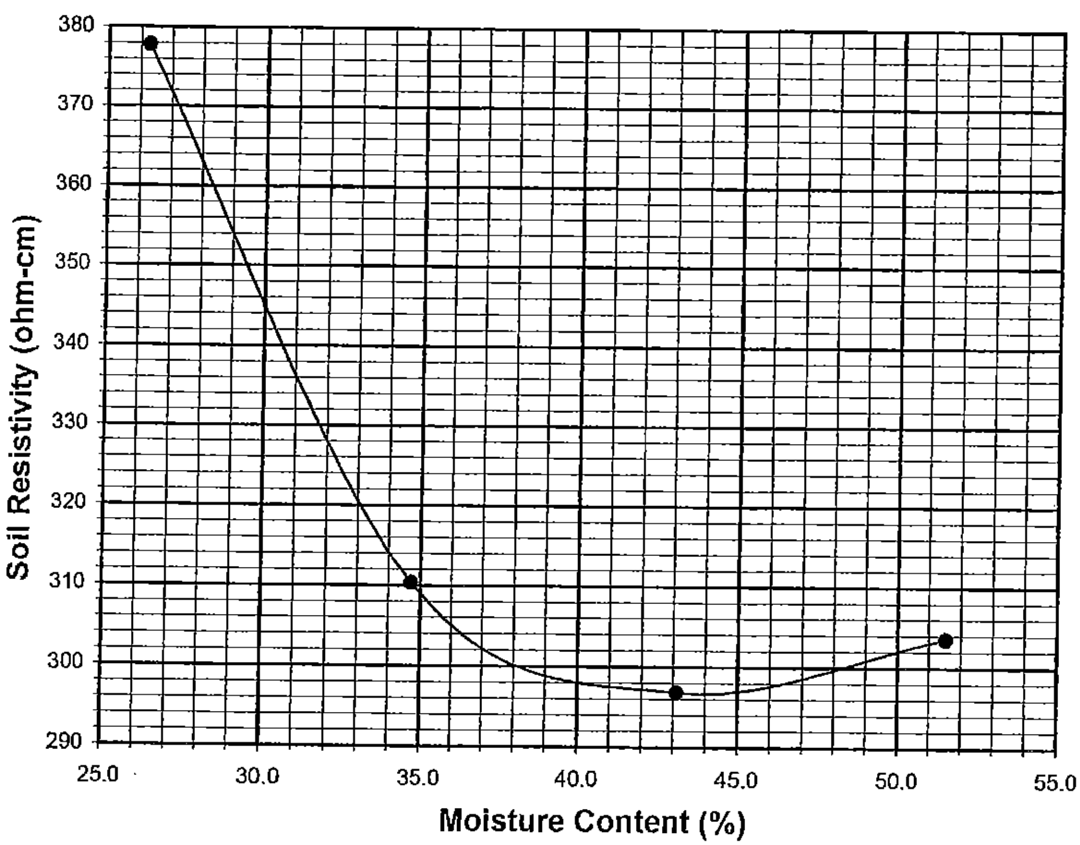
Project Name: Dana Point Harbor Renovation
Project No. : 600024-004
Boring No.: B-8
Sample No. : Bag-1
Soil Identification: SC

Tested By : V. Juliano Date: 11/14/07
Data Input By: LF Date: 11/20/07
Depth (ft.) : 0-5

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	200	26.27	56	378
2	300	34.69	46	310
3	400	43.11	44	297
4	500	51.53	45	304
5				

Moisture Content (%) (MCi)	9.44
Wet Wt. of Soil + Cont. (g)	181.20
Dry Wt. of Soil + Cont. (g)	169.87
Wt. of Container (g)	49.80
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
297	**43.1**	**1013**	**651**	**6.06**	**21.8**



APPENDIX C

Infiltration Test Results

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/11/2018
Project Number:	17-206-02	**Tested By:**	KMF
Test Hole Number:	DH-5	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches radius= 4 inches		

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	9:57	10:32	35.0	35.0	0.67	0.75	52.00	51.00	1.00	51.50	0.06
2	10:32	11:02	30.0	65.0	0.75	0.83	51.00	50.00	1.00	50.50	0.08
3	11:02	11:32	30.0	95.0	0.75	0.75	51.00	51.00	0.00	51.00	0.00
4	11:32	12:02	30.0	125.0	0.75	0.83	51.00	50.00	1.00	50.50	0.08
5	12:02	12:32	30.0	155.0	0.75	0.83	51.00	50.00	1.00	50.50	0.08
6	12:32	13:02	30.0	185.0	0.75	0.75	51.00	51.00	0.00	51.00	0.00
7	13:02	13:32	30.0	215.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
8	13:32	14:02	30.0	245.0	0.75	0.83	51.00	50.00	1.00	50.50	0.08
9	14:02	14:32	30.0	275.0	0.67	0.71	52.00	51.50	0.50	51.75	0.04
10	14:32	15:02	30.0	305.0	0.67	0.75	52.00	51.00	1.00	51.50	0.07
11	15:02	15:32	30.0	335.0	0.67	0.75	51.96	51.00	0.96	51.48	0.07
12	15:32	16:32	60.0	395.0	0.67	0.75	51.96	51.00	0.96	51.48	0.04
13	15:32	16:32	60.0	455.0	0.67	0.75	51.96	51.00	0.96	51.48	0.04

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.04
FACTORED INFILTRATION RATE (IN/HR):	0.02

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (S_A):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED
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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/11/2018
Project Number:	17-206-02	**Tested By:**	KMF
Test Hole Number:	DH-7	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius= 4	inches

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	10:18	10:43	25.0	25.0	0.83	0.92	50.00	49.00	1.00	49.50	0.09
2	10:43	11:13	30.0	55.0	0.85	0.88	49.80	49.50	0.30	49.65	0.02
3	11:13	11:43	30.0	85.0	0.84	0.87	49.90	49.60	0.30	49.75	0.02
4	11:43	12:13	30.0	115.0	0.86	0.92	49.70	48.95	0.75	49.33	0.06
5	12:13	12:43	30.0	145.0	0.83	0.83	50.00	50.00	0.00	50.00	0.00
6	12:43	13:13	30.0	175.0	0.83	0.85	50.00	49.75	0.25	49.88	0.02
7	13:13	13:43	30.0	205.0	0.85	0.92	49.75	49.00	0.75	49.38	0.06
8	13:43	14:13	30.0	235.0	0.79	0.87	50.50	49.56	0.94	50.03	0.07
9	14:13	14:43	30.0	265.0	0.83	0.90	50.00	49.20	0.80	49.60	0.06
10	14:43	15:13	30.0	295.0	0.83	0.90	50.00	49.20	0.80	49.60	0.06
11	15:13	15:43	30.0	325.0	0.83	0.90	50.00	49.20	0.80	49.60	0.06
12	15:43	16:13	30.0	355.0	0.83	0.90	50.00	49.20	0.80	49.60	0.06
13	16:13	16:43	30.0	385.0	0.83	0.90	50.00	49.20	0.80	49.60	0.06

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.05
FACTORED INFILTRATION RATE (IN/HR):	0.02

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (SA):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization			**Date:**	9/12/2018
Project Number:	17-206-02			**Tested By:**	KMF
Test Hole Number:	DH-8			**USCS Soil Classification:**	SC
Total Depth :	5.00	feet		**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4	inches	

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	(in)	(in/hour)
1	6:01	6:26	25.0	25.0	0.58	0.63	53.00	52.50	0.50	52.75	0.04
2	6:26	6:56	30.0	55.0	0.56	0.56	53.25	53.25	0.00	53.25	0.00
3	6:56	7:26	30.0	85.0	0.56	0.60	53.25	52.75	0.50	53.00	0.04
4	7:26	7:56	30.0	115.0	0.56	0.58	53.25	53.00	0.25	53.13	0.02
5	7:56	8:26	30.0	145.0	0.56	0.58	53.25	53.00	0.25	53.13	0.02
6	8:26	8:56	30.0	175.0	0.56	0.56	53.25	53.25	0.00	53.25	0.00
7	8:56	9:26	30.0	205.0	0.56	0.58	53.25	53.00	0.25	53.13	0.02
8	9:26	9:56	30.0	235.0	0.56	0.56	53.25	53.25	0.00	53.25	0.00
9	9:56	10:26	30.0	265.0	0.56	0.58	53.25	53.00	0.25	53.13	0.02
10	10:26	10:56	30.0	295.0	0.56	0.65	53.25	52.25	1.00	52.75	0.07
11	10:56	11:26	30.0	325.0	0.50	0.54	54.00	53.50	0.50	53.75	0.04
12	11:26	11:56	30.0	355.0	0.50	0.54	54.00	53.50	0.50	53.75	0.04
13	11:56	12:26	30.0	385.0	0.50	0.53	54.00	53.64	0.36	53.82	0.03

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.03
FACTORED INFILTRATION RATE (IN/HR):	0.01

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

GMU

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-9	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	5:58	6:23	25.0	25.0	0.75	0.83	51.00	50.00	1.00	50.50	0.09
2	6:23	6:53	30.0	55.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
1	6:53	7:23	30.0	85.0	0.75	0.81	51.00	50.25	0.75	50.63	0.06
2	7:23	7:53	30.0	115.0	0.75	0.81	51.00	50.25	0.75	50.63	0.06
3	7:53	8:23	30.0	145.0	0.75	0.79	51.00	50.50	0.50	50.75	0.04
4	8:23	8:53	30.0	175.0	0.75	0.79	51.00	50.50	0.50	50.75	0.04
5	8:53	9:23	30.0	205.0	0.75	0.79	51.00	50.50	0.50	50.75	0.04
6	9:23	9:53	30.0	235.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
7	9:53	10:23	30.0	265.0	0.75	0.81	51.00	50.25	0.75	50.63	0.06
8	10:23	10:53	30.0	295.0	0.75	0.81	51.00	50.25	0.75	50.63	0.06
9	10:53	11:23	30.0	325.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
10	11:23	11:53	30.0	355.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
11	11:53	12:23	30.0	385.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
12	12:23	12:53	30.0	415.0	0.75	0.79	51.00	50.50	0.50	50.75	0.04
13	12:53	13:23	30.0	445.0	0.75	0.77	51.00	50.75	0.25	50.88	0.02
14	13:23	13:53	30.0	475.0	0.75	0.79	51.00	50.50	0.50	50.75	0.04

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.03
FACTORED INFILTRATION RATE (IN/HR):	0.01

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (SA):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-10	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	5:57	7:52	115.0	115.0	1.83	1.83	38.00	38.00	0.00	38.00	0.00
2	6:22	8:19	117.0	232.0	1.83	1.83	38.00	38.00	0.00	38.00	0.00
1	6:52	7:22	30.0	262.0	1.83	1.88	38.00	37.50	0.50	37.75	0.05
2	7:22	7:52	30.0	292.0	1.83	1.88	38.00	37.44	0.56	37.72	0.06
3	7:52	8:22	30.0	322.0	1.83	1.88	38.00	37.44	0.56	37.72	0.06
4	8:22	8:52	30.0	352.0	1.83	1.88	38.00	37.44	0.56	37.72	0.06
5	8:52	9:22	30.0	382.0	1.83	1.88	38.00	37.44	0.56	37.72	0.06
6	9:22	9:52	30.0	412.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
7	9:52	10:22	30.0	442.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
8	10:22	10:52	30.0	472.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
9	10:52	11:22	30.0	502.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
10	11:22	11:52	30.0	532.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
11	11:52	12:22	30.0	562.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
12	12:22	12:52	30.0	592.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
13	12:52	13:22	30.0	622.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08
14	13:22	13:52	30.0	652.0	1.83	1.90	38.00	37.20	0.80	37.60	0.08

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.07
FACTORED INFILTRATION RATE (IN/HR):	0.03

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (S_A):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization		**Date:**	9/12/2018	
Project Number:	17-206-02		**Tested By:**	KMF	
Test Hole Number:	DH-13		**USCS Soil Classification:**	SC	
Total Depth :	5.00	feet	**Water Temperature:**	75	°F
Test Hole Diameter:	8.00 inches	radius=	4	inches	

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	(in)	(in/hour)
1	6:06	6:31	25.0	25.0	2.63	2.68	28.44	27.84	0.60	28.14	0.10
2	6:31	7:01	30.0	55.0	2.50	2.65	30.00	28.20	1.80	29.10	0.23
3	7:01	7:31	30.0	85.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
4	7:31	8:01	30.0	115.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
5	8:01	8:31	30.0	145.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
6	8:31	9:01	30.0	175.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
7	9:01	9:31	30.0	205.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
8	9:31	10:01	30.0	235.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
9	10:01	10:31	30.0	265.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
10	10:31	11:01	30.0	295.0	2.50	2.75	30.00	27.00	3.00	28.50	0.39
11	11:01	11:31	30.0	325.0	2.50	2.75	30.00	27.00	3.00	28.50	0.39
12	11:31	12:01	30.0	355.0	2.50	2.75	30.00	27.00	3.00	28.50	0.39
13	12:01	12:31	30.0	385.0	2.50	2.75	30.00	27.00	3.00	28.50	0.39
14	12:31	13:01	30.0	415.0	2.51	2.67	29.88	27.96	1.92	28.92	0.25

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.29
FACTORED INFILTRATION RATE (IN/HR):	0.13

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (SA):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	KMF
Test Hole Number:	DH-14	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches, radius= 4 inches		

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	6:09	6:34	25.0	25.0	2.08	2.25	35.04	33.00	2.04	34.02	0.27
2	6:31	7:04	33.0	58.0	2.08	2.25	35.04	33.00	2.04	34.02	0.21
3	7:04	7:34	30.0	88.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
4	7:34	8:04	30.0	118.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
5	8:04	8:34	30.0	148.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
6	8:34	9:04	30.0	178.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
7	9:04	9:34	30.0	208.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
8	9:34	10:04	30.0	238.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
9	10:04	10:34	30.0	268.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
10	10:34	11:04	30.0	298.0	2.08	2.25	35.04	33.00	2.04	34.02	0.23
11	11:04	11:34	30.0	328.0	2.08	2.17	35.04	33.96	1.08	34.50	0.12
12	11:34	12:04	30.0	358.0	2.08	2.17	35.04	33.96	1.08	34.50	0.12
13	12:04	12:34	30.0	388.0	2.08	2.17	35.04	33.96	1.08	34.50	0.12

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.10
FACTORED INFILTRATION RATE (IN/HR):	0.04

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization			**Date:**	9/12/2018
Project Number:	17-206-02			**Tested By:**	MF
Test Hole Number:	DH-17			**USCS Soil Classification:**	SC
Total Depth :	5.00	feet		**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4	inches	

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	7:25	7:50	25.0	25.0	2.58	3.57	29.04	17.16	11.88	23.10	2.27
2	7:51	8:16	25.0	50.0	2.57	3.67	29.16	15.96	13.20	22.56	2.58
1	8:16	8:46	30.0	80.0	2.25	3.17	33.00	21.96	11.04	27.48	1.50
2	8:48	9:18	30.0	110.0	2.42	3.33	30.96	20.04	10.92	25.50	1.59
3	9:18	9:48	30.0	140.0	2.29	3.17	32.52	21.96	10.56	27.24	1.44
4	9:48	10:18	30.0	170.0	2.42	3.17	30.96	21.96	9.00	26.46	1.26
5	10:18	10:48	30.0	200.0	2.40	3.29	31.20	20.52	10.68	25.86	1.53
6	10:48	11:18	30.0	230.0	2.46	3.71	30.48	15.48	15.00	22.98	2.40
7	11:18	11:48	30.0	260.0	2.40	3.33	31.20	20.04	11.16	25.62	1.62
8	11:48	12:18	30.0	290.0	2.50	3.48	30.00	18.24	11.76	24.12	1.80
9	12:18	12:48	30.0	320.0	2.33	3.19	32.04	21.72	10.32	26.88	1.43
10	12:48	13:18	30.0	350.0	2.67	3.58	27.96	17.04	10.92	22.50	1.78
11	13:18	13:48	30.0	380.0	2.38	3.13	31.44	22.44	9.00	26.94	1.24
12	13:48	14:18	30.0	410.0	2.42	3.13	30.96	22.44	8.52	26.70	1.19

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	1.19
FACTORED INFILTRATION RATE (IN/HR):	0.53

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization		**Date:**	9/12/2018
Project Number:	17-206-02		**Tested By:**	MF
Test Hole Number:	DH-18		**USCS Soil Classification:**	SC
Total Depth :	5.00	feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius= 4 inches		

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	7:30	7:55	25.0	25.0	2.16	2.79	34.08	26.52	7.56	30.30	1.12
2	7:56	8:21	25.0	50.0	2.16	2.83	34.08	26.04	8.04	30.06	1.20
1	8:21	8:51	30.0	80.0	1.91	2.58	37.08	29.04	8.04	33.06	0.92
2	8:51	9:21	30.0	110.0	2.16	2.41	34.08	31.08	3.00	32.58	0.35
3	9:21	9:51	30.0	140.0	2.16	2.37	34.08	31.56	2.52	32.82	0.29
4	9:51	10:21	30.0	170.0	2.16	2.41	34.08	31.08	3.00	32.58	0.35
5	10:21	10:51	30.0	200.0	2.16	2.41	34.08	31.08	3.00	32.58	0.35
6	10:51	11:21	30.0	230.0	1.98	2.29	36.24	32.52	3.72	34.38	0.41
7	11:21	11:51	30.0	260.0	1.91	2.29	37.08	32.52	4.56	34.80	0.50
8	11:51	12:21	30.0	290.0	1.99	2.37	36.12	31.56	4.56	33.84	0.51
9	12:21	12:51	30.0	320.0	1.99	2.25	36.12	33.00	3.12	34.56	0.34
10	12:51	13:21	30.0	350.0	1.99	2.29	36.12	32.52	3.60	34.32	0.40
11	13:21	13:51	30.0	380.0	1.91	2.14	37.08	34.32	2.76	35.70	0.29
12	13:51	14:21	30.0	410.0	1.91	2.14	37.08	34.32	2.76	35.70	0.29

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.28
FACTORED INFILTRATION RATE (IN/HR):	0.12

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

GMU

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-19	**USCS Soil Classification:**	SC
Total Depth :	4.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	7:27	7:52	25.0	25.0	2.58	2.62	17.04	16.56	0.48	16.80	0.12
2	7:54	8:19	25.0	50.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
1	8:19	8:49	30.0	80.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
2	8:49	9:19	30.0	110.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
3	9:19	9:49	30.0	140.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
4	9:49	10:19	30.0	170.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
5	10:19	10:49	30.0	200.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
6	10:49	11:19	30.0	230.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
7	11:19	11:49	30.0	260.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
8	11:49	12:19	30.0	290.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
9	12:19	12:49	30.0	320.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
10	12:49	13:19	30.0	350.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
11	13:19	13:49	30.0	380.0	2.58	2.59	17.04	16.92	0.12	16.98	0.03
12	13:51	2:19	-692.0	-312.0	2.58	2.59	17.04	16.92	0.12	16.98	0.00

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.01
FACTORED INFILTRATION RATE (IN/HR):	0.01

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (S_A):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-20	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches, radius= 4 inches		

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	7:20	7:45	25.0	25.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
2	7:46	8:11	25.0	50.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
1	8:11	8:41	30.0	80.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
2	8:41	9:11	30.0	110.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
3	9:11	9:41	30.0	140.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
4	9:41	10:11	30.0	170.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
5	10:11	10:41	30.0	200.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
6	10:41	11:11	30.0	230.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00
7	11:11	11:41	30.0	260.0	2.67	2.92	27.96	24.96	3.00	26.46	0.42
8	11:41	12:11	30.0	290.0	2.67	2.83	27.96	26.04	1.92	27.00	0.26
9	12:11	12:41	30.0	320.0	2.50	2.65	30.00	28.20	1.80	29.10	0.23
10	12:41	13:11	30.0	350.0	2.50	2.67	30.00	27.96	2.04	28.98	0.26
11	13:11	13:41	30.0	380.0	2.56	2.67	29.28	27.96	1.32	28.62	0.17
12	13:41	14:11	30.0	410.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.16
FACTORED INFILTRATION RATE (IN/HR):	0.07

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (SA):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-21	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	7:21	7:46	25.0	25.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
2	7:49	8:14	25.0	50.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
1	8:14	8:44	30.0	80.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
2	8:44	9:14	30.0	110.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12
3	9:14	9:44	30.0	140.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
4	9:44	10:14	30.0	170.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
5	10:14	10:44	30.0	200.0	2.50	2.54	30.00	29.52	0.48	29.76	0.06
6	10:44	11:14	30.0	230.0	2.50	2.54	30.00	29.52	0.48	29.76	0.06
7	11:14	11:44	30.0	260.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00
8	11:44	12:14	30.0	290.0	2.50	2.52	30.00	29.76	0.24	29.88	0.03
9	12:14	12:44	30.0	320.0	2.52	2.56	29.76	29.28	0.48	29.52	0.06
10	12:44	13:14	30.0	350.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12
11	13:14	13:44	30.0	380.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12
12	13:44	14:14	30.0	410.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.10
FACTORED INFILTRATION RATE (IN/HR):	0.05

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (SA):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

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***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	9/12/2018
Project Number:	17-206-02	**Tested By:**	MF
Test Hole Number:	DH-22	**USCS Soil Classification:**	SC
Total Depth :	5.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	7:43	8:08	25.0	25.0	2.42	3.65	30.96	16.20	14.76	23.58	2.77
2	8:09	8:34	25.0	50.0	2.42	3.50	30.96	18.00	12.96	24.48	2.35
1	8:34	9:04	30.0	80.0	2.42	3.08	30.96	23.04	7.92	27.00	1.09
2	9:04	9:34	30.0	110.0	2.42	3.17	30.96	21.96	9.00	26.46	1.26
3	9:34	10:04	30.0	140.0	2.42	3.17	30.96	21.96	9.00	26.46	1.26
4	10:04	10:34	30.0	170.0	2.42	3.33	30.96	20.04	10.92	25.50	1.59
5	10:34	11:04	30.0	200.0	2.25	3.17	33.00	21.96	11.04	27.48	1.50
6	11:04	11:34	30.0	230.0	2.25	2.88	33.00	25.44	7.56	29.22	0.97
7	11:34	12:04	30.0	260.0	2.38	2.85	31.44	25.80	5.64	28.62	0.74
8	12:04	12:34	30.0	290.0	2.25	2.47	33.00	30.36	2.64	31.68	0.31
9	12:34	13:04	30.0	320.0	2.23	2.43	33.24	30.84	2.40	32.04	0.28
10	13:04	13:34	30.0	350.0	2.25	2.49	33.00	30.12	2.88	31.56	0.34
11	13:34	14:04	30.0	380.0	2.27	2.42	32.76	30.96	1.80	31.86	0.21
12	14:04	14:34	30.0	410.0	2.28	2.49	32.64	30.12	2.52	31.38	0.30

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.24
FACTORED INFILTRATION RATE (IN/HR):	0.11

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization		**Date:**	9/12/2018	
Project Number:	17-206-02		**Tested By:**	KMF	
Test Hole Number:	DH-23		**USCS Soil Classification:**	SC	
Total Depth :	5.00	feet	**Water Temperature:**	75	°F
Test Hole Diameter:	8.00 inches	radius= 4	inches		

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	9:31	9:56	25.0	25.0	3.42	3.58	18.96	17.04	1.92	18.00	0.46
2	9:58	10:28	30.0	55.0	3.42	3.56	18.96	17.28	1.68	18.12	0.33
3	10:30	11:09	39.0	94.0	3.43	3.60	18.84	16.80	2.04	17.82	0.32
4	11:10	11:37	27.0	121.0	3.37	3.42	19.56	18.96	0.60	19.26	0.13
5	11:38	12:08	30.0	151.0	3.42	3.53	18.96	17.64	1.32	18.30	0.26
6	12:10	12:40	30.0	181.0	3.42	3.51	18.96	17.88	1.08	18.42	0.21
7	12:41	13:10	29.0	210.0	3.43	3.47	18.84	18.36	0.48	18.60	0.10
8	13:11	13:45	34.0	244.0	3.42	3.50	18.96	18.00	0.96	18.48	0.17
9	13:46	14:11	25.0	269.0	3.41	3.48	19.08	18.24	0.84	18.66	0.20
10	14:12	14:41	29.0	298.0	3.41	3.48	19.08	18.24	0.84	18.66	0.17
11	14:43	15:13	30.0	328.0	3.42	3.48	18.96	18.24	0.72	18.60	0.14
12	15:14	15:44	30.0	358.0	3.41	3.45	19.08	18.60	0.48	18.84	0.09

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.11
FACTORED INFILTRATION RATE (IN/HR):	0.05

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (SA):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization		**Date:**	9/12/2018
Project Number:	17-206-02		**Tested By:**	KMF
Test Hole Number:	DH-24		**USCS Soil Classification:**	SC
Total Depth :	5.00	feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius= 4 inches		

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	(in)	(in/hour)
1	9:35	10:02	27.0	27.0	3.40	3.45	19.20	18.60	0.60	18.90	0.13
2	10:04	10:34	30.0	57.0	3.38	3.40	19.44	19.20	0.24	19.32	0.05
3	10:36	11:13	37.0	94.0	3.40	3.46	19.20	18.48	0.72	18.84	0.11
4	11:14	11:41	27.0	121.0	3.37	3.41	19.56	19.08	0.48	19.32	0.10
5	11:42	12:12	30.0	151.0	3.41	3.41	19.08	19.08	0.00	19.08	0.00
6	12:12	12:42	30.0	181.0	3.41	3.45	19.08	18.60	0.48	18.84	0.09
7	12:42	13:13	31.0	212.0	3.45	3.47	18.60	18.36	0.24	18.48	0.05
8	13:14	13:48	34.0	246.0	3.47	3.50	18.36	18.00	0.36	18.18	0.06
9	13:49	14:14	25.0	271.0	3.39	3.43	19.32	18.84	0.48	19.08	0.11
10	14:15	14:44	29.0	300.0	3.45	3.47	18.60	18.36	0.24	18.48	0.05
11	14:45	15:16	31.0	331.0	3.47	3.49	18.36	18.12	0.24	18.24	0.05
12	15:17	15:46	29.0	360.0	3.37	3.40	19.56	19.20	0.36	19.38	0.07

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.05
FACTORED INFILTRATION RATE (IN/HR):	0.02

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

APPENDIX C-1

Previous Infiltration Testing Results

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	8/27/2012
Project Number:	11-161-00	**Tested By:**	N/A
Test Hole Number:	DH-10	**USCS Soil Classification:**	SC
Total Depth :	3.25 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolation Rate
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	8:54	9:35	41.0	91.0	1.19	1.82	24.72	17.16	7.56	20.94	0.96
2	9:38	10:06	28.0	119.0	1.23	1.65	24.24	19.20	5.04	21.72	0.91
3	10:09	10:38	29.0	148.0	1.27	1.63	23.76	19.44	4.32	21.60	0.76
4	10:40	11:08	28.0	176.0	1.26	1.56	23.88	20.28	3.60	22.08	0.64
5	11:10	11:39	29.0	205.0	1.27	1.55	23.76	20.40	3.36	22.08	0.58
6	11:41	12:22	41.0	246.0	1.25	1.53	24.00	20.64	3.36	22.32	0.40
7	12:25	12:59	34.0	280.0	1.16	1.41	25.08	22.08	3.00	23.58	0.41
8	13:01	13:40	39.0	319.0	1.10	1.42	25.80	21.96	3.84	23.88	0.46
9	13:42	14:34	52.0	371.0	1.05	1.42	26.40	21.96	4.44	24.18	0.39
10	14:34	15:09	35.0	406.0	1.00	1.25	27.00	24.00	3.00	25.50	0.37

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.35
FACTORED INFILTRATION RATE (IN/HR):	0.15

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
			Geotechnical Factor of Safety (S_A):	2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

GMU

Falling Head Borehole Infiltration Test

Project Name:	Dana Point Harbor Revitalization	**Date:**	4/8/2015
Project Number:	11-161-03	**Tested By:**	N/A
Test Hole Number:	DH-22	**USCS Soil Classification:**	SC
Total Depth :	7.00 feet	**Water Temperature:**	75 °F
Test Hole Diameter:	8.00 inches	radius=	4 inches

Trial	Start Time	End Time	ΔT (min)	Total Time (min)	Initial Depth of Water (ft)	Final Depth of Water (ft)	H_0 (in)	H_f (in)	ΔH (in)	H_{avg} (in)	Unfactored Percolation Rate (in/hour)
1	7:10	7:40	30.0	80.0	4.50	4.57	30.00	29.16	0.84	29.58	0.11
2	7:41	8:11	30.0	110.0	4.51	4.53	29.88	29.64	0.24	29.76	0.03
3	8:12	8:42	30.0	140.0	4.48	4.51	30.24	29.88	0.36	30.06	0.04
4	8:42	9:12	30.0	170.0	4.46	4.49	30.48	30.12	0.36	30.30	0.04
5	9:13	9:43	30.0	200.0	4.49	4.51	30.12	29.88	0.24	30.00	0.03
6	9:44	10:14	30.0	230.0	4.45	4.48	30.60	30.24	0.36	30.42	0.04
7	10:15	10:45	30.0	260.0	4.45	4.48	30.60	30.24	0.36	30.42	0.04
8	10:45	11:15	30.0	290.0	4.45	4.48	30.60	30.24	0.36	30.42	0.04
9	11:16	11:46	30.0	320.0	4.44	4.47	30.72	30.36	0.36	30.54	0.04
10	11:47	12:17	30.0	350.0	4.39	4.42	31.32	30.96	0.36	31.14	0.04
11	12:18	12:48	30.0	320.0	4.37	4.40	31.56	31.20	0.36	31.38	0.04
12	12:50	13:20	30.0	350.0	4.37	4.40	31.56	31.20	0.36	31.38	0.04

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.04
FACTORED INFILTRATION RATE (IN/HR):	0.02

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Factor of Safety (SA):		2.25

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Description	High Concern	Medium Concern	Low Concern
Soil assessment methods	Use of borhole methods to estimate vertical infiltration rate (not recommended, but may be necessary at a planning level). Less than 2 tests per BMP	At least 2 tests per BMP. Use of borehole tests for dry wells or infiltration trenches. Use of infiltrometer or small scale PIT methods for vertical infiltration BMPs.	Extensive infiltration testing such as: PIT testing or infiltrometer testing at 3+ locations per BMP, and/or commitment to construction phase testing and design adaption if necessary.
Predominant soil texture	Silty and clayey soils with significant fines	Finer sandy soils with some loam content	Clean, granular soils (sands)
Site soil variablity	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment.	Soil borings/test pits indicate moderately homogeneous soils.	Multiple soil borings/test pits indicate relatively homogeneous soils.
Depth to groundwater	Groundwater conditions or movement not well understood.	Seasonal high GW at least 10 ft below facility bottom.	Seasonal high GW at least 15 ft below facility bottom.

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

APPENDIX D

CPT Liquefaction Analysis

GMU Geotechnical
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

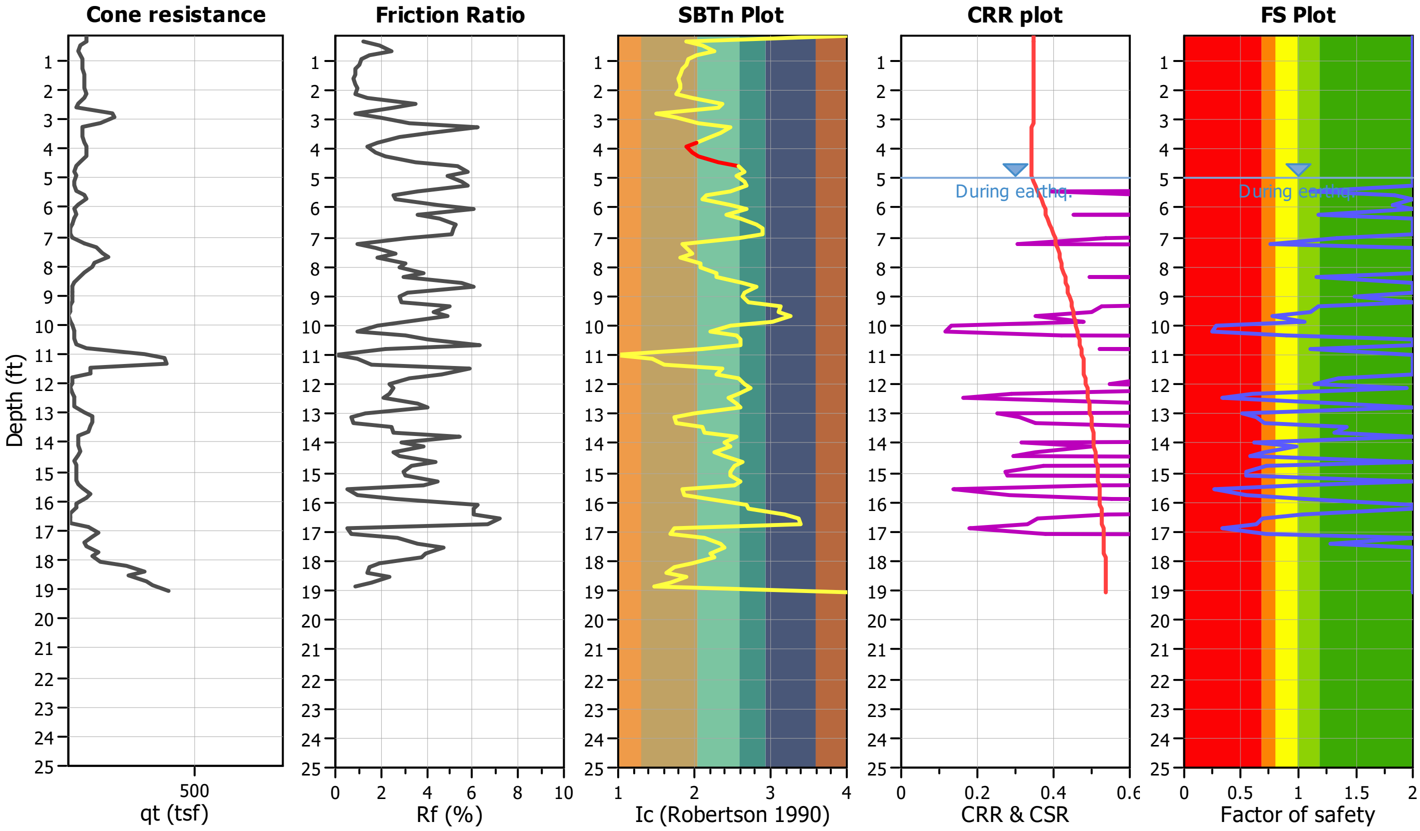
LIQUEFACTION ANALYSIS REPORT

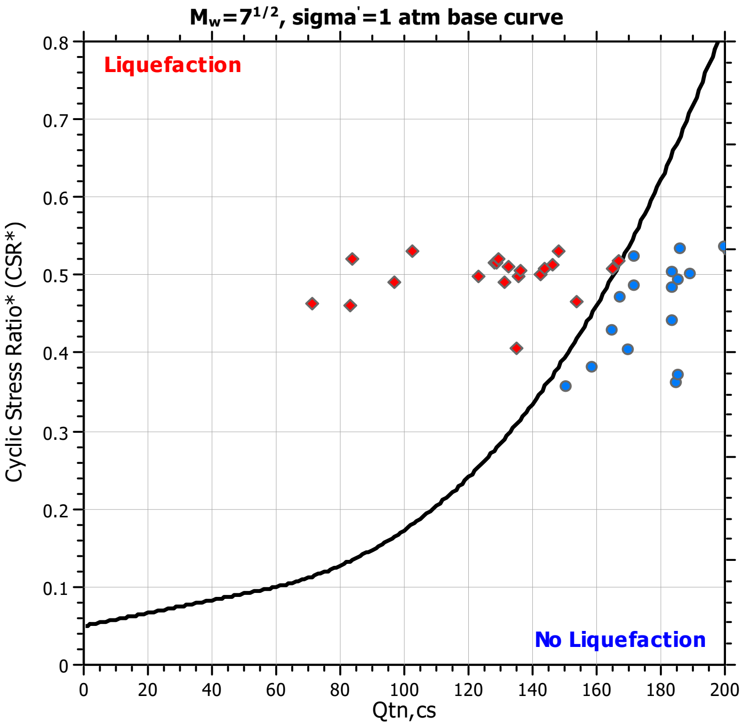
Project title : 11-161-00 **Location :**

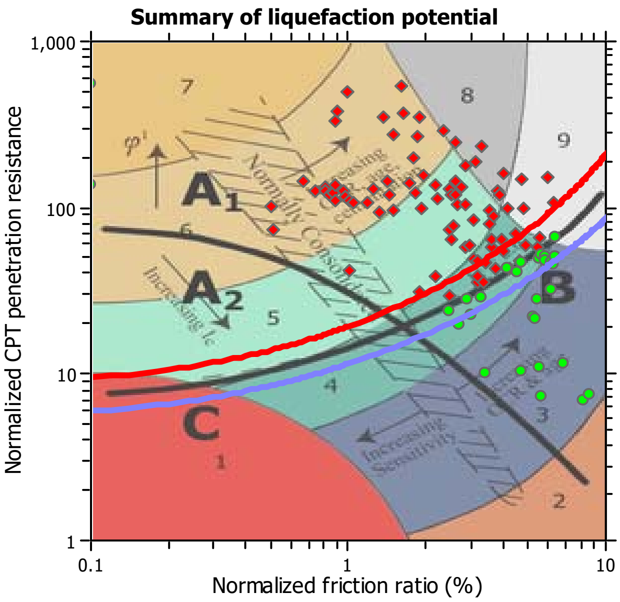
CPT file : 11-161-00 CPT-1t

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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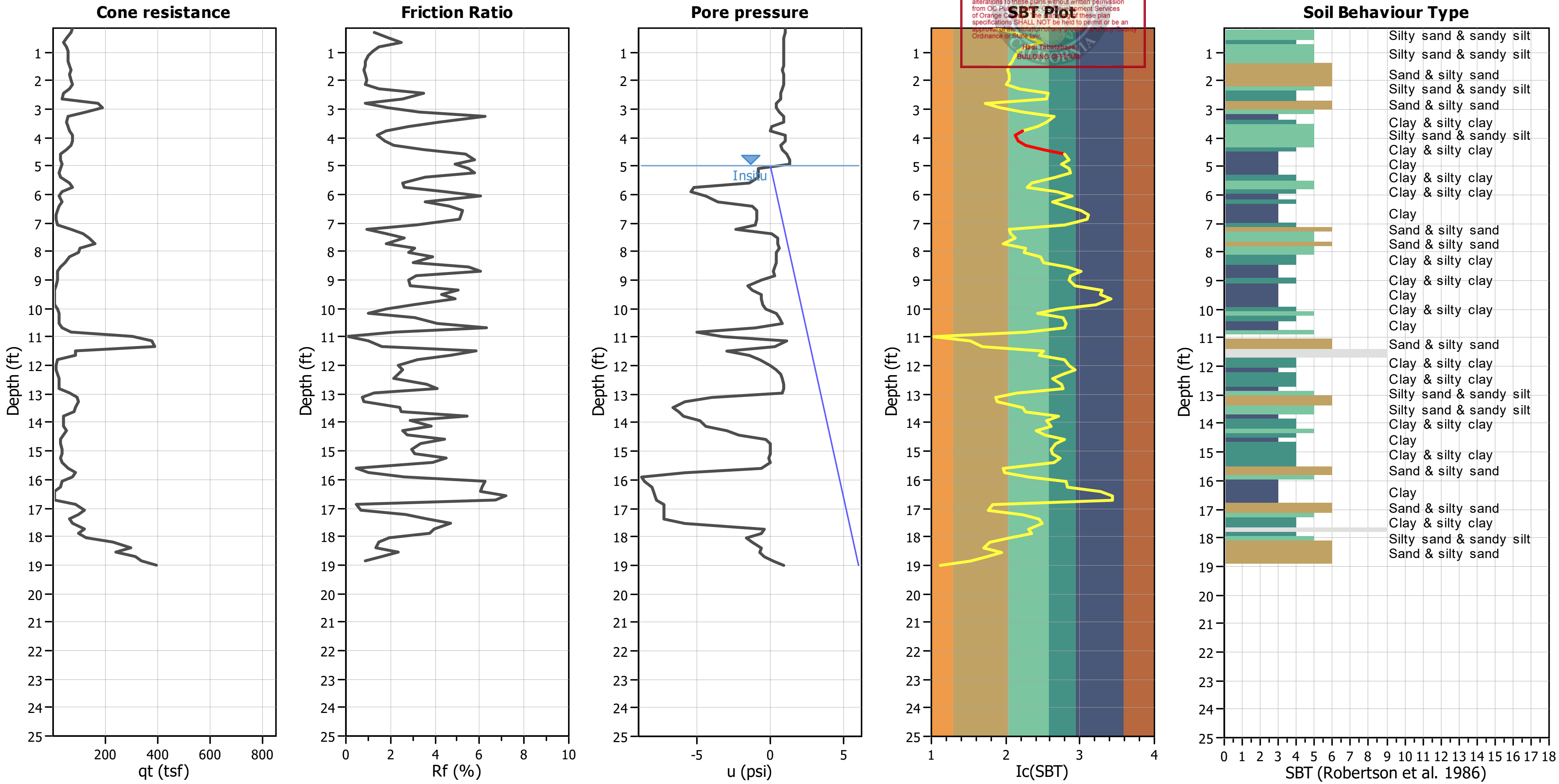
Hadi Tabatabaee
BUILDING OFFICIAL

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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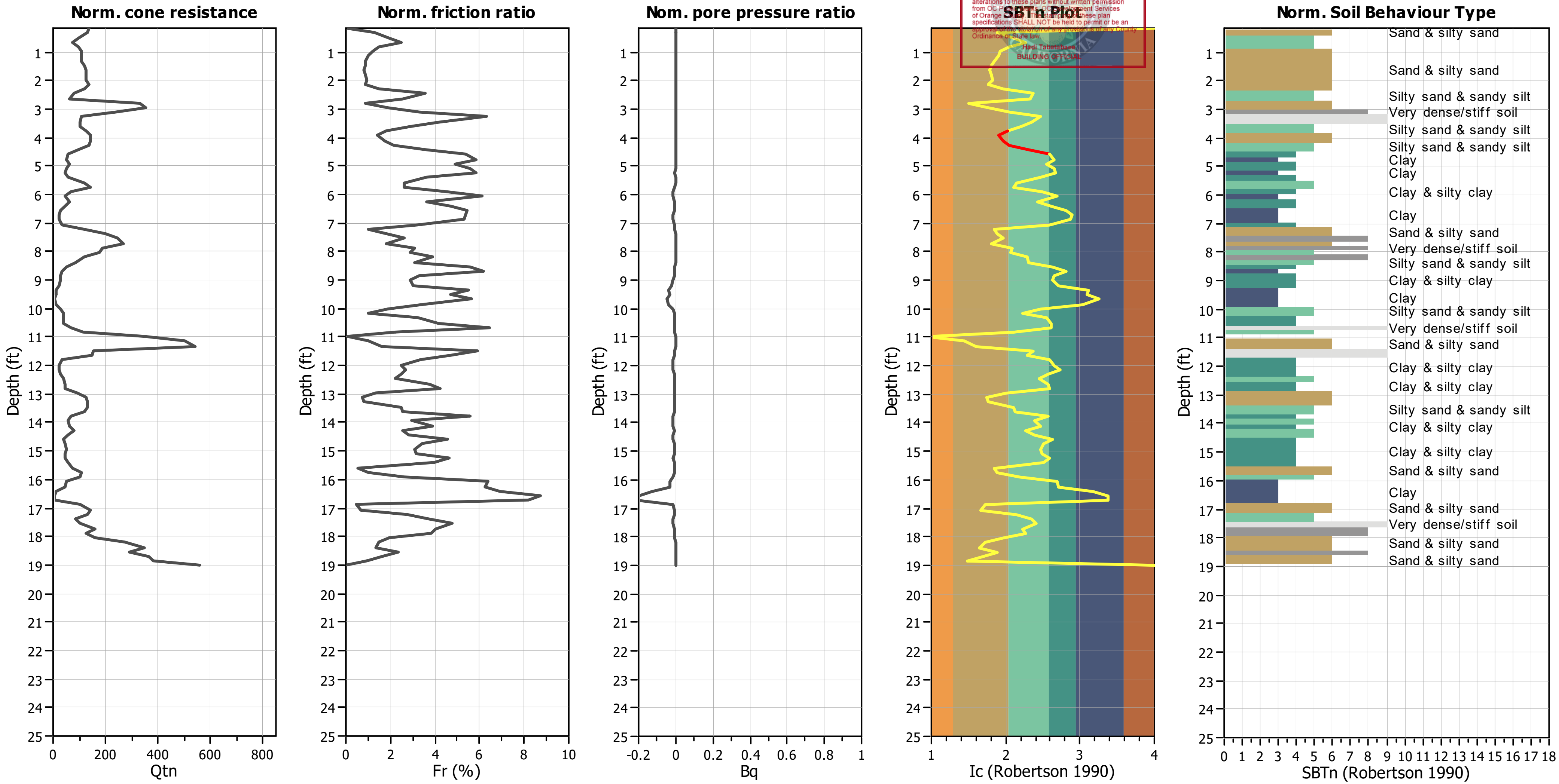
CPT basic interpretation plots (normalized)



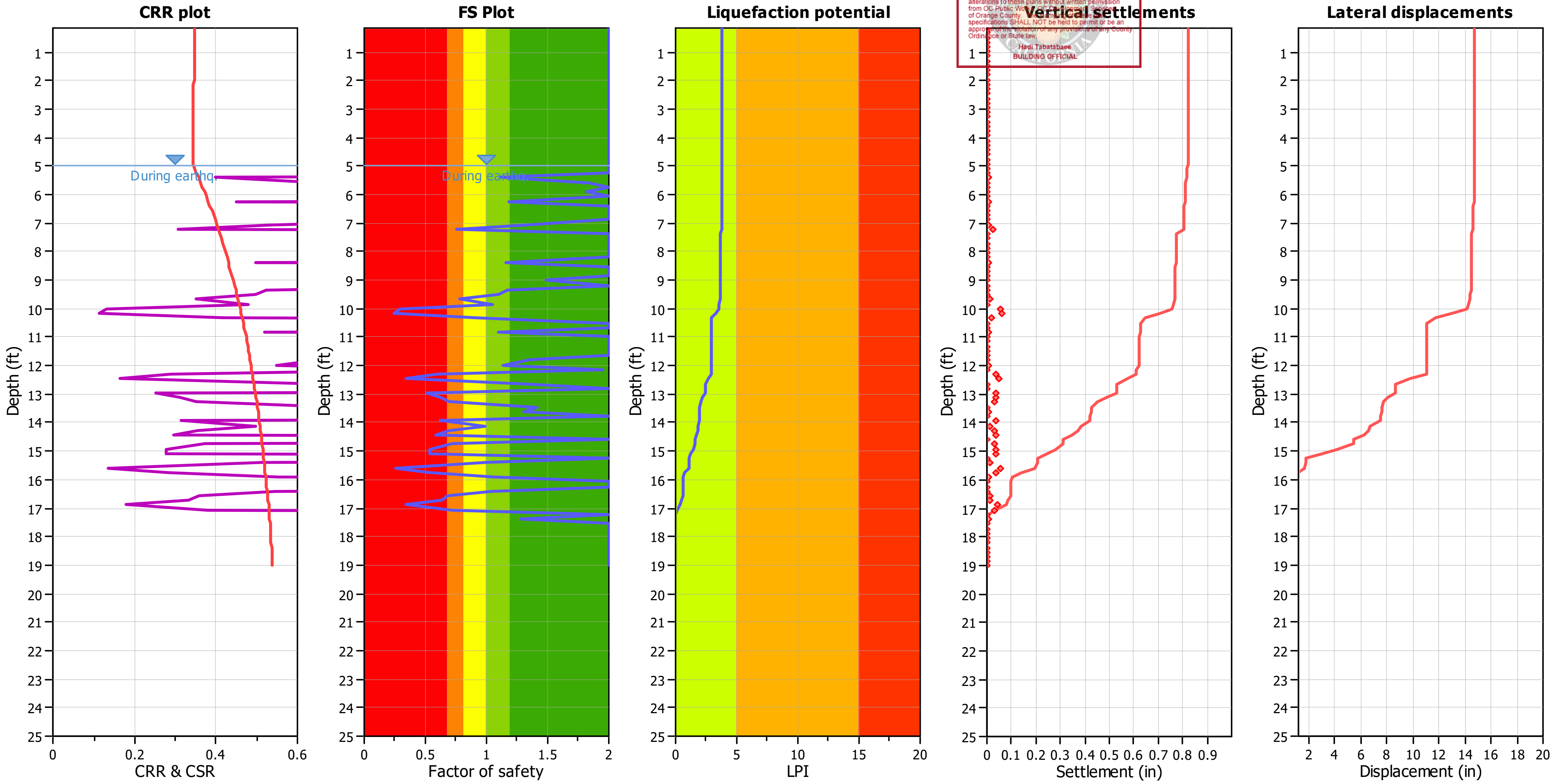
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

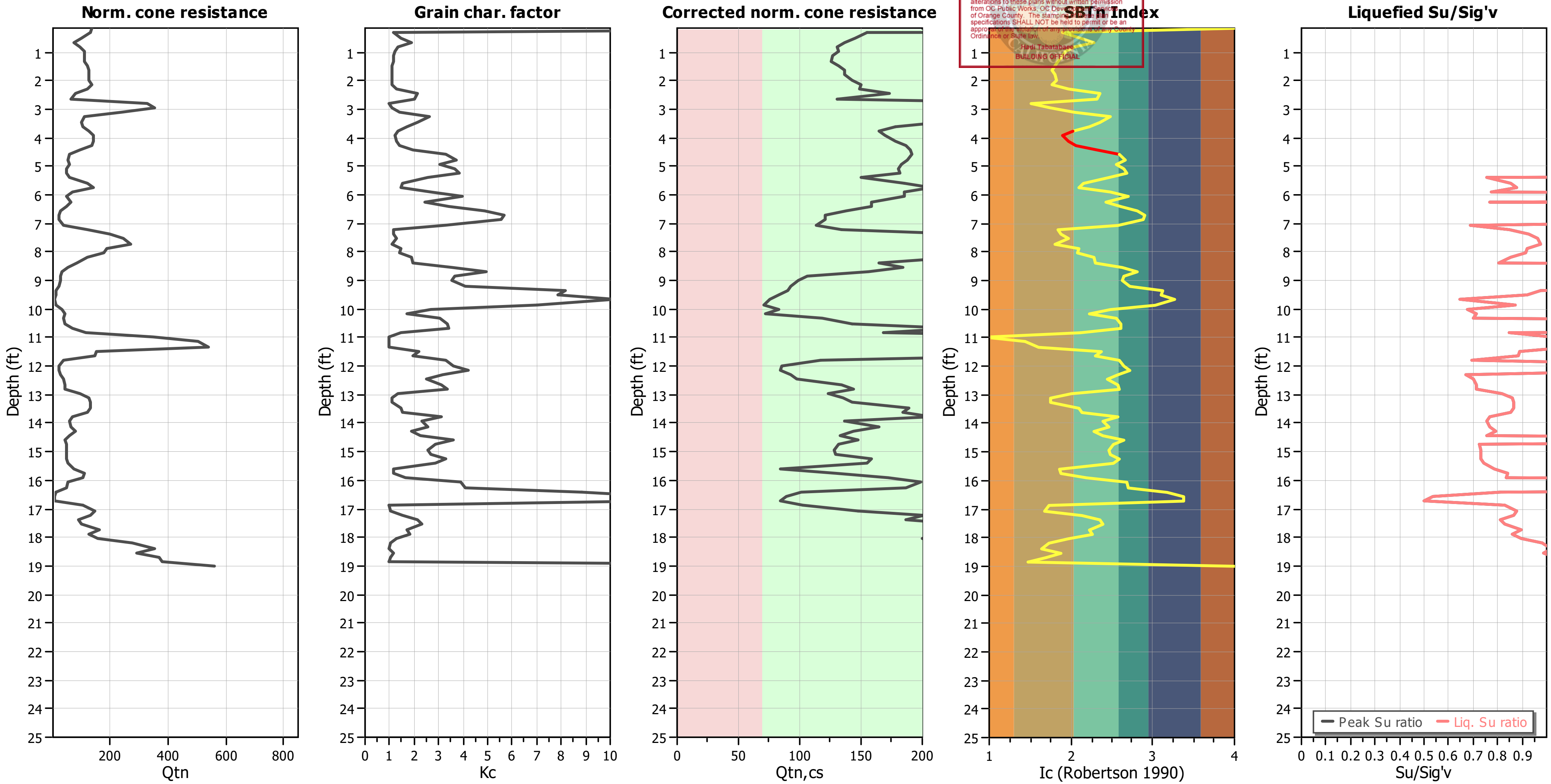
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

GMU Geotechnical
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

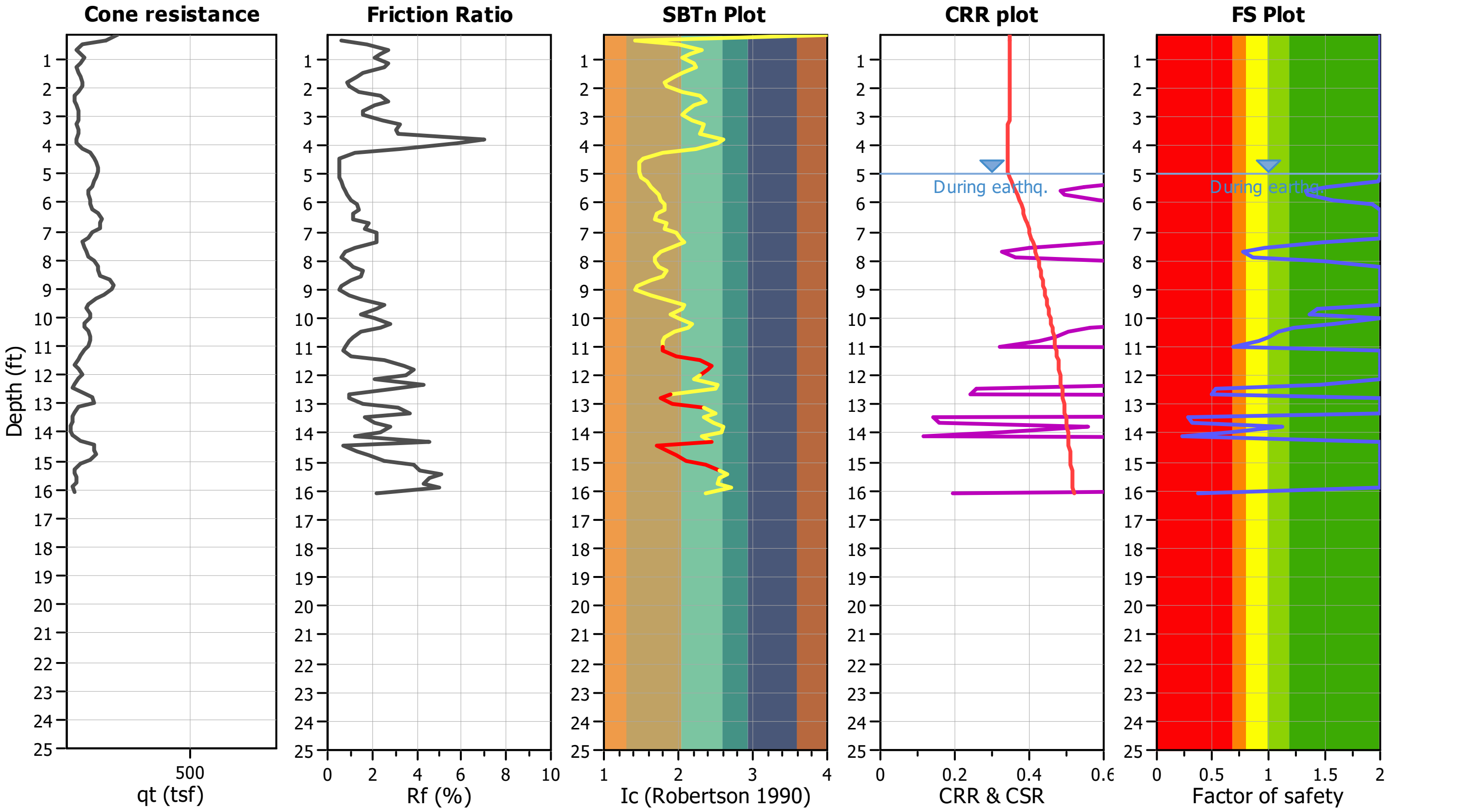
LIQUEFACTION ANALYSIS REPORT

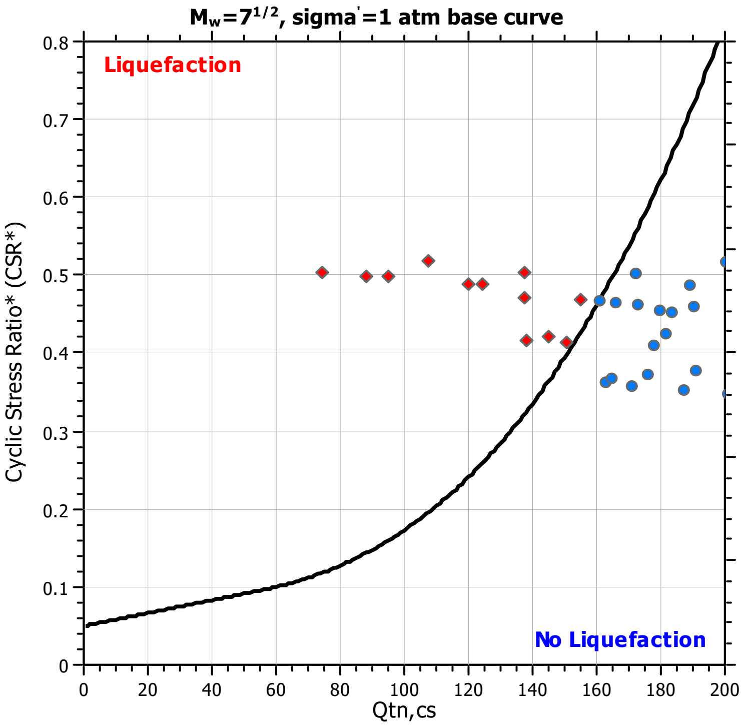
Project title : 11-161-00 **Location :**

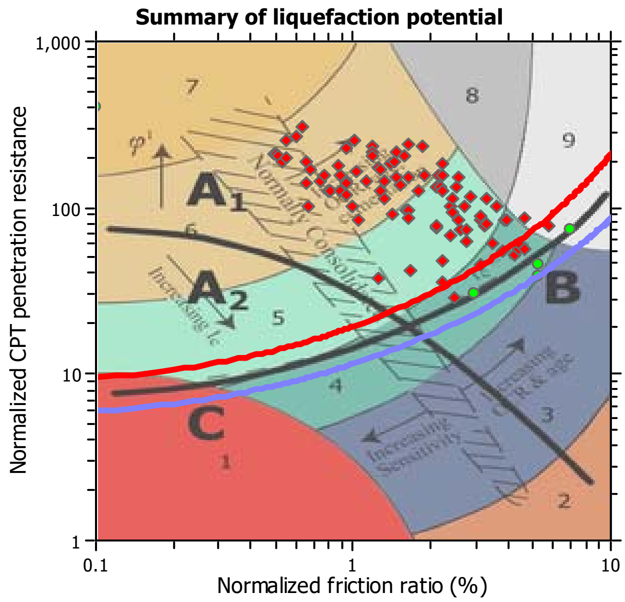
CPT file : 11-161-00 CPT-4t

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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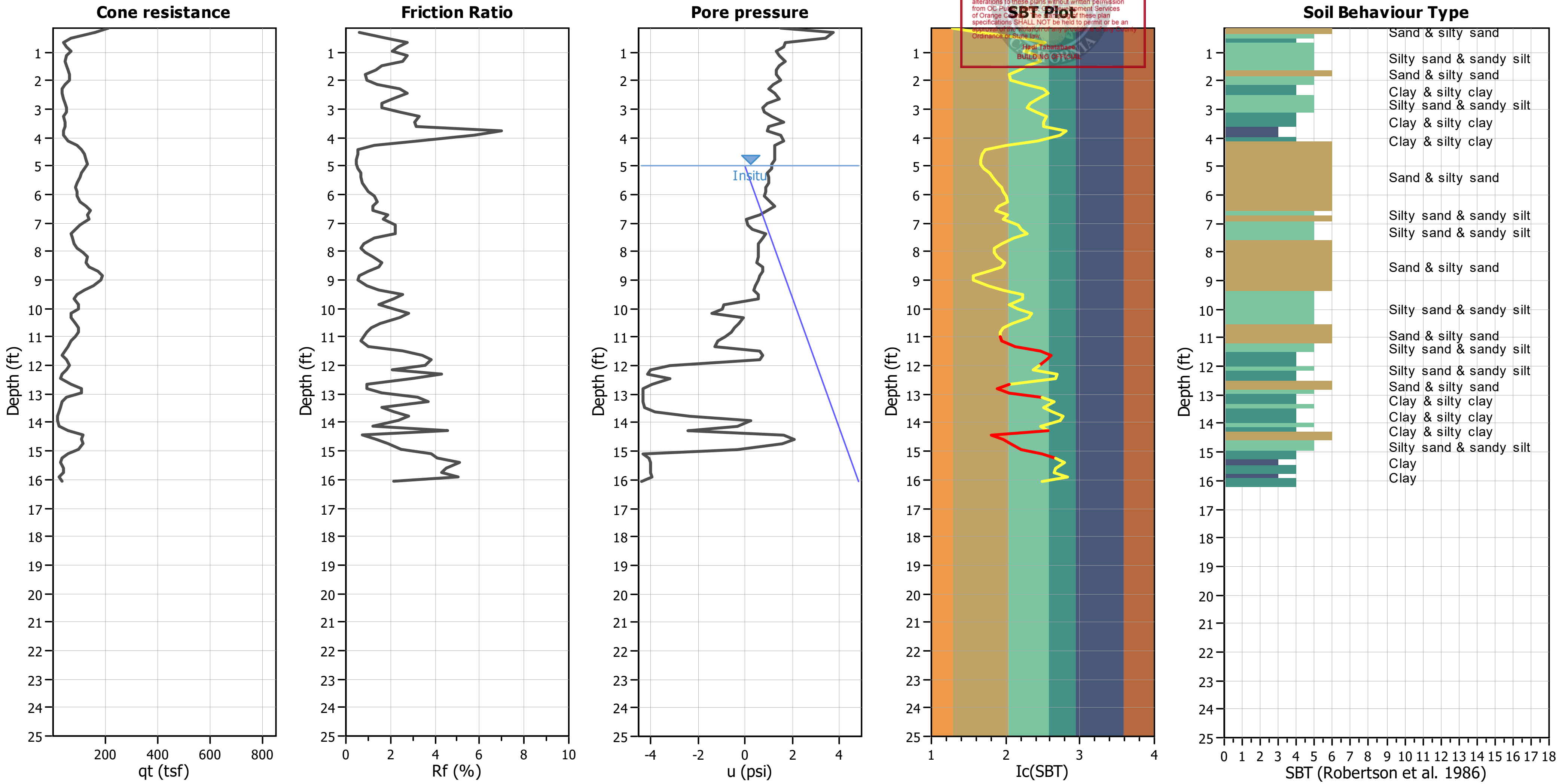
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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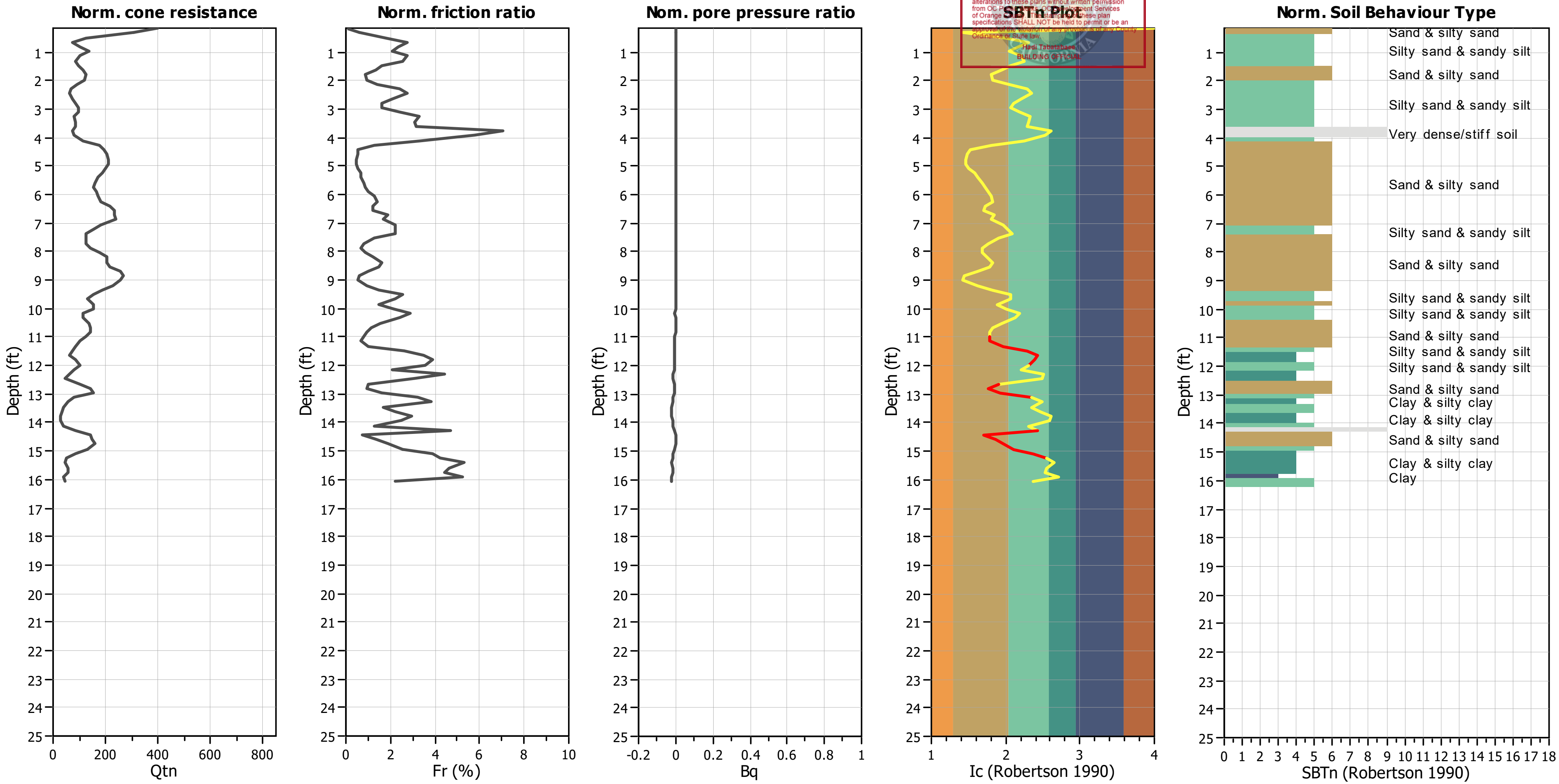
CPT basic interpretation plots (normalized)



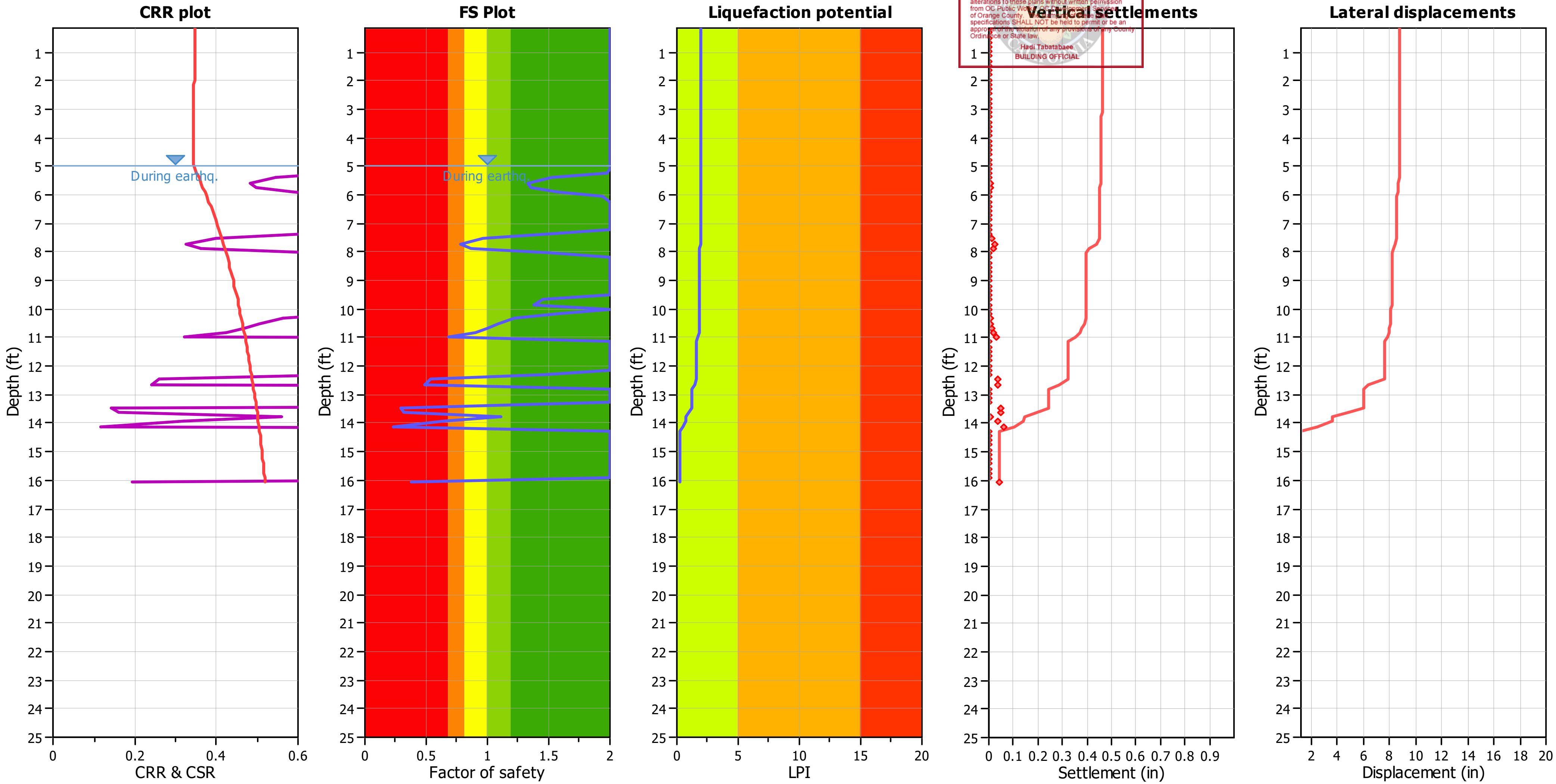
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

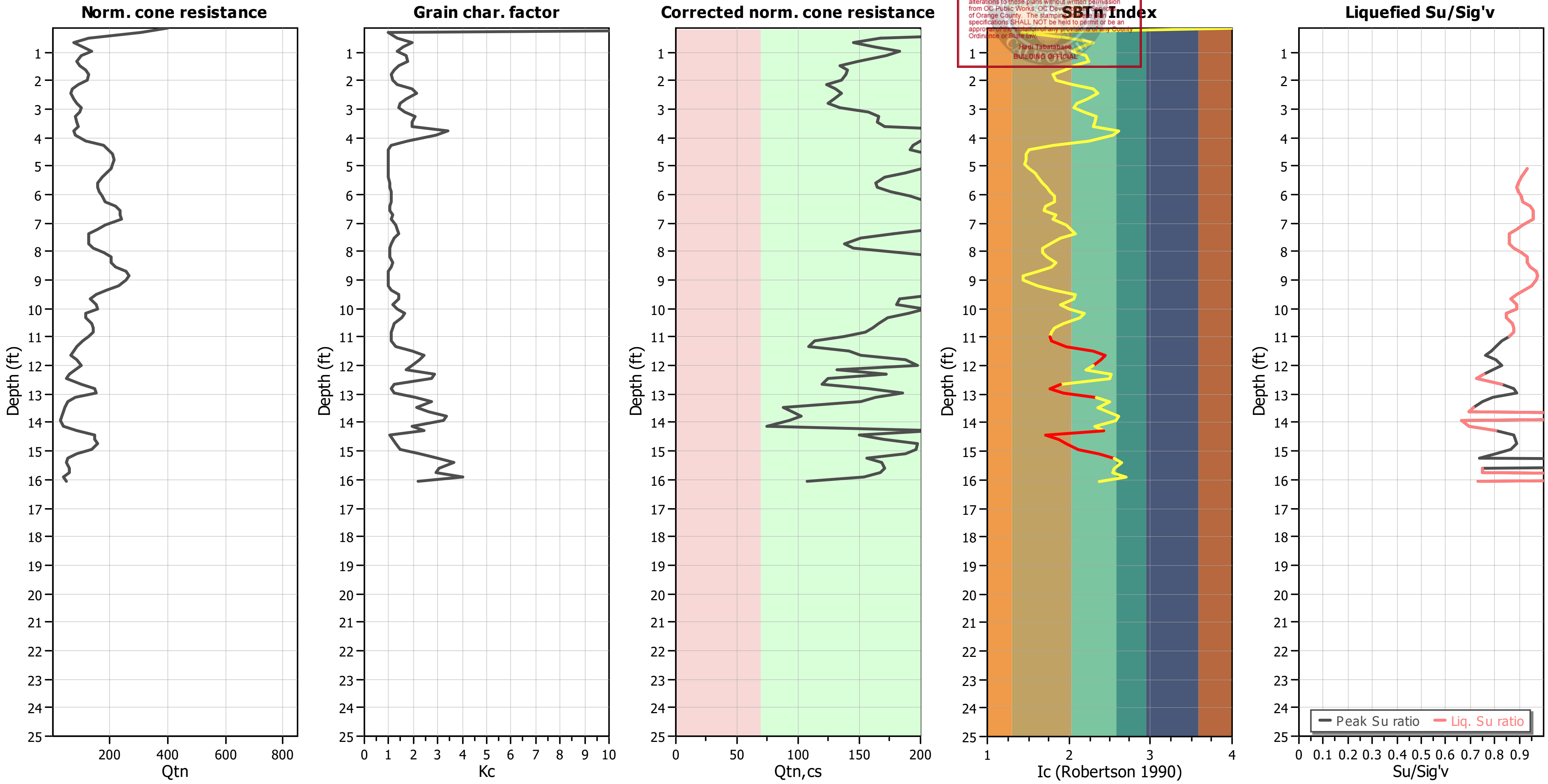
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

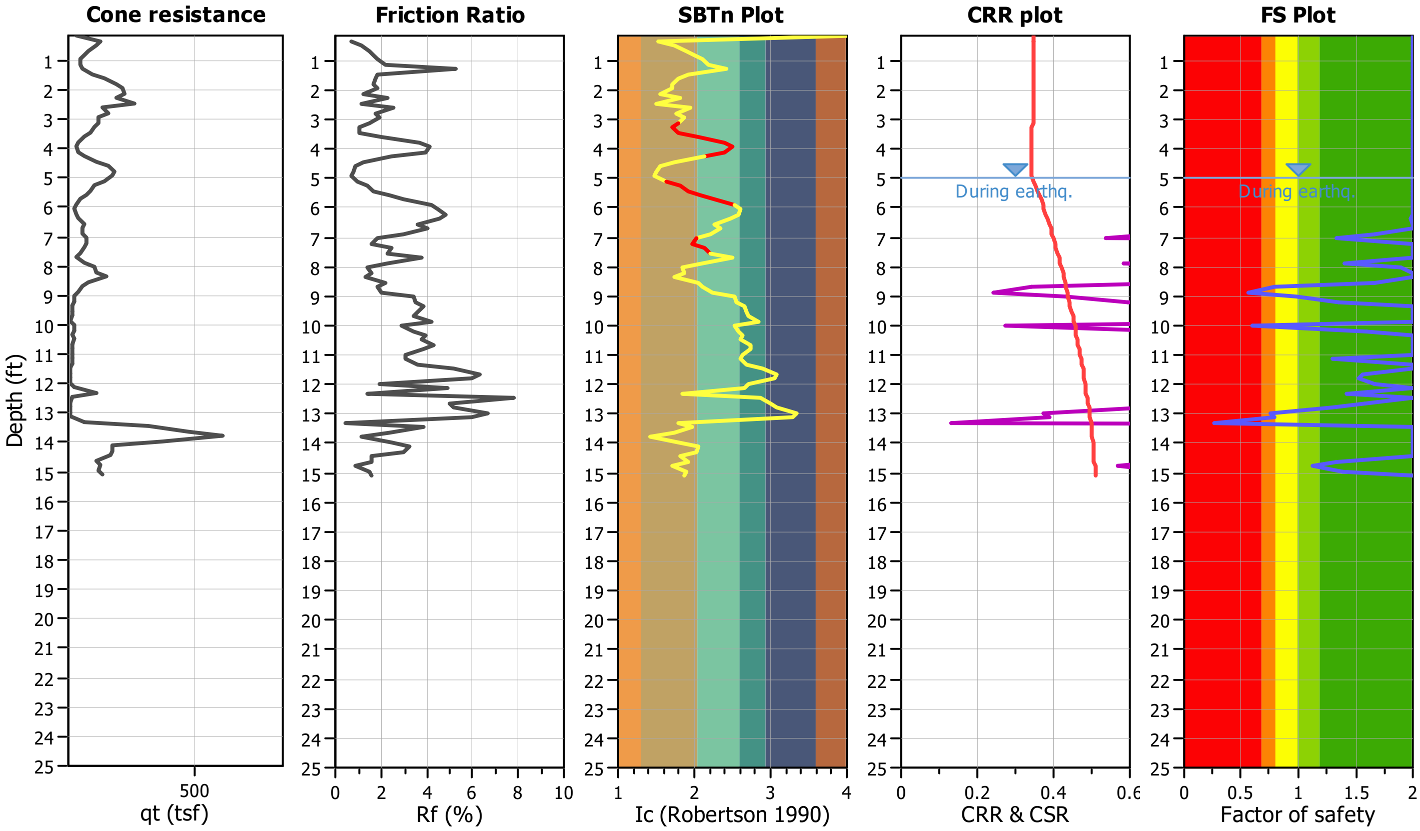
LIQUEFACTION ANALYSIS REPORT

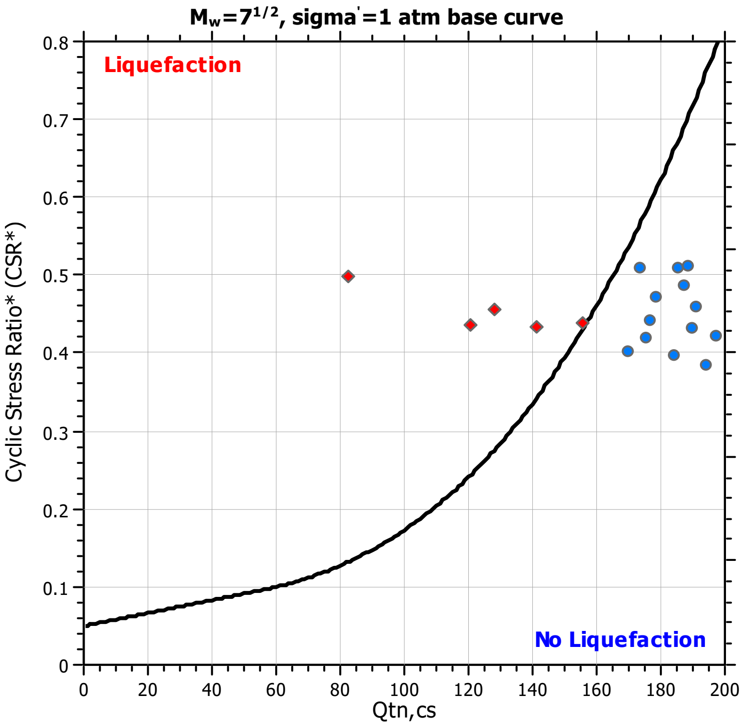
Project title : 11-161-00 **Location :**

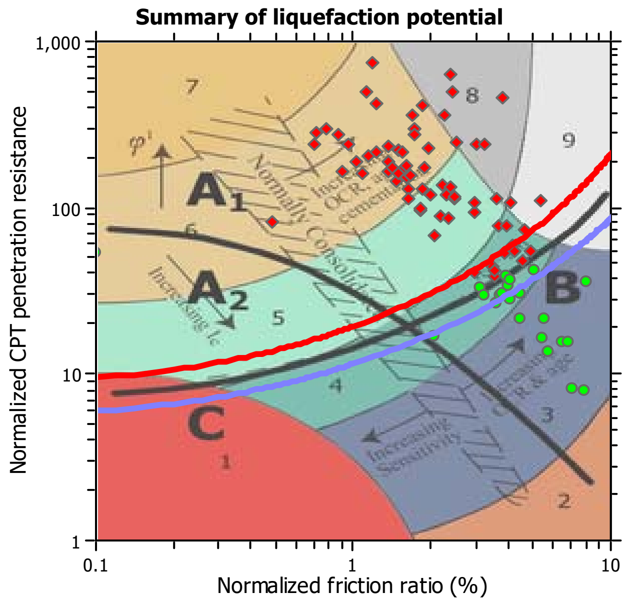
CPT file : 11-161-00 CPT-5t

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		

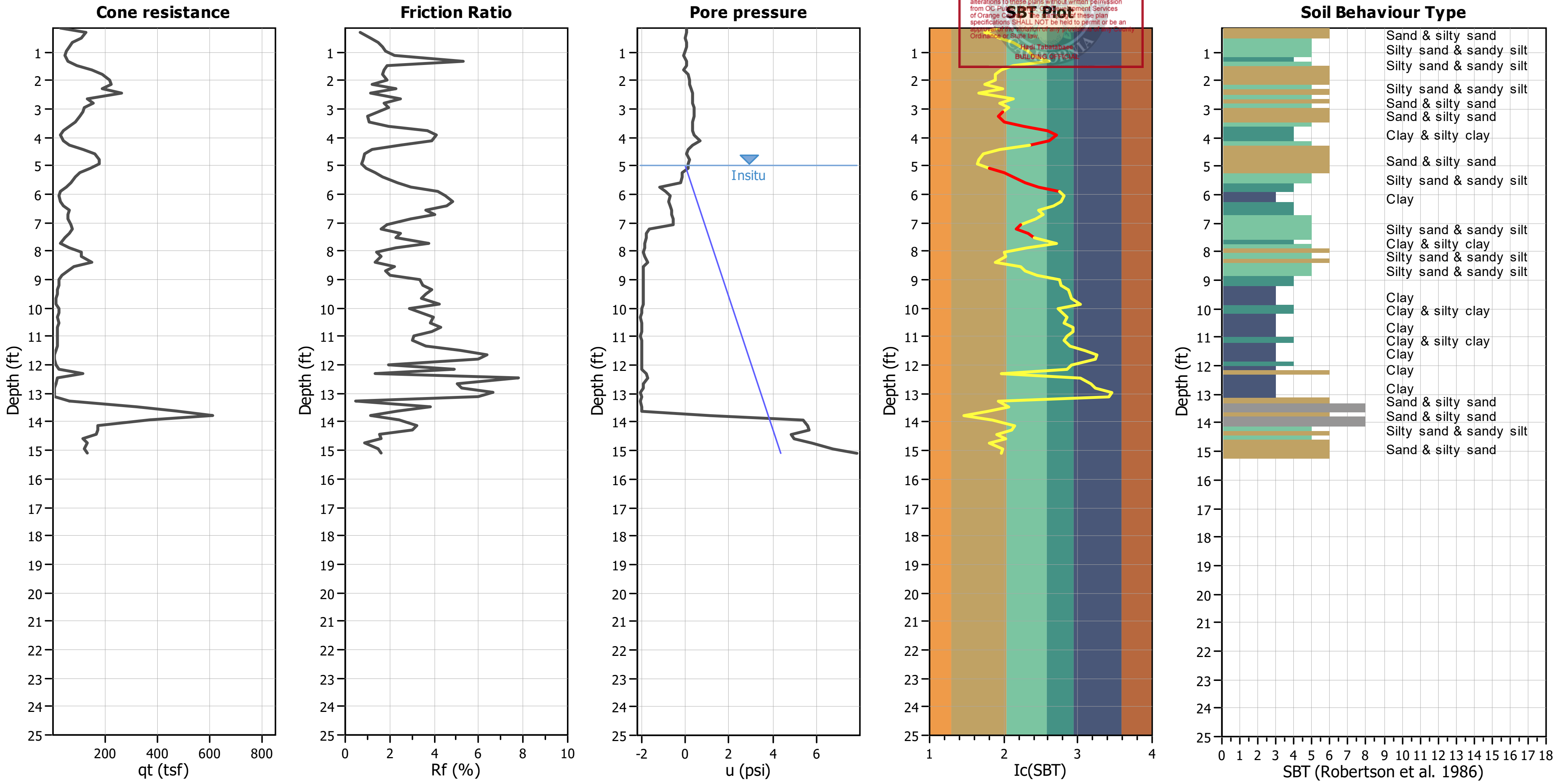






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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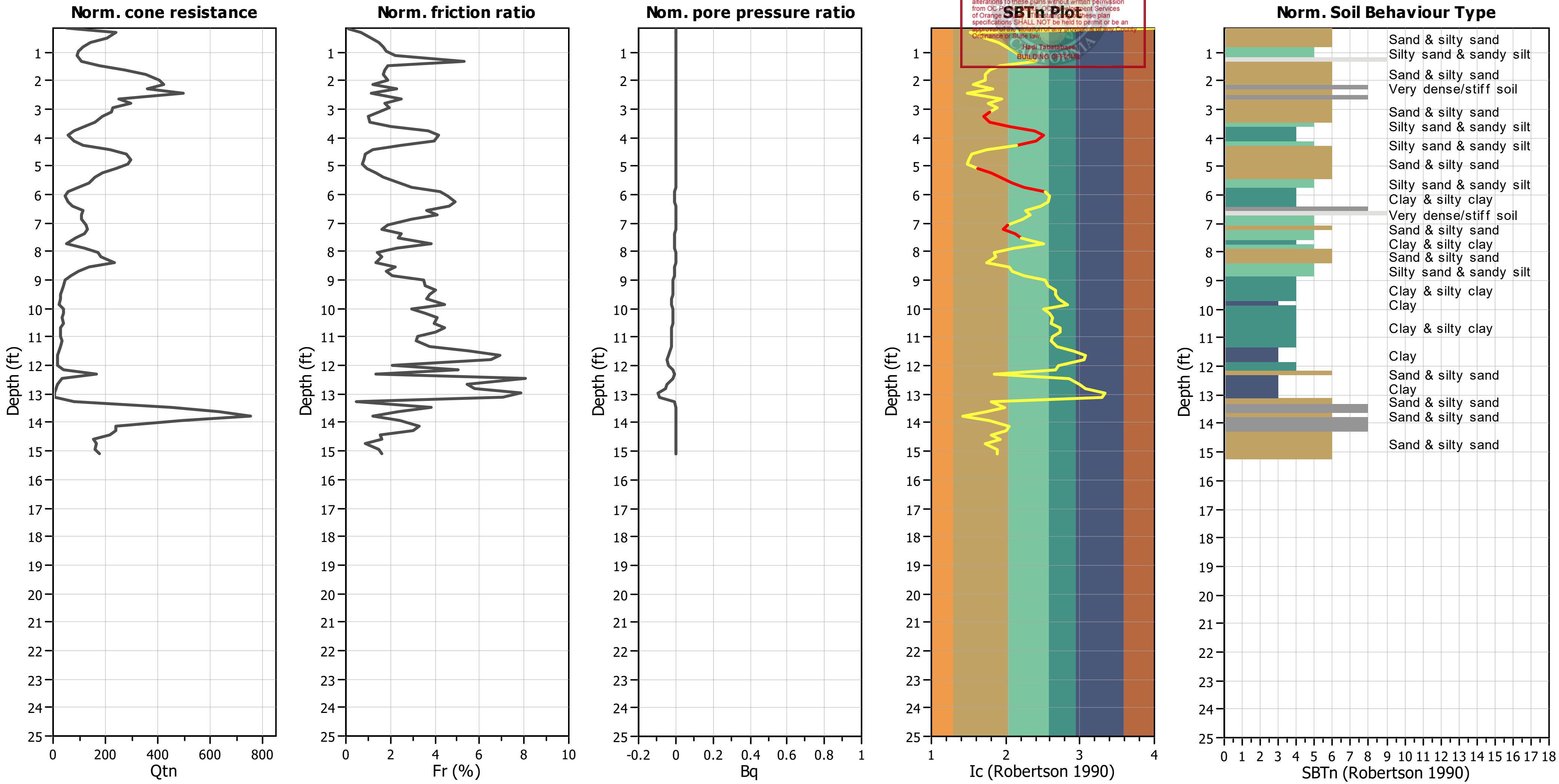
BUILDING OFFICIAL

CPT basic interpretation plots (normalized)



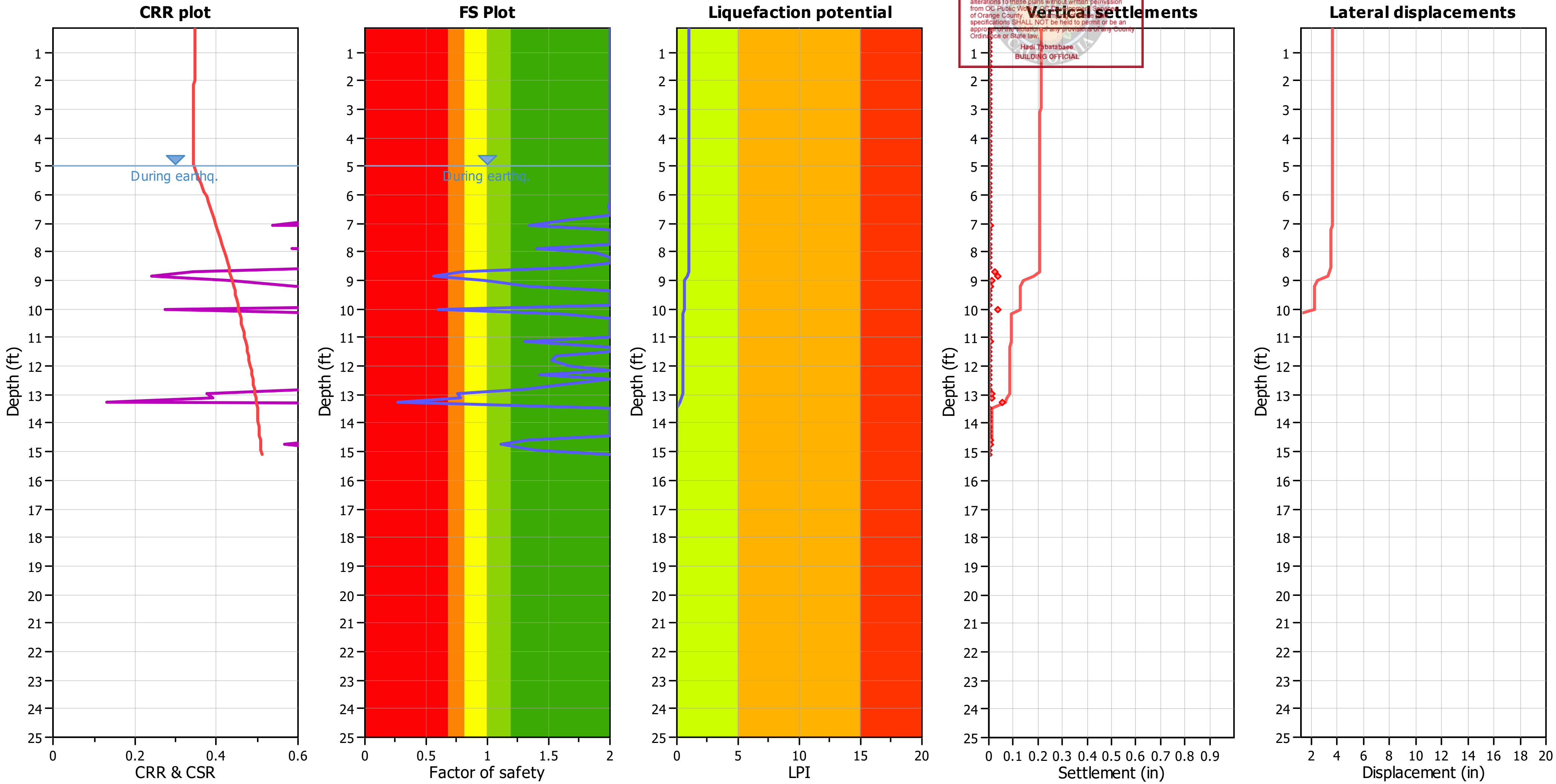
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

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Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

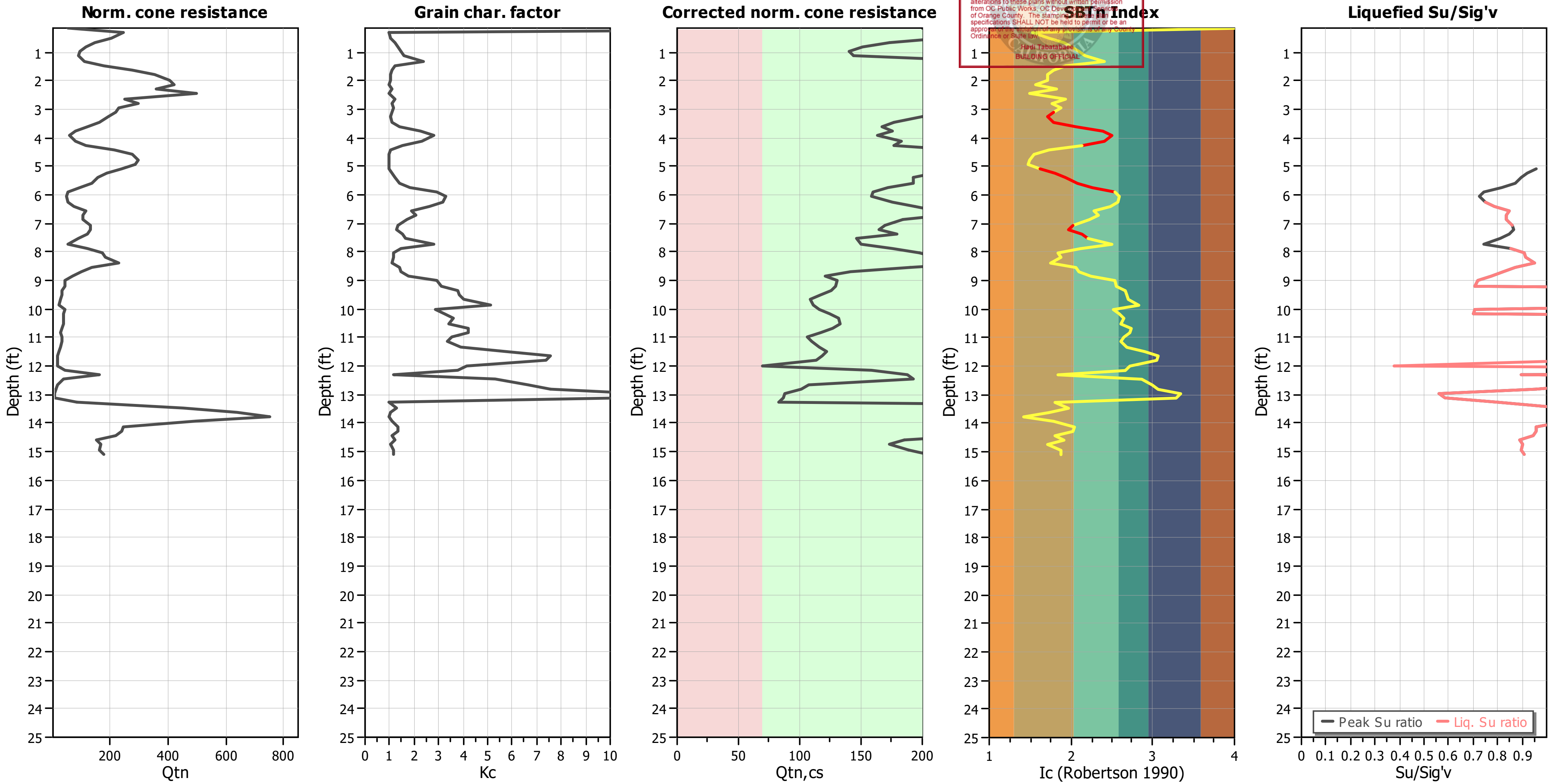
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
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GMU Geotechnical
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

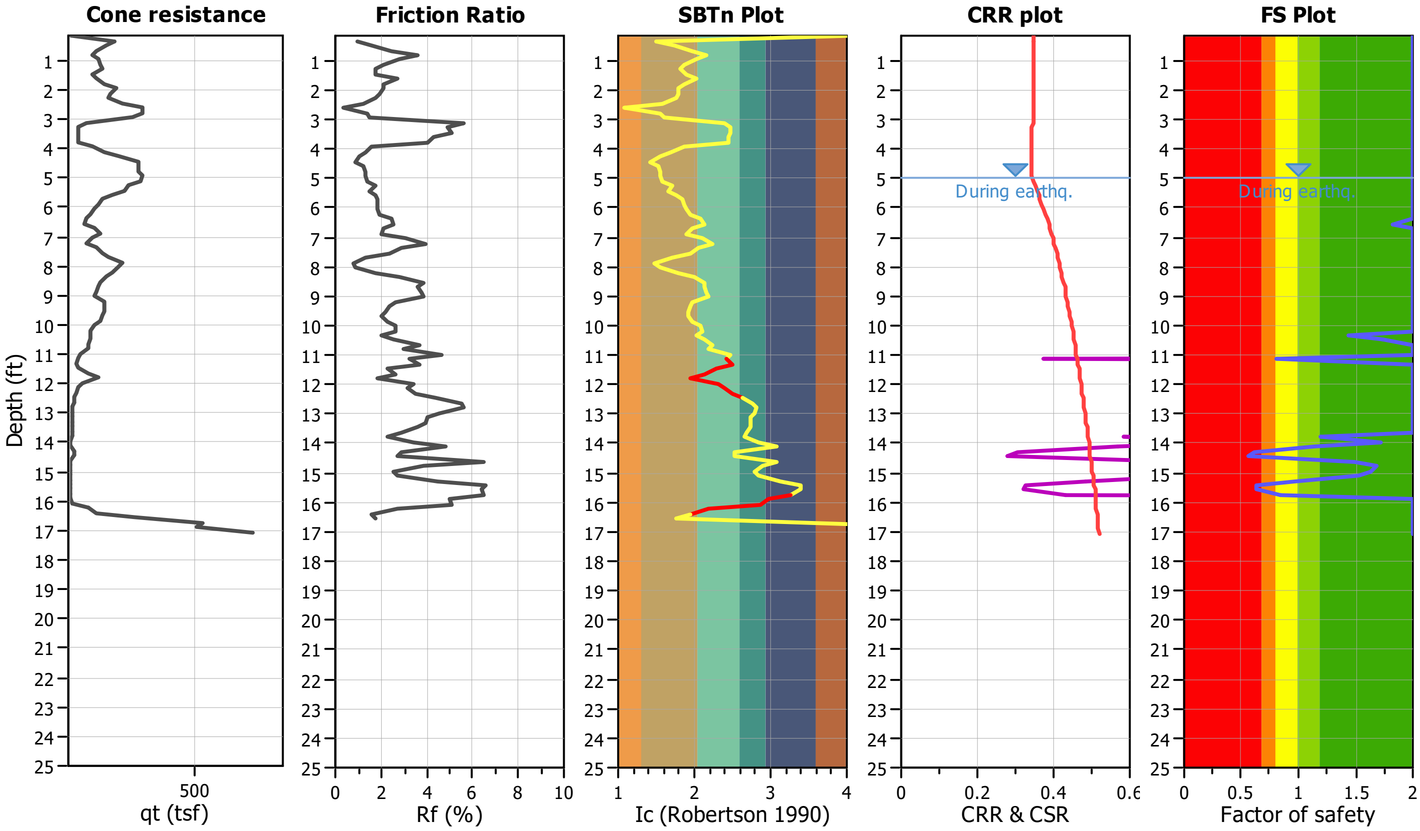
LIQUEFACTION ANALYSIS REPORT

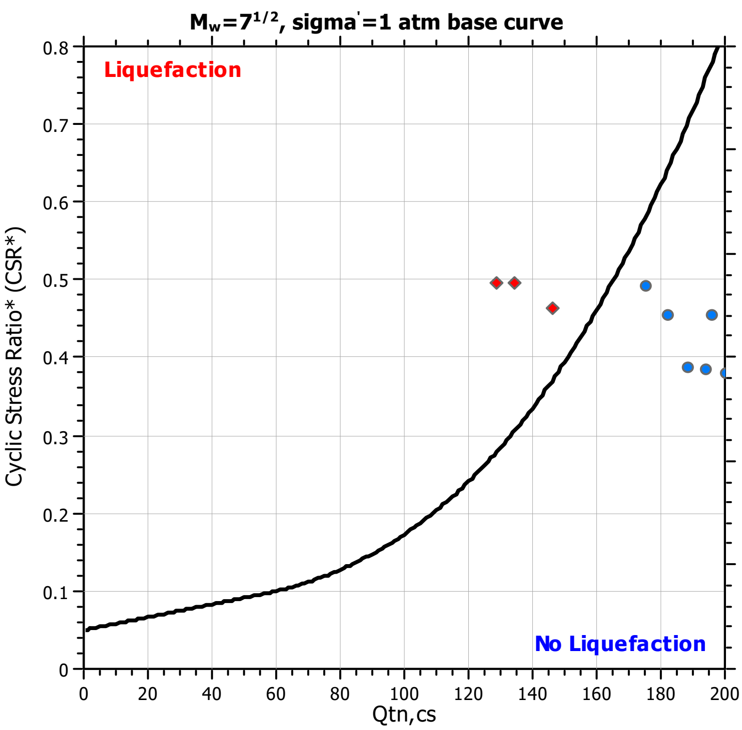
Project title : 11-161-00 **Location :**

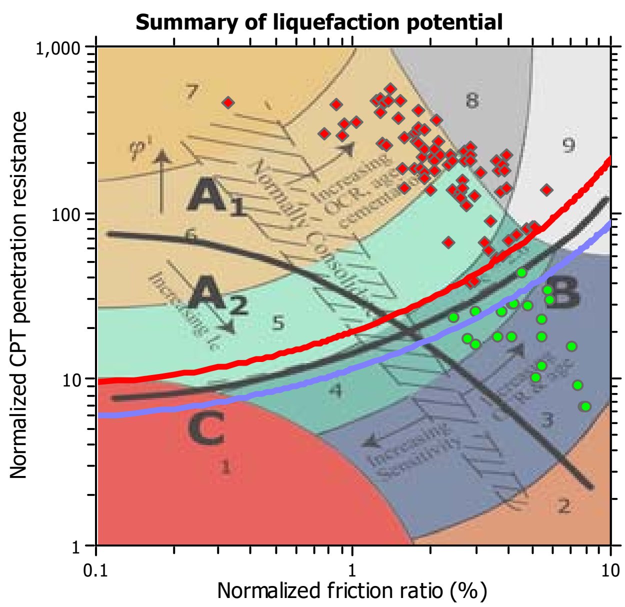
CPT file : 11-161-00 CPT-6t

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		





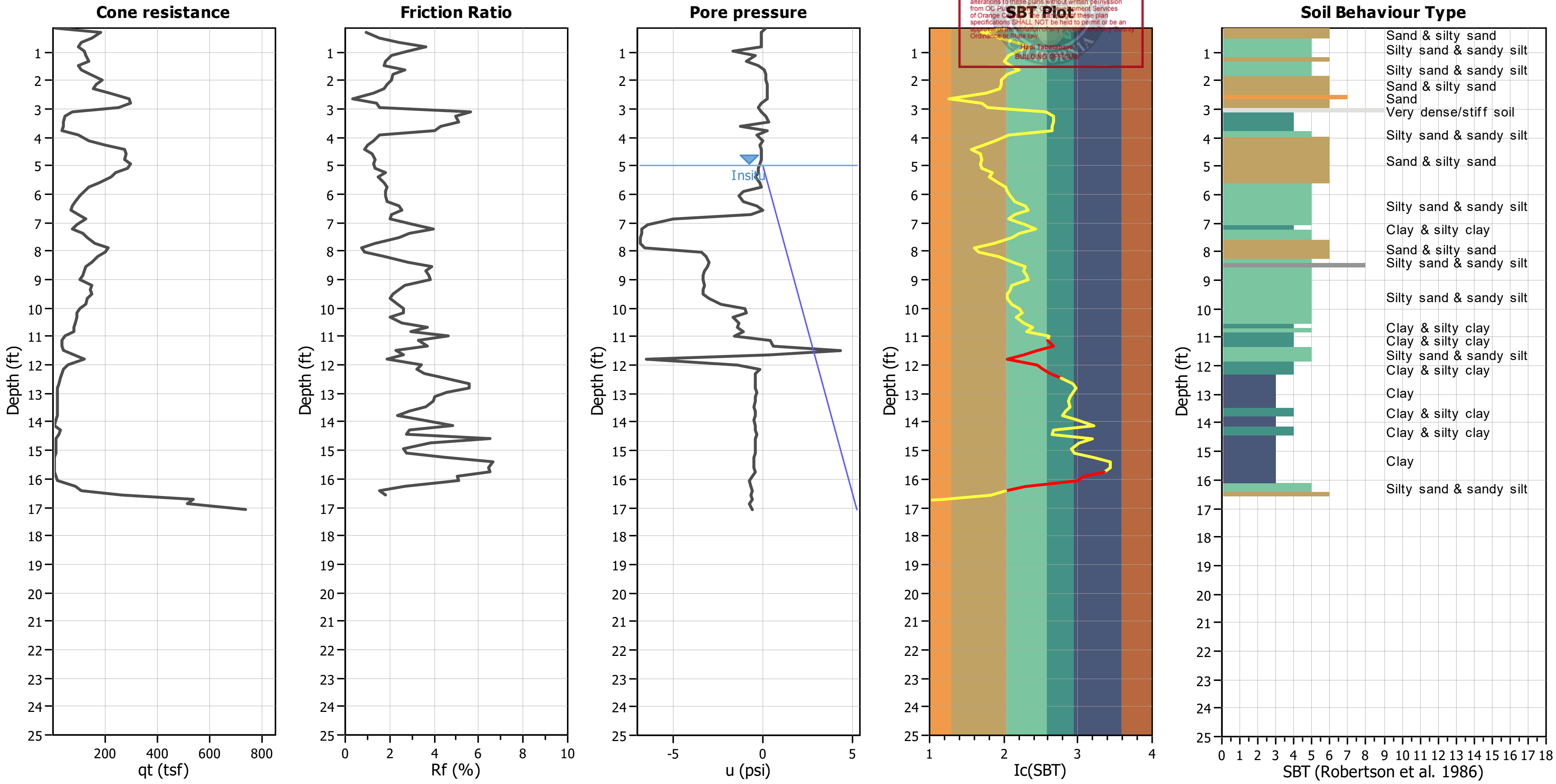


Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

CPT basic interpretation plots



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Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
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Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
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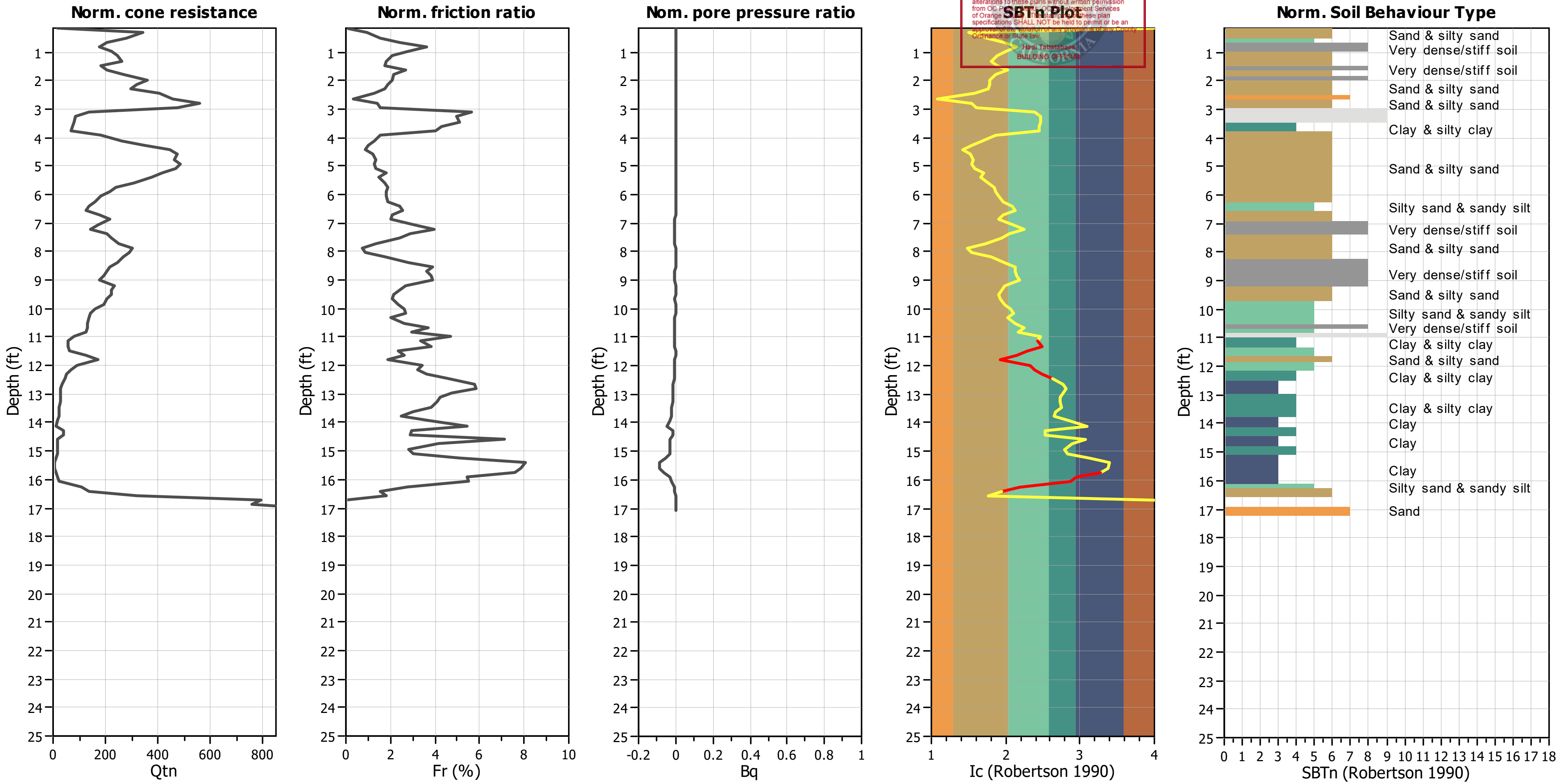
County of Orange - OC Public Works
OC Development Services
APPROVED
This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.
Hadi Tabatabaee
BUILDING OFFICIAL

CPT basic interpretation plots (normalized)



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Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
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Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
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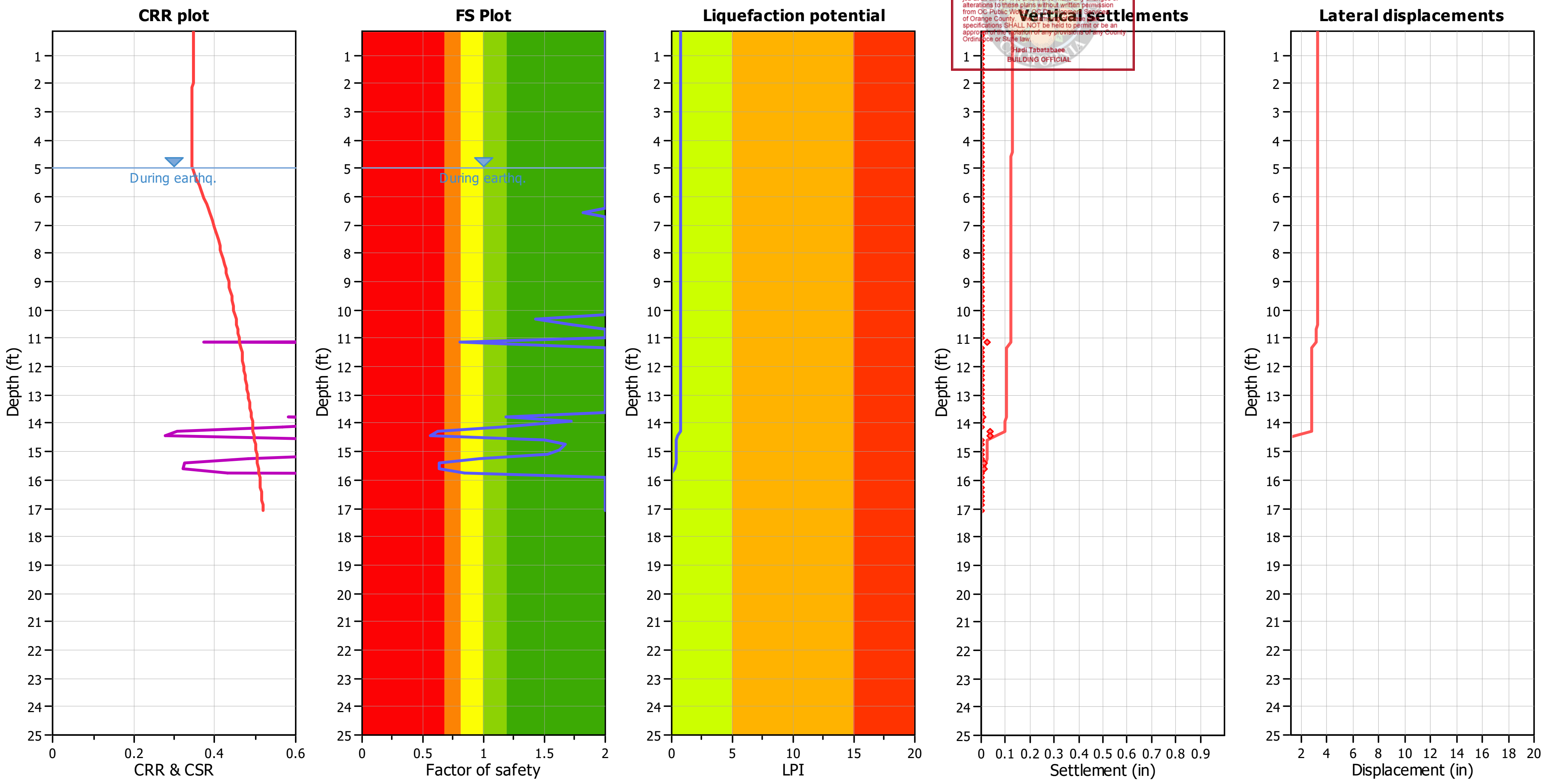
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

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Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
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Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
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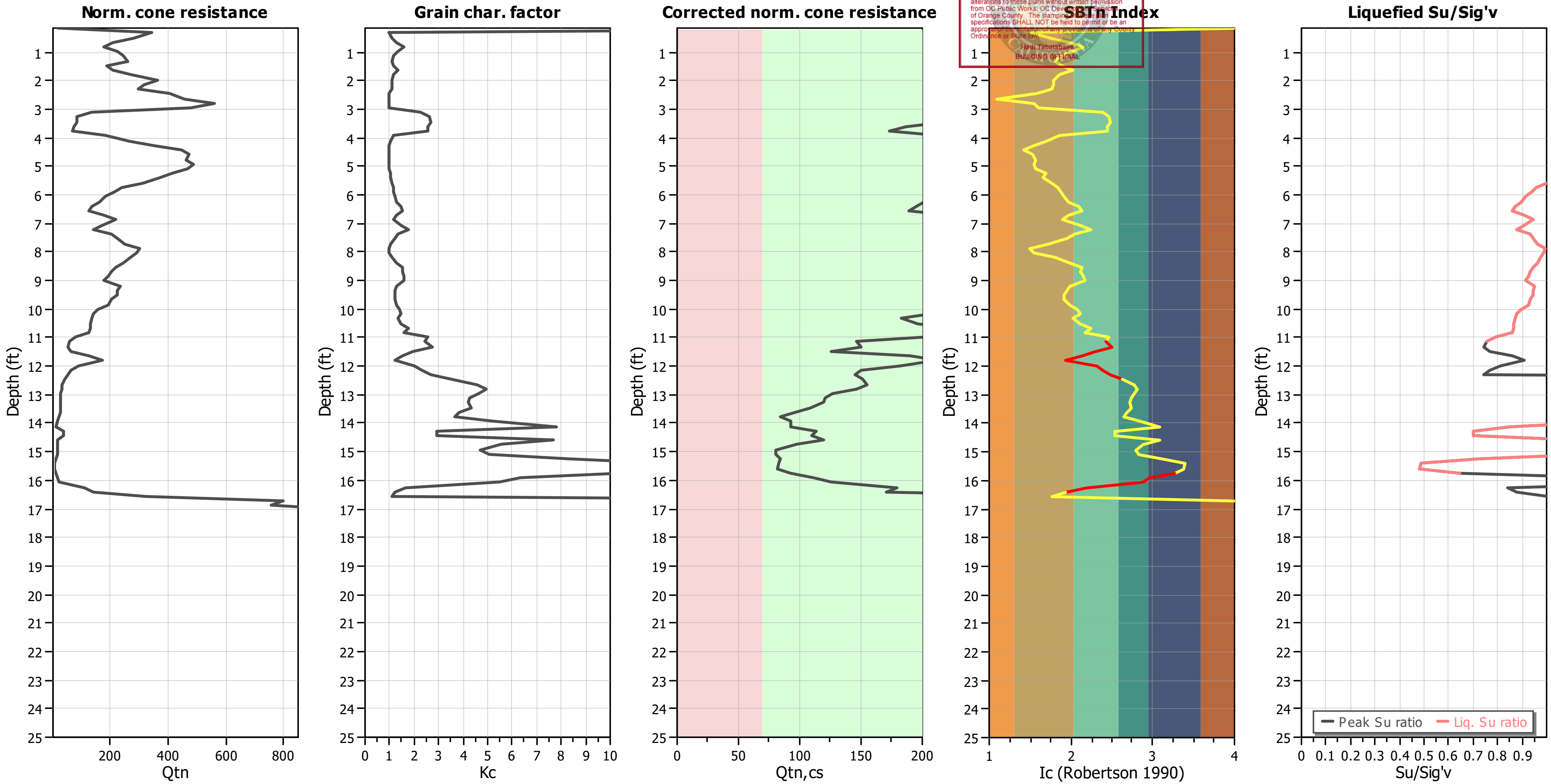
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
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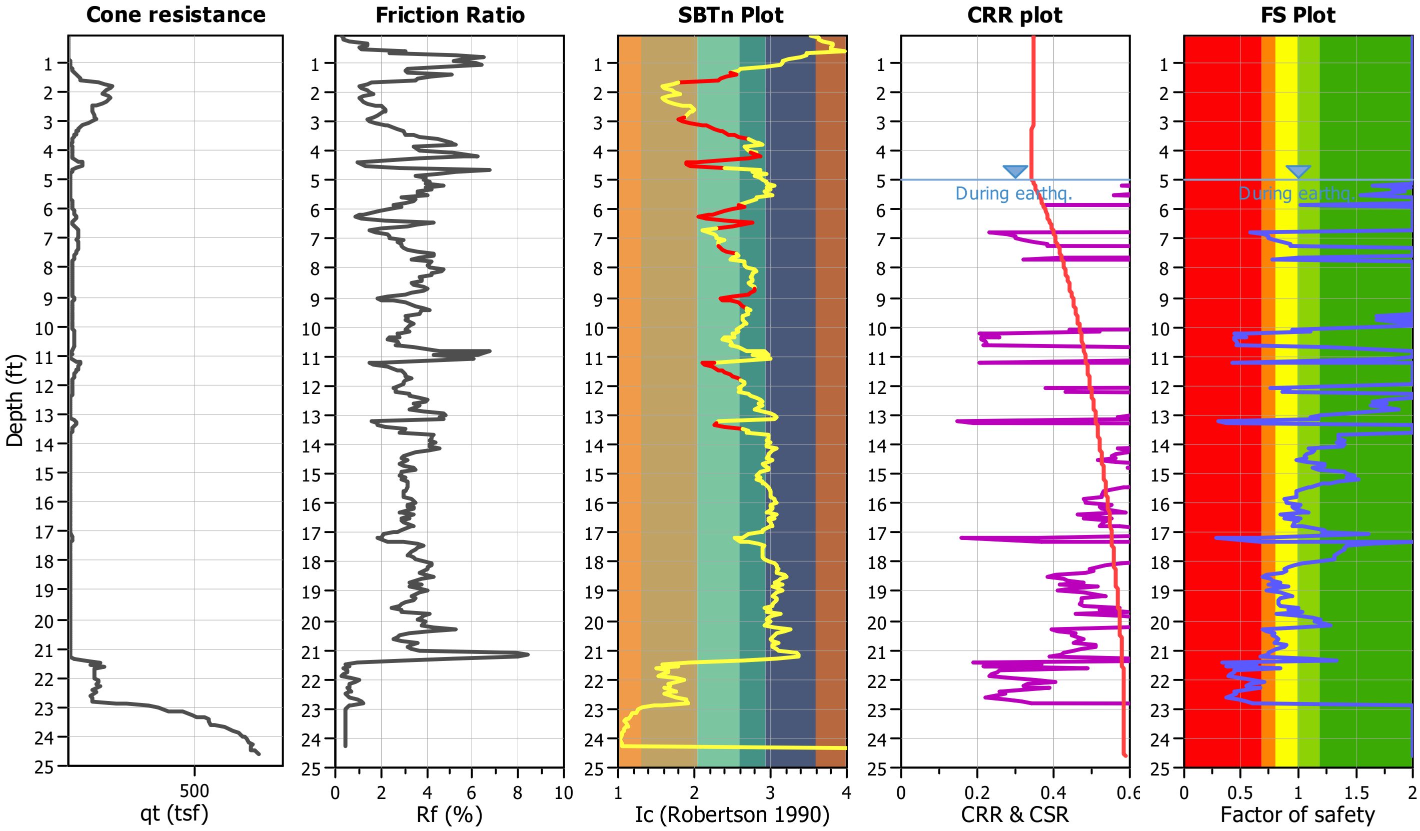
LIQUEFACTION ANALYSIS REPORT

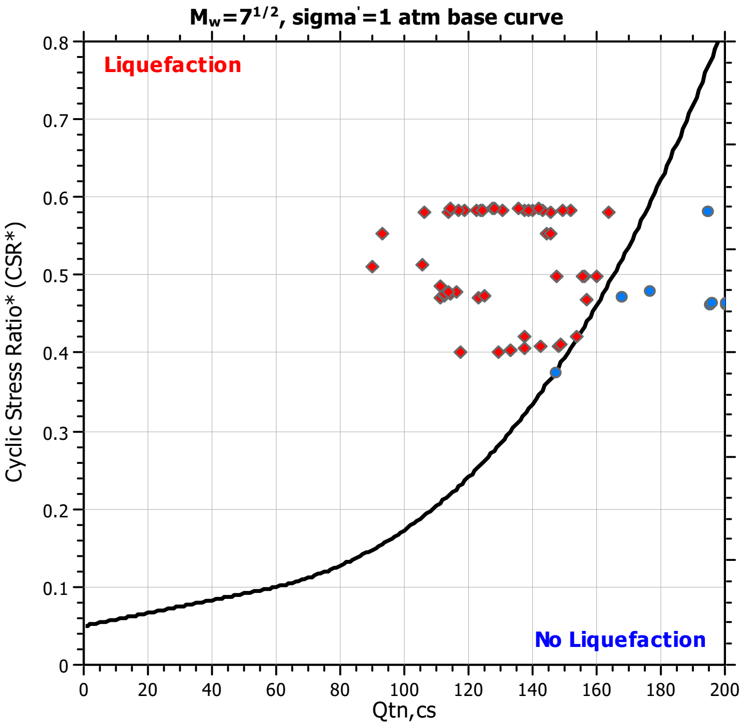
Project title : 11-161-00 **Location :**

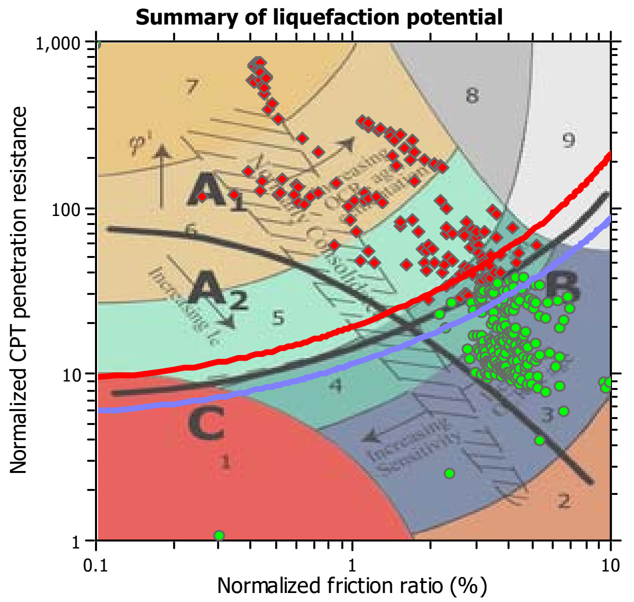
CPT file : 17-206-02 CPT-6A

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		





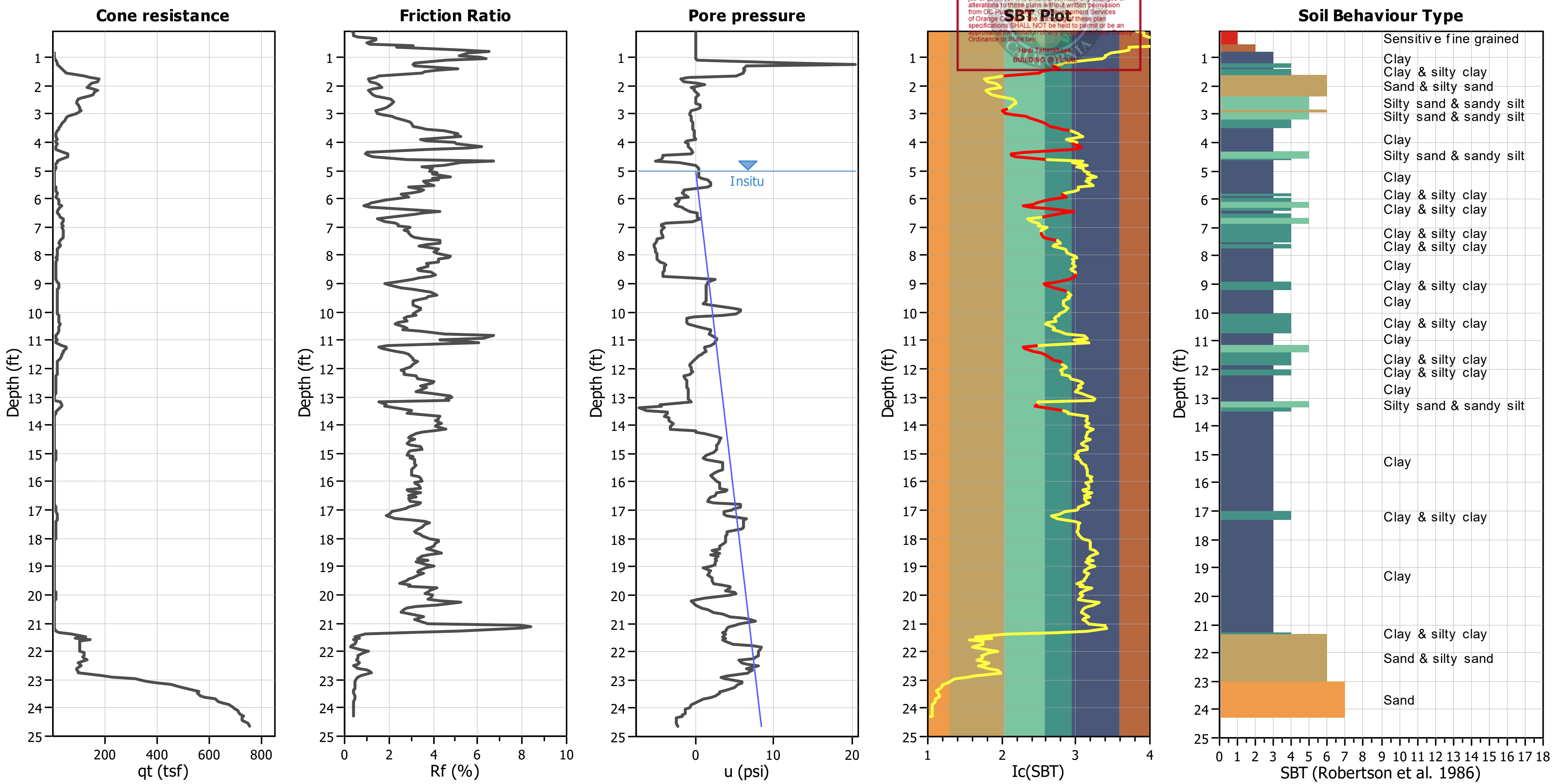


Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

CPT basic interpretation plots



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Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
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Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

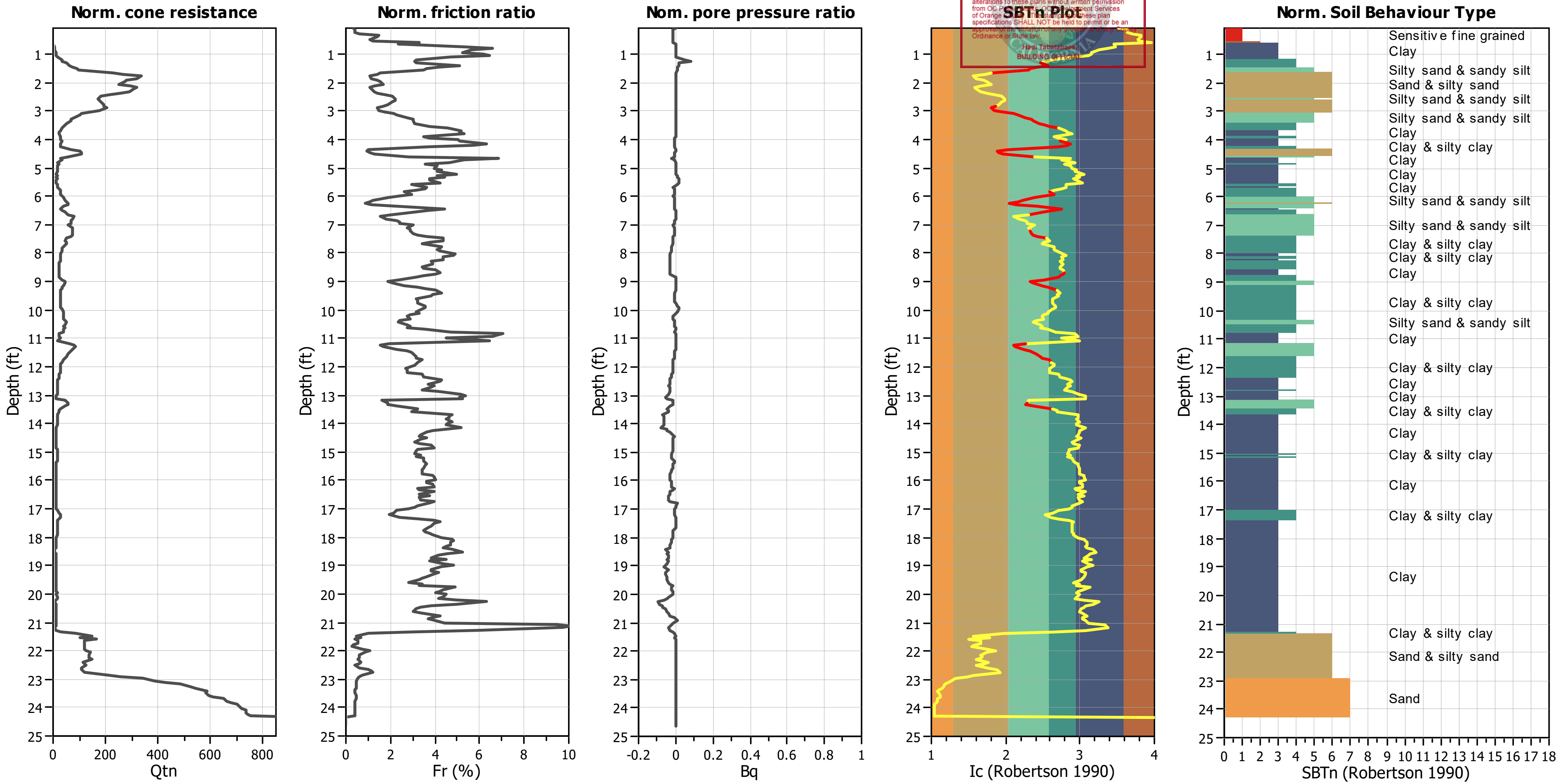
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
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Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
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Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
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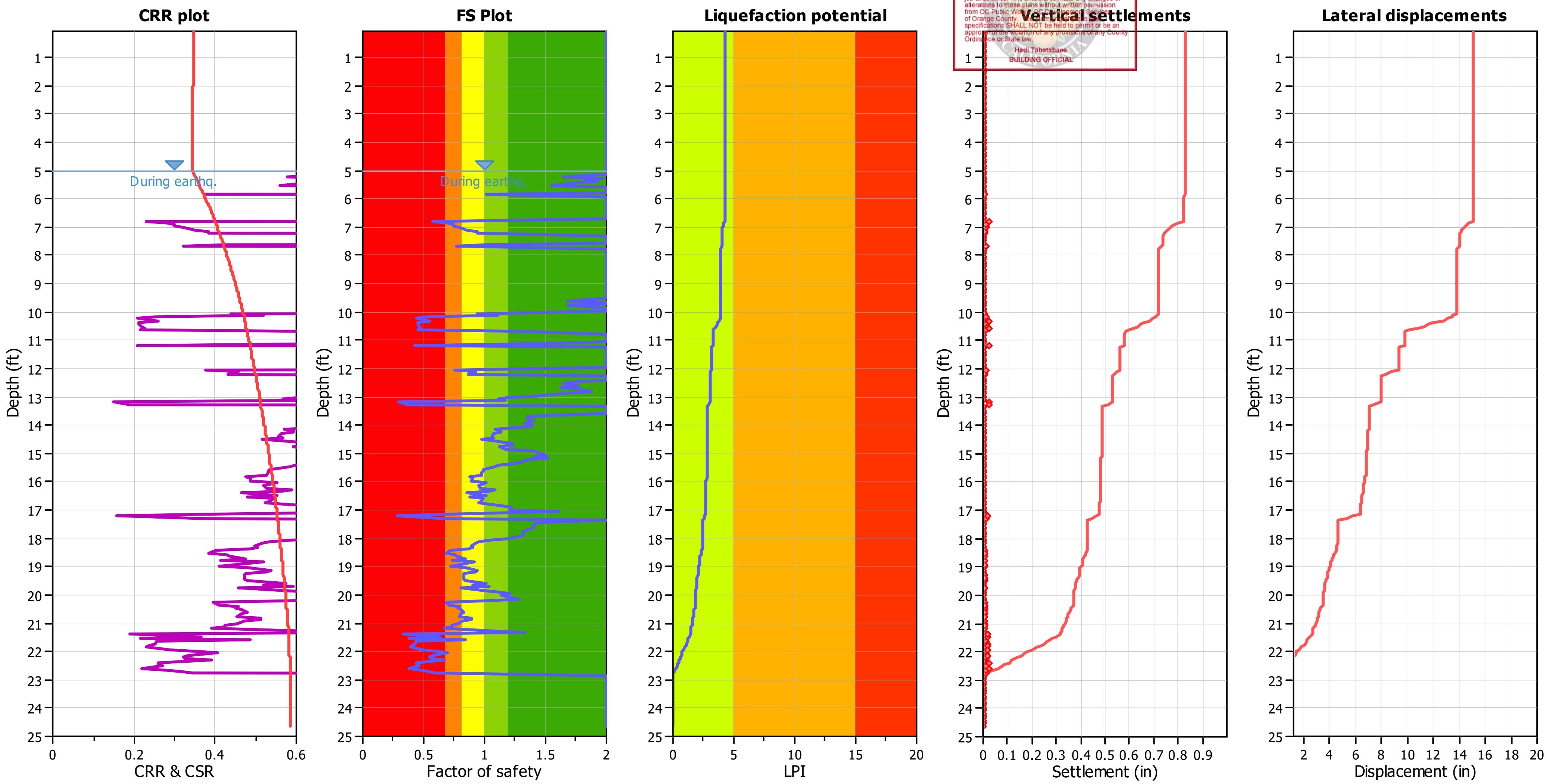
Liquefaction analysis overall plots



Input parameters and analysis data

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F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
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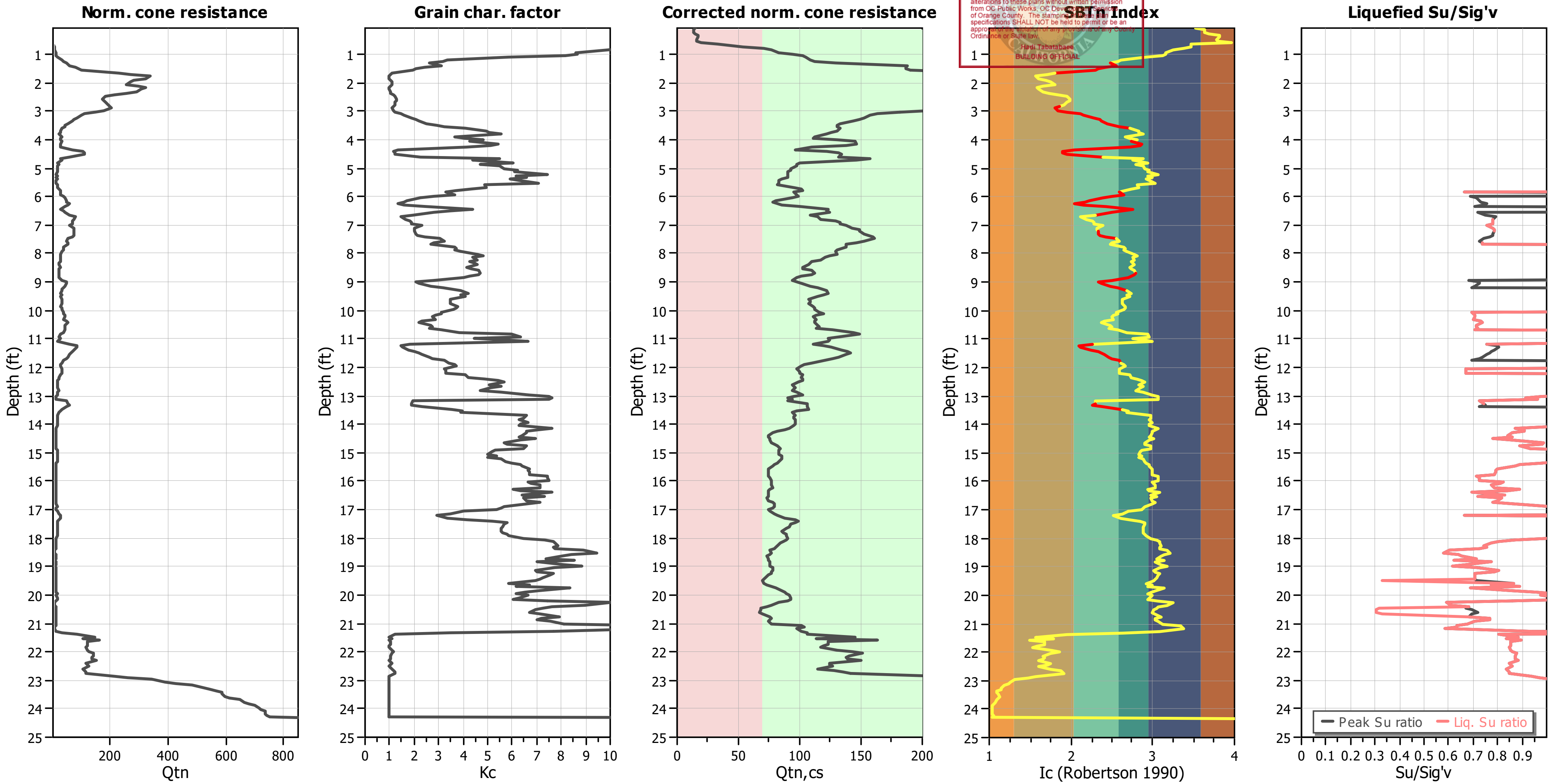
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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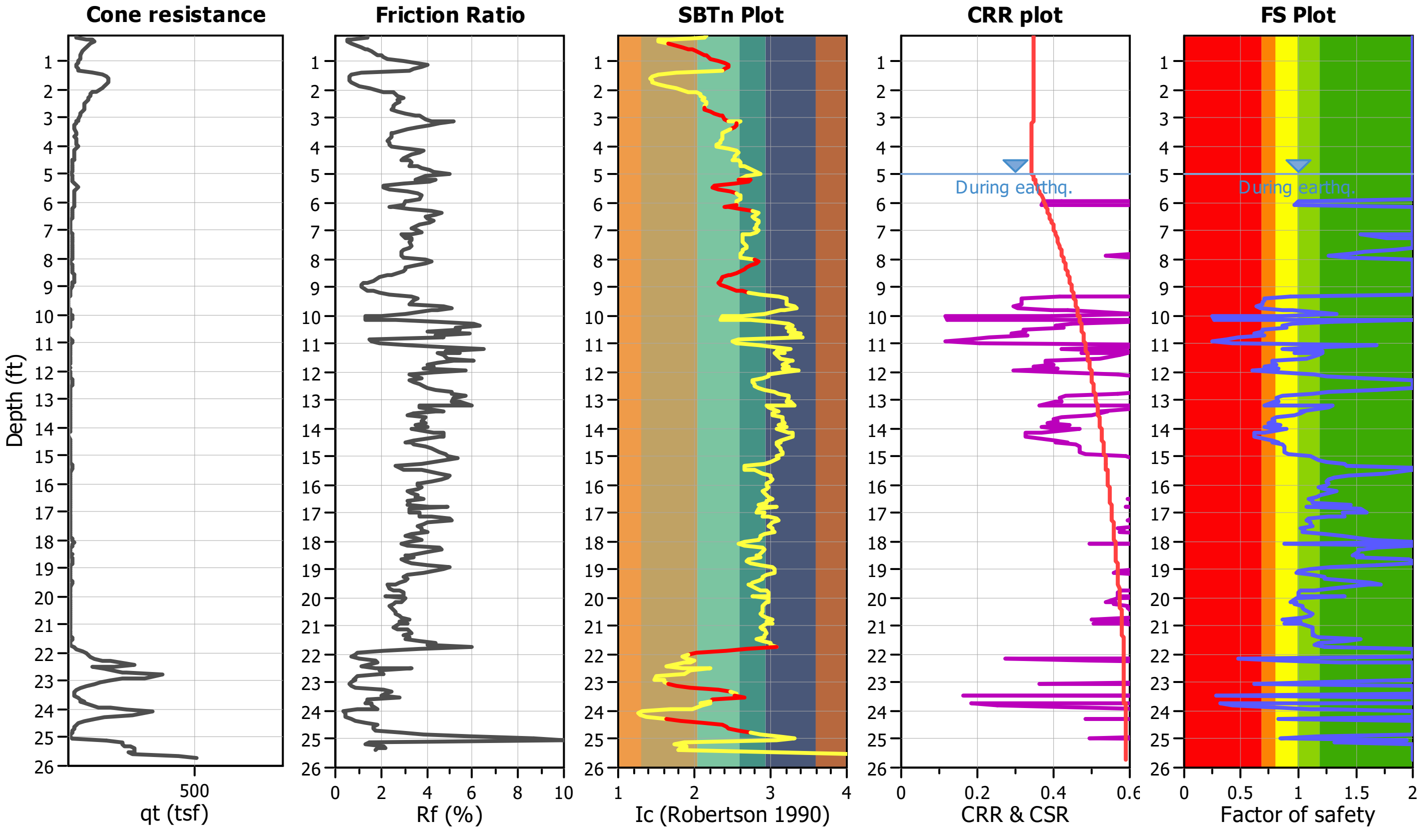
LIQUEFACTION ANALYSIS REPORT

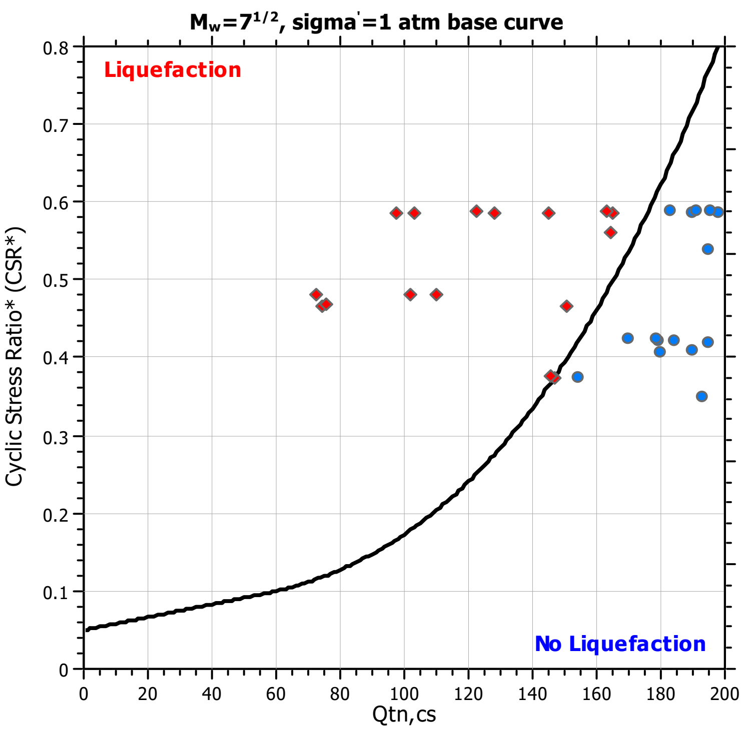
Project title : 11-161-00 **Location :**

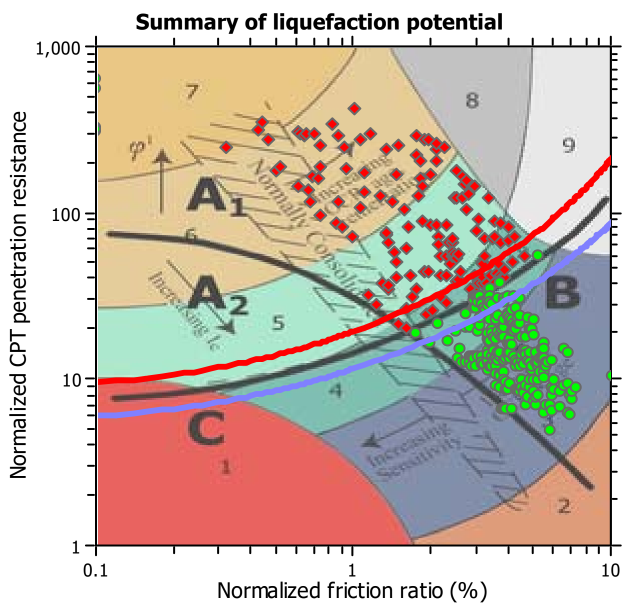
CPT file : 17-206-02 CPT-7A

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
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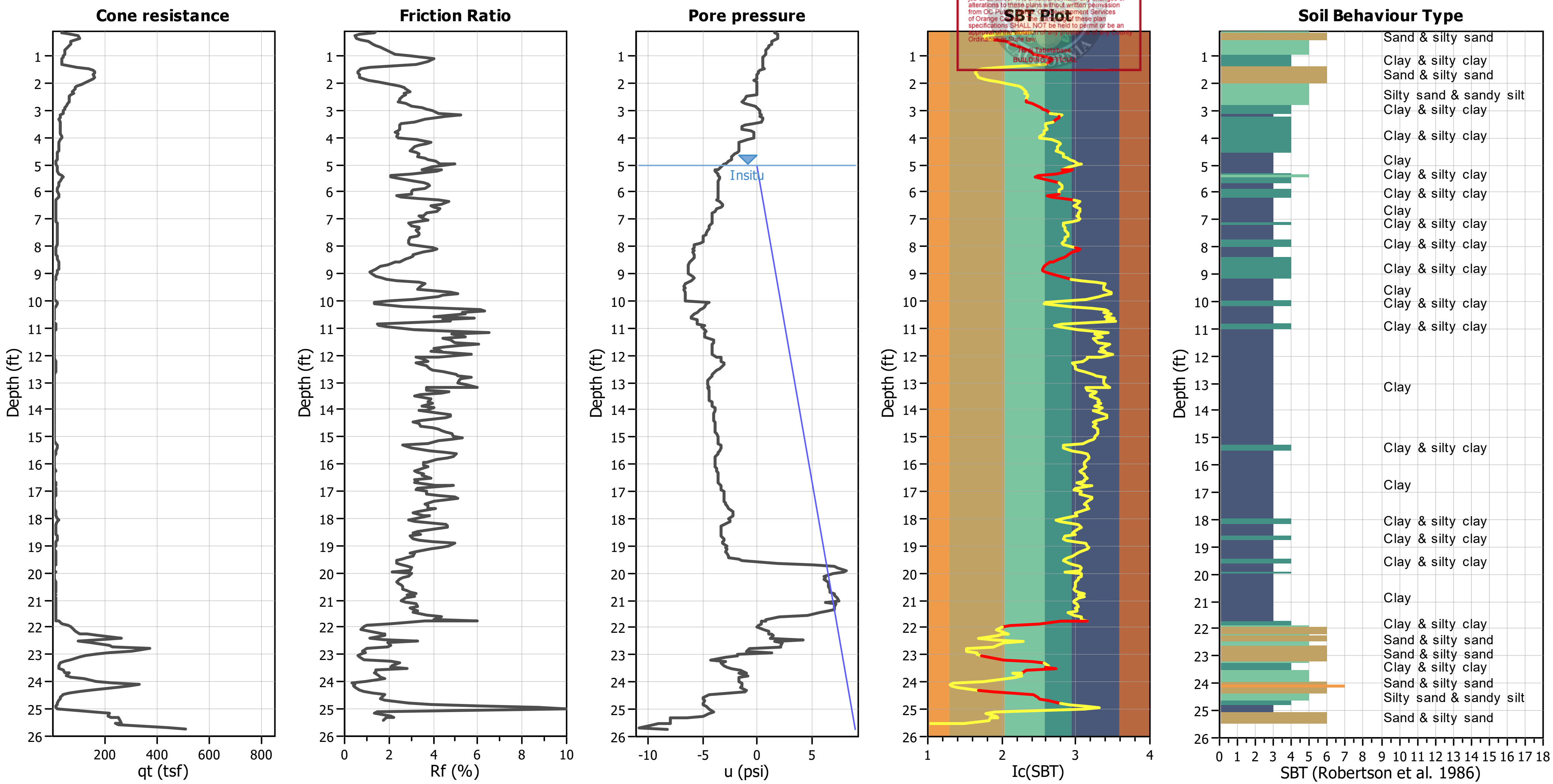
Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

CPT basic interpretation plots



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Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
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SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
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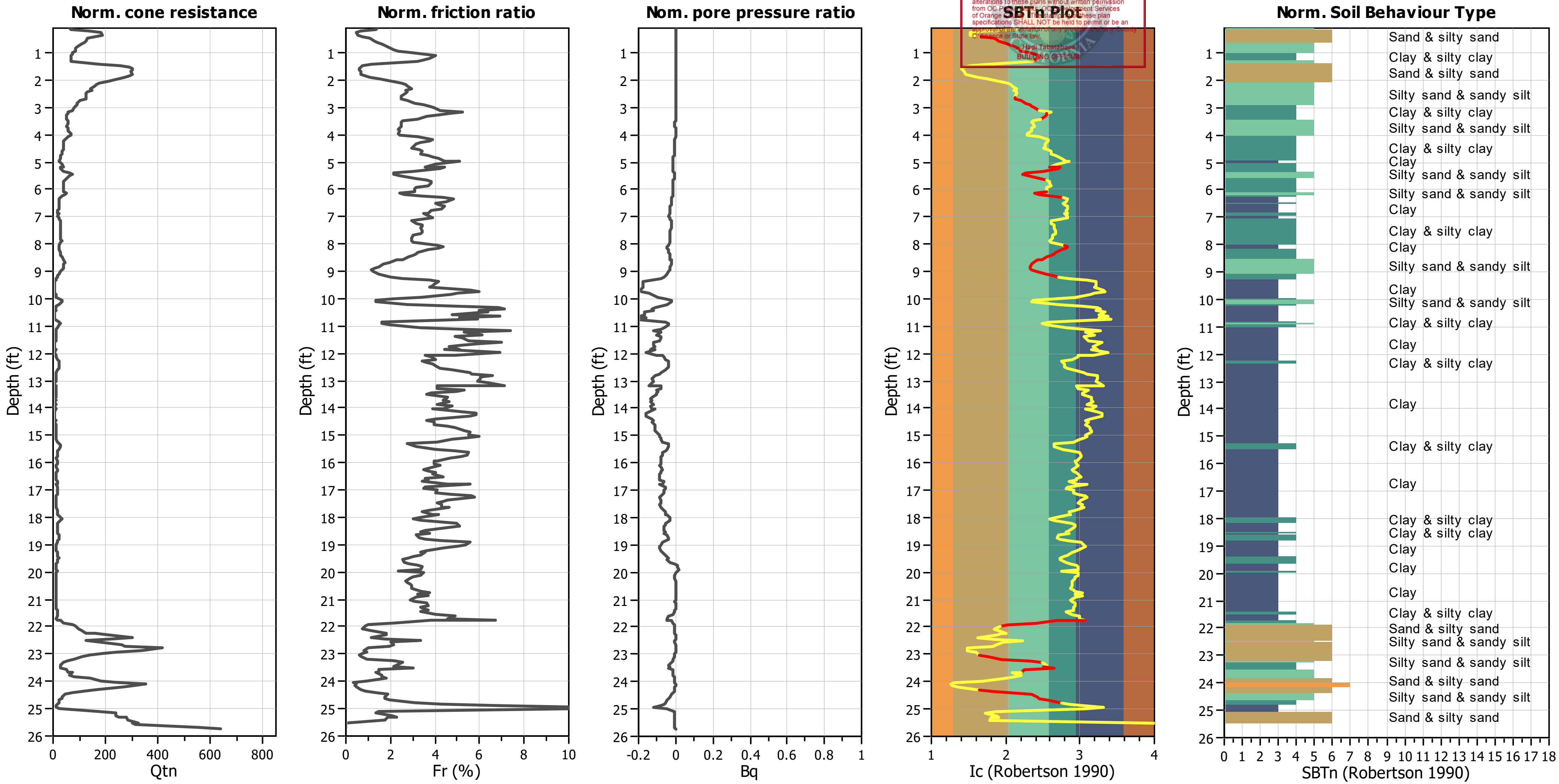
County of Orange - OC Public Works
OC Development Services
APPROVED

CPT basic interpretation plots (normalized)



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SBTn legend

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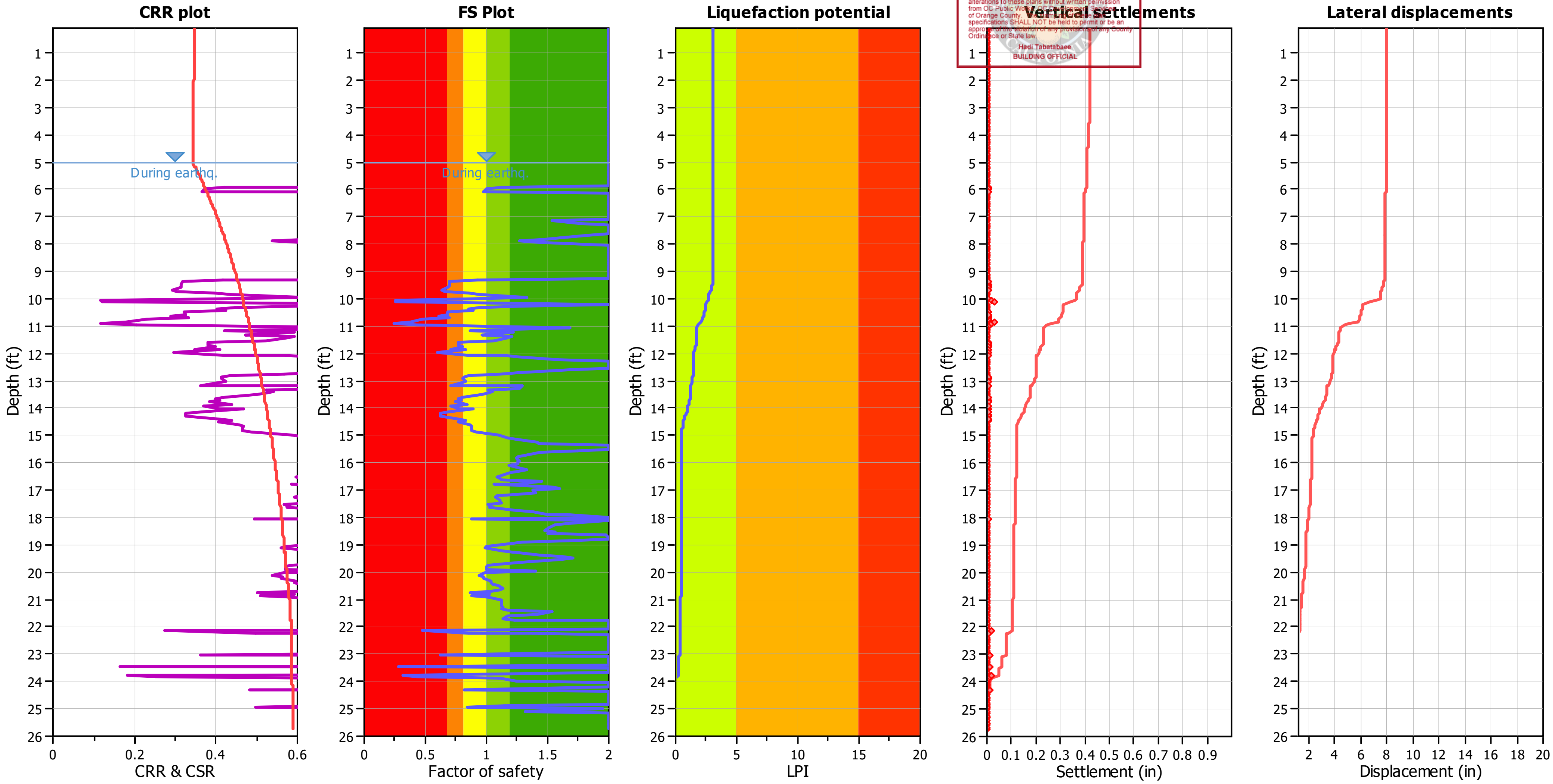
Liquefaction analysis overall plots



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LPI color scheme

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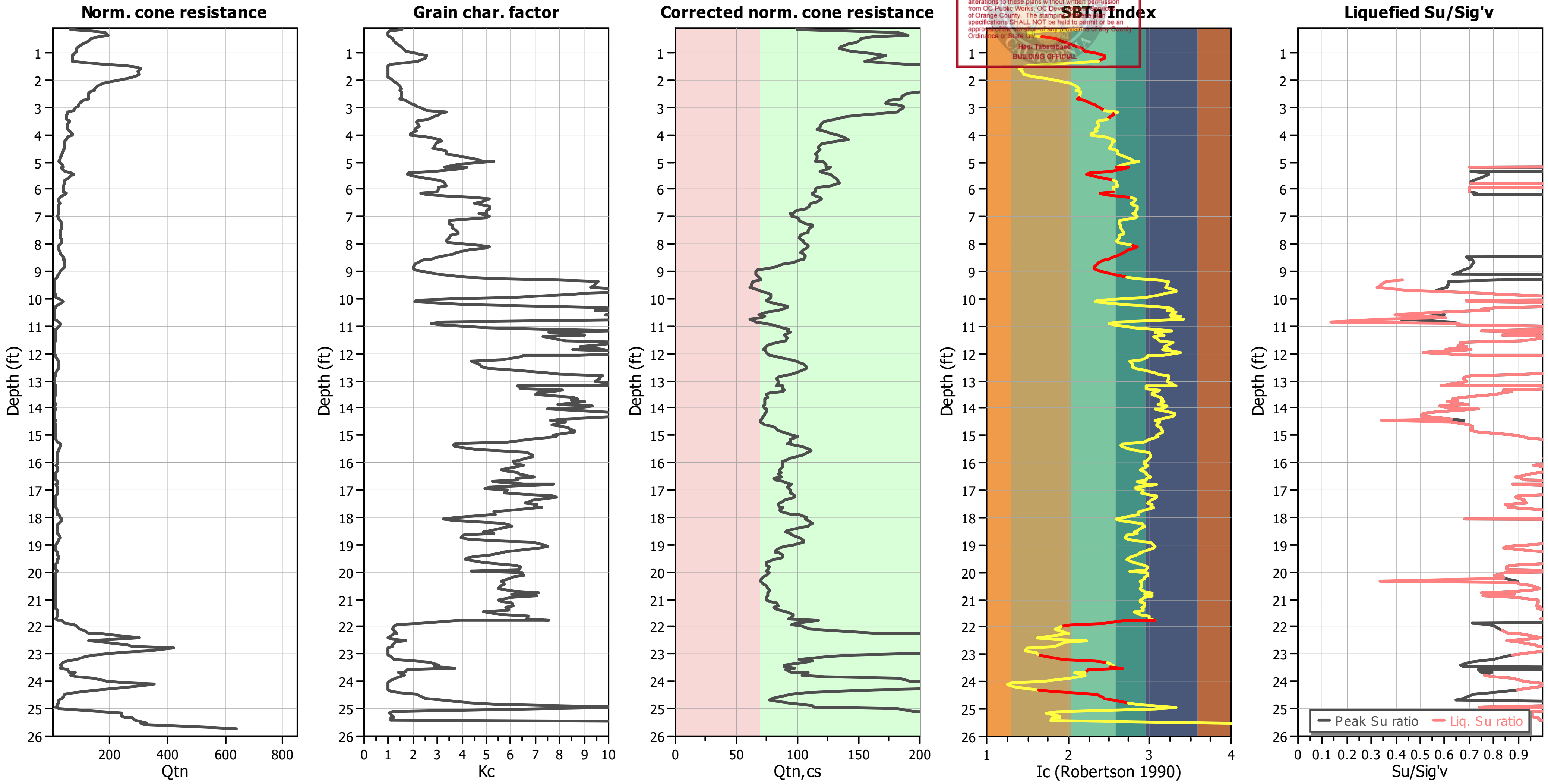
Check for strength loss plots (Robertson (2010))



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Building&Safety: Ryan Rose
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OC Development Services
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Hadi Tabatabaee
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GMU Geotechnical
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

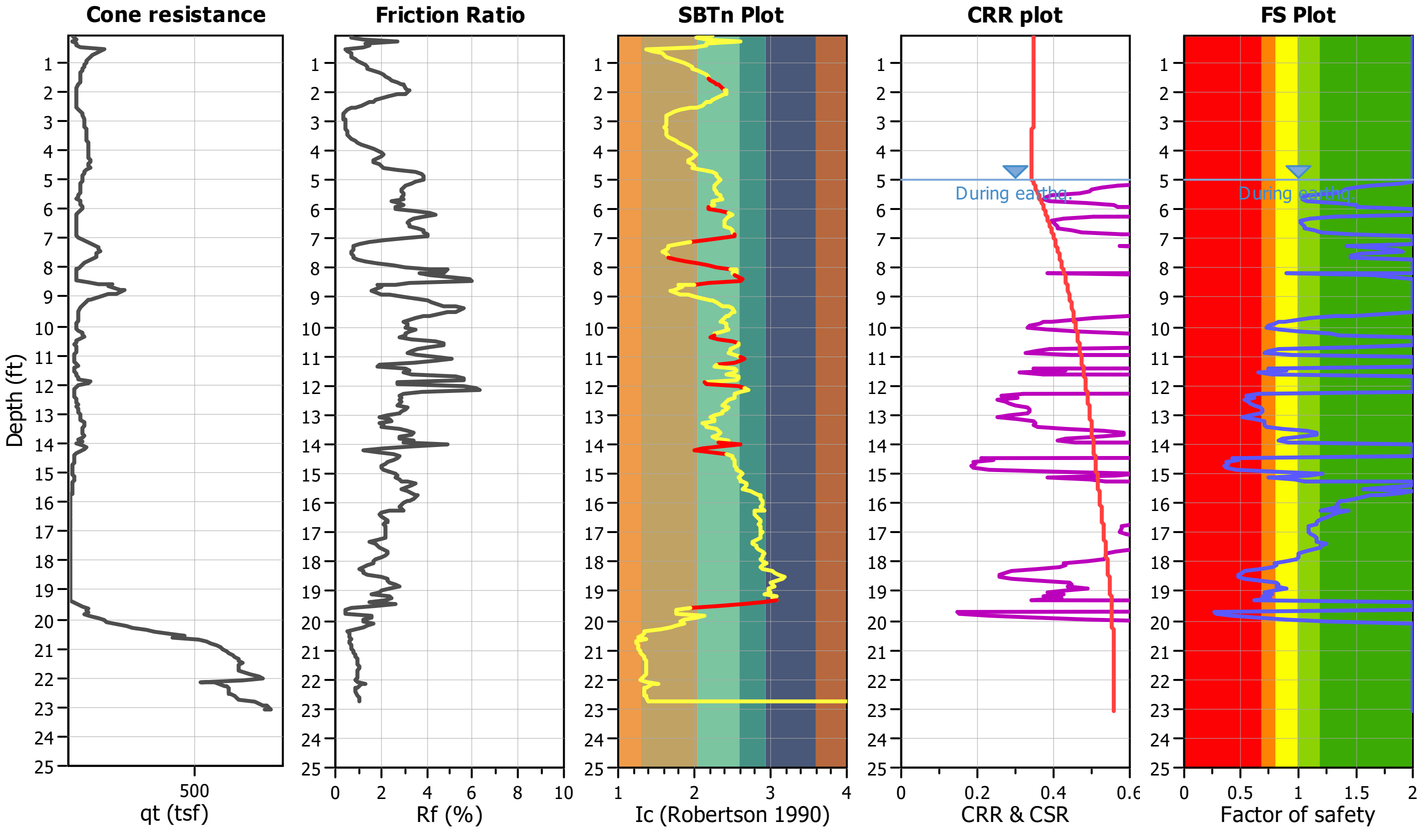
LIQUEFACTION ANALYSIS REPORT

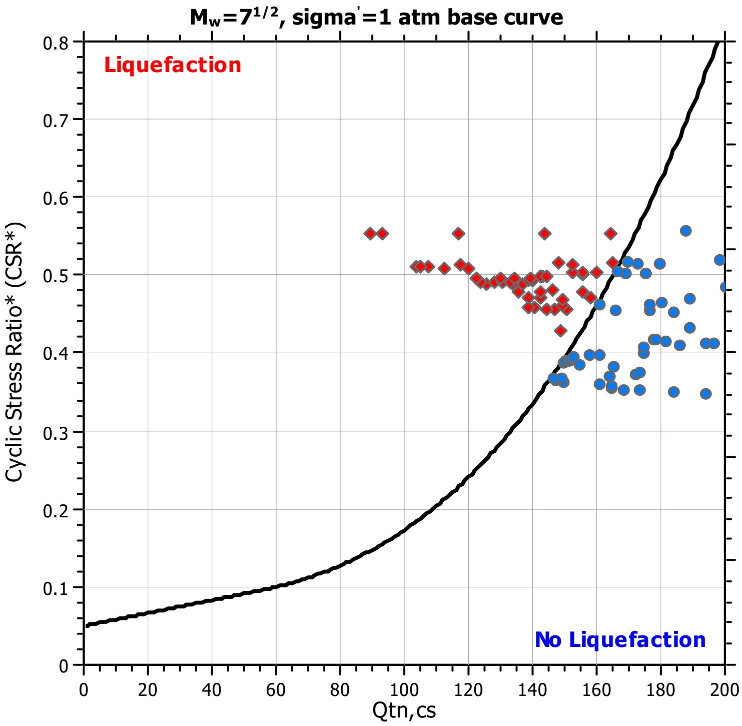
Project title : 11-161-00 **Location :**

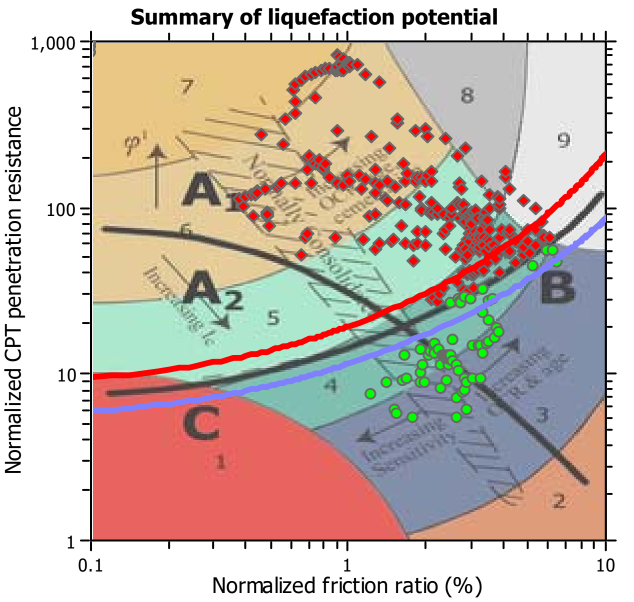
CPT file : 17-206-02 CPT-3A

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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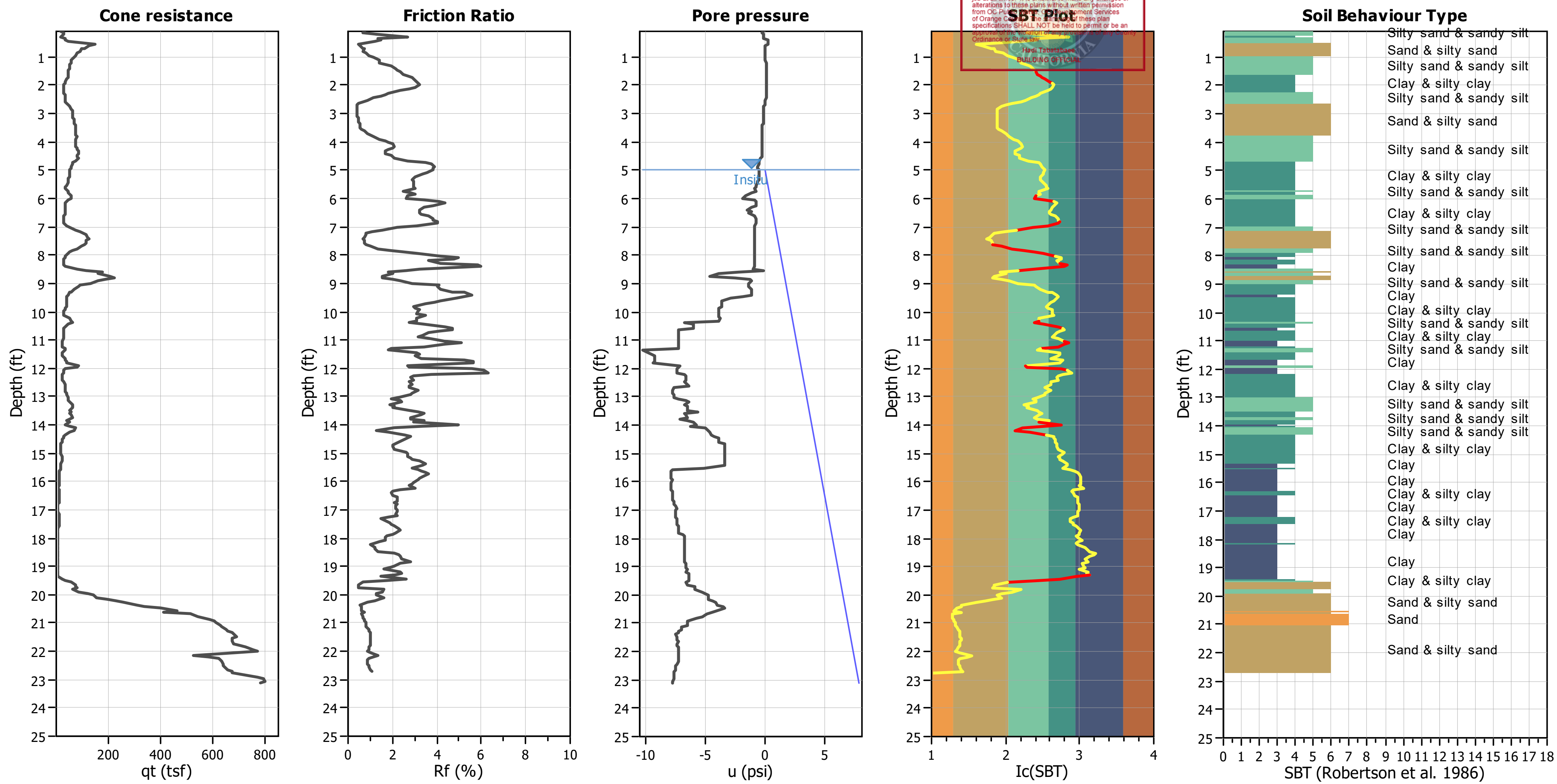
CPT basic interpretation plots



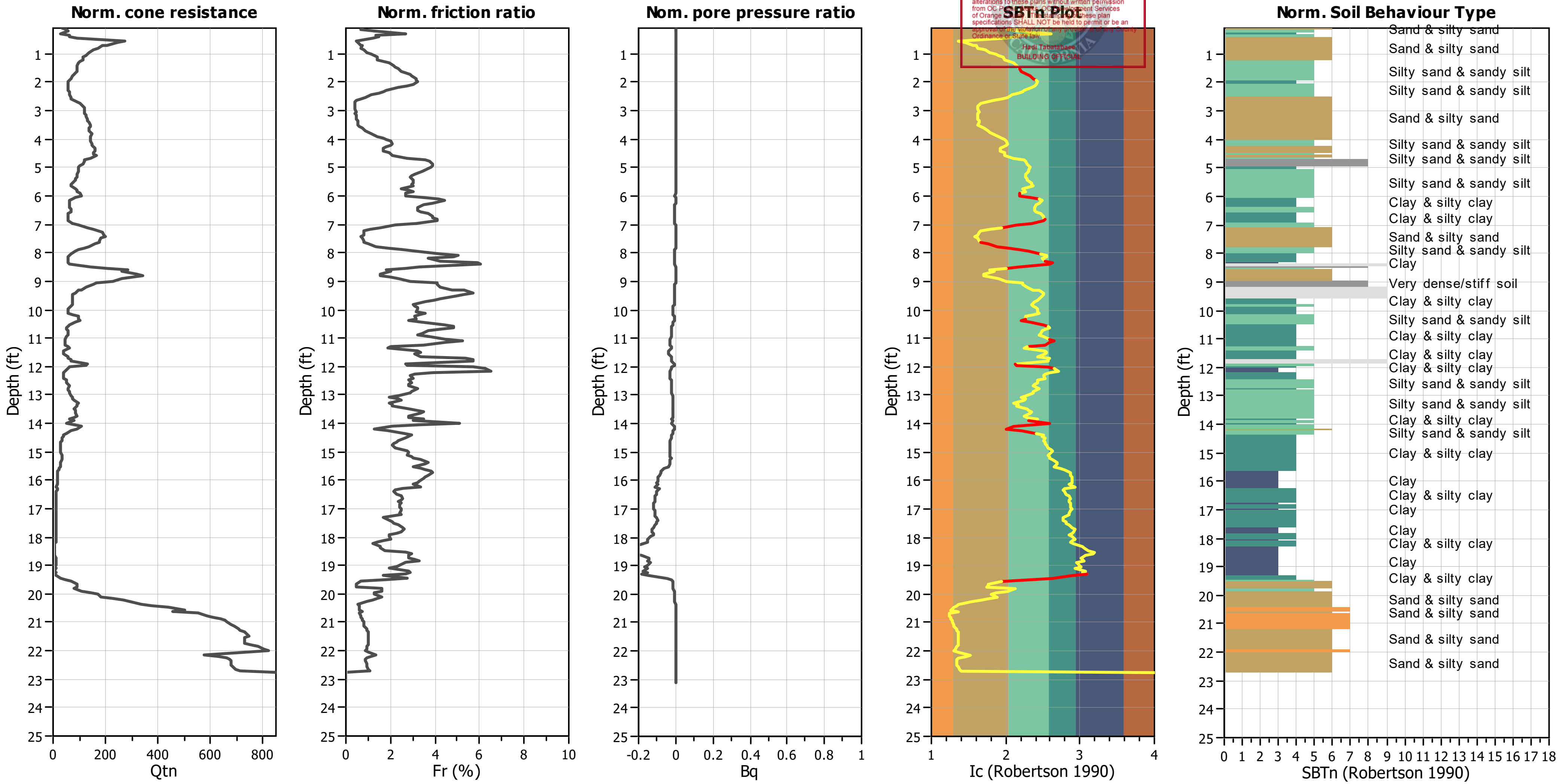
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
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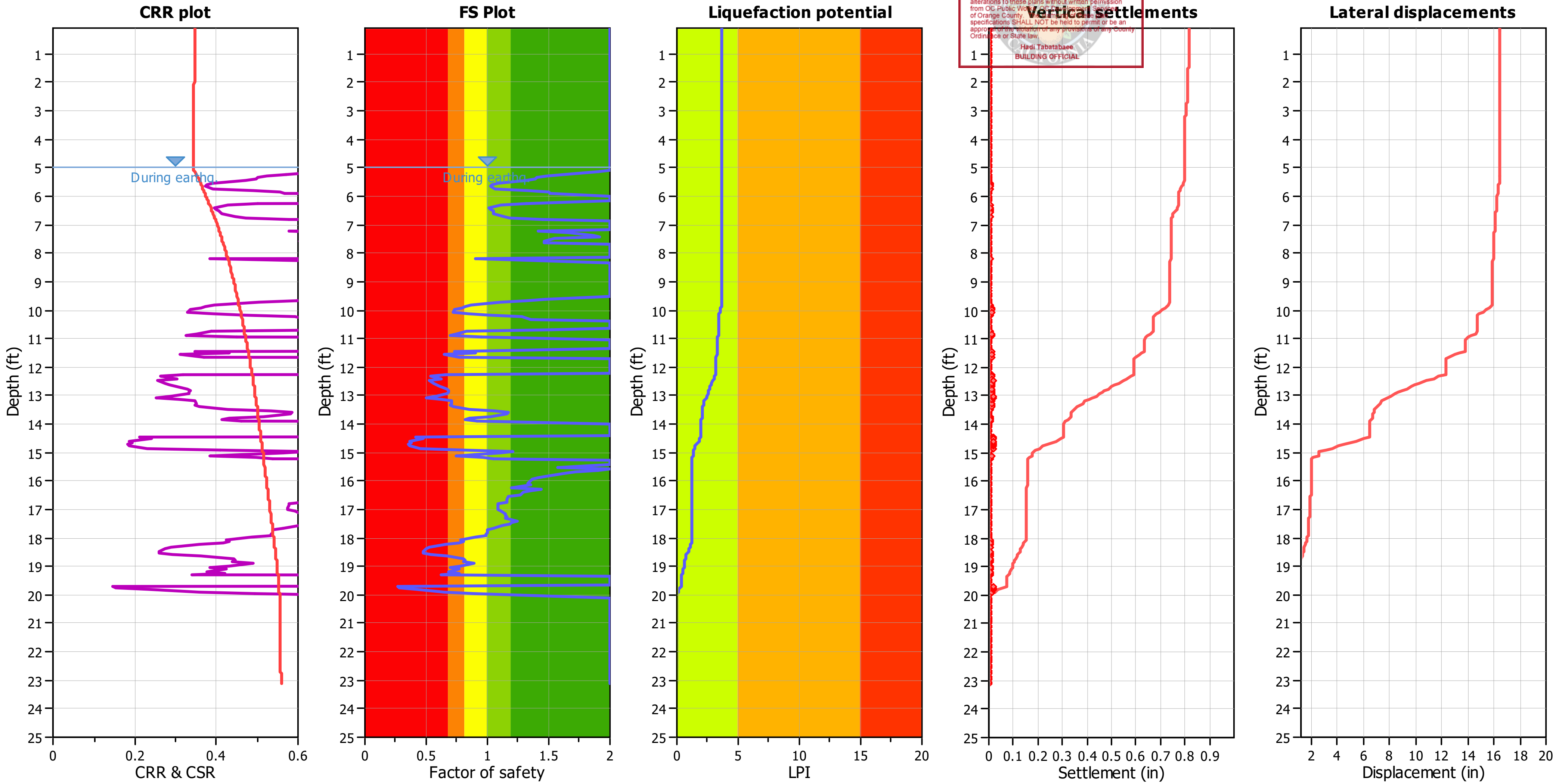
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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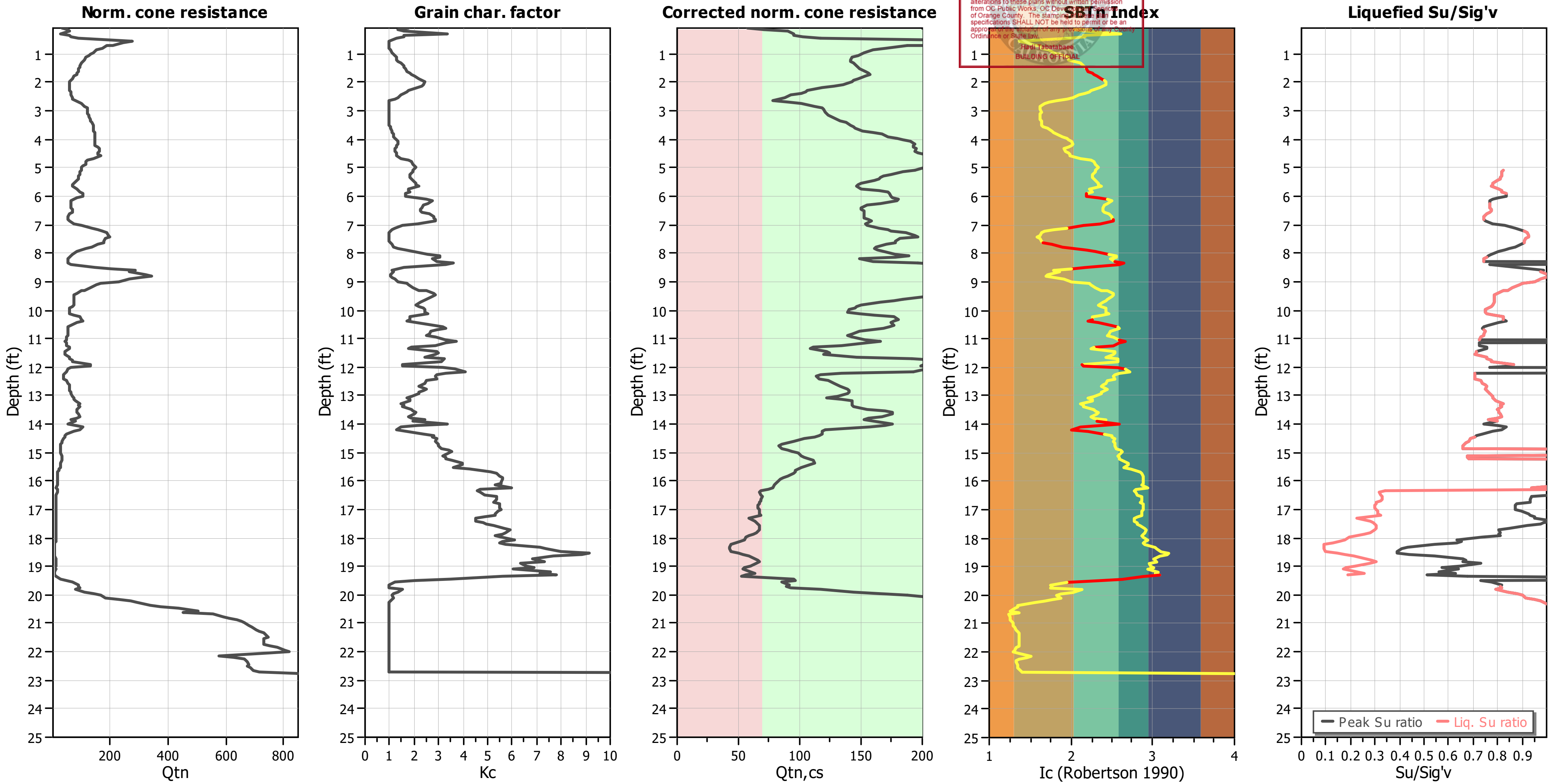
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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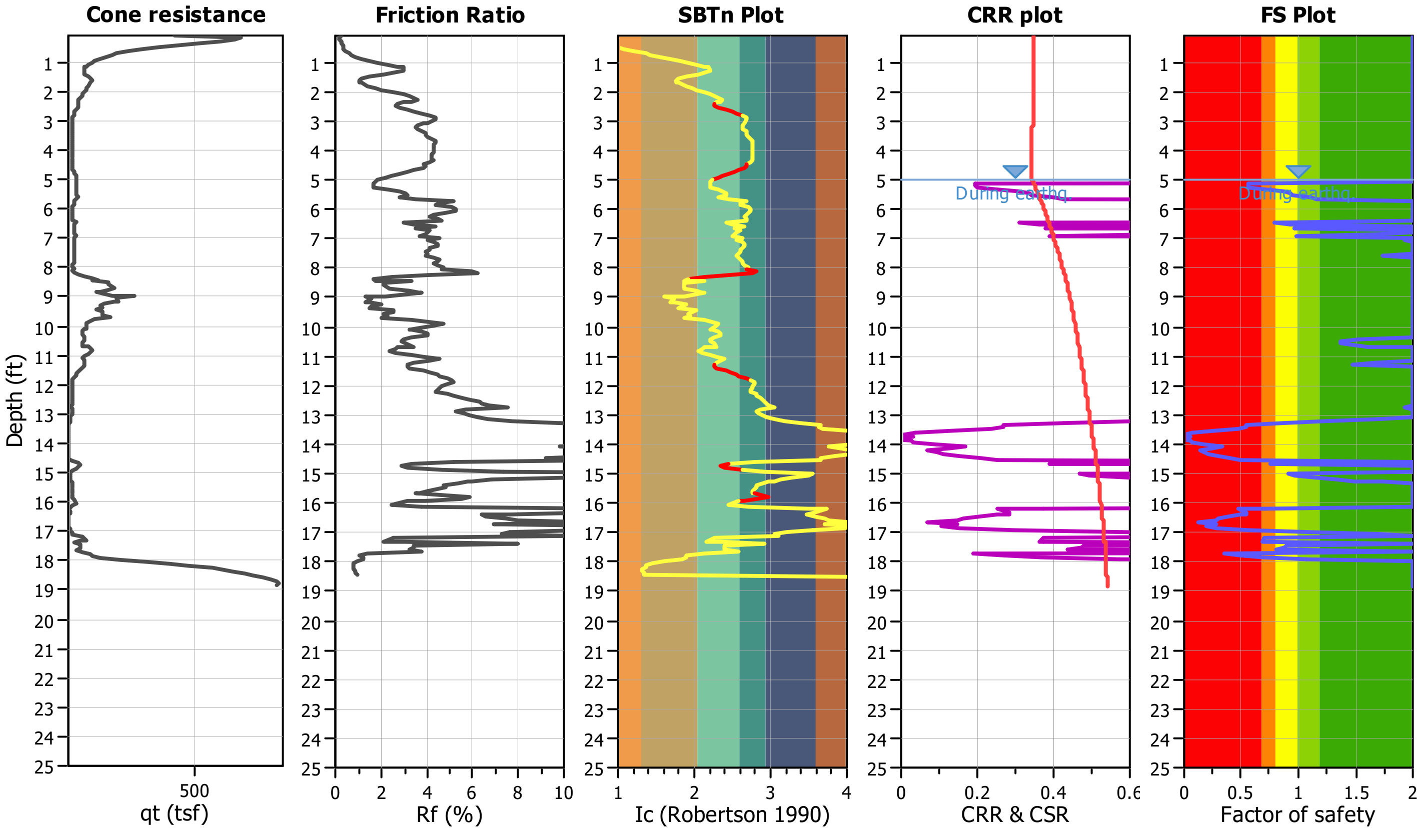
LIQUEFACTION ANALYSIS REPORT

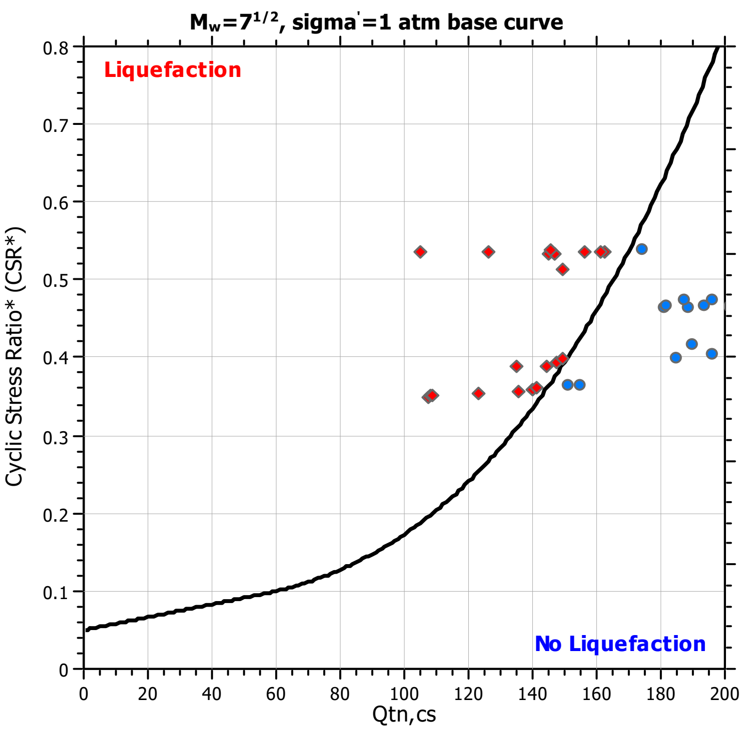
Project title : 11-161-00 **Location :**

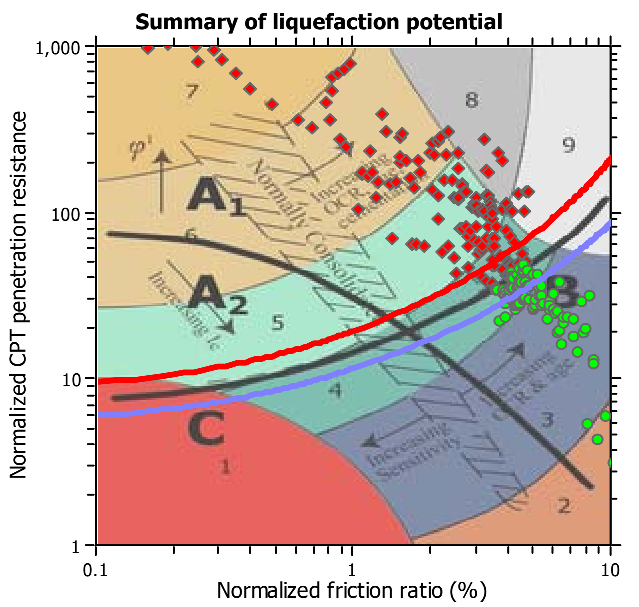
CPT file : 17-206-02 CPT-4A

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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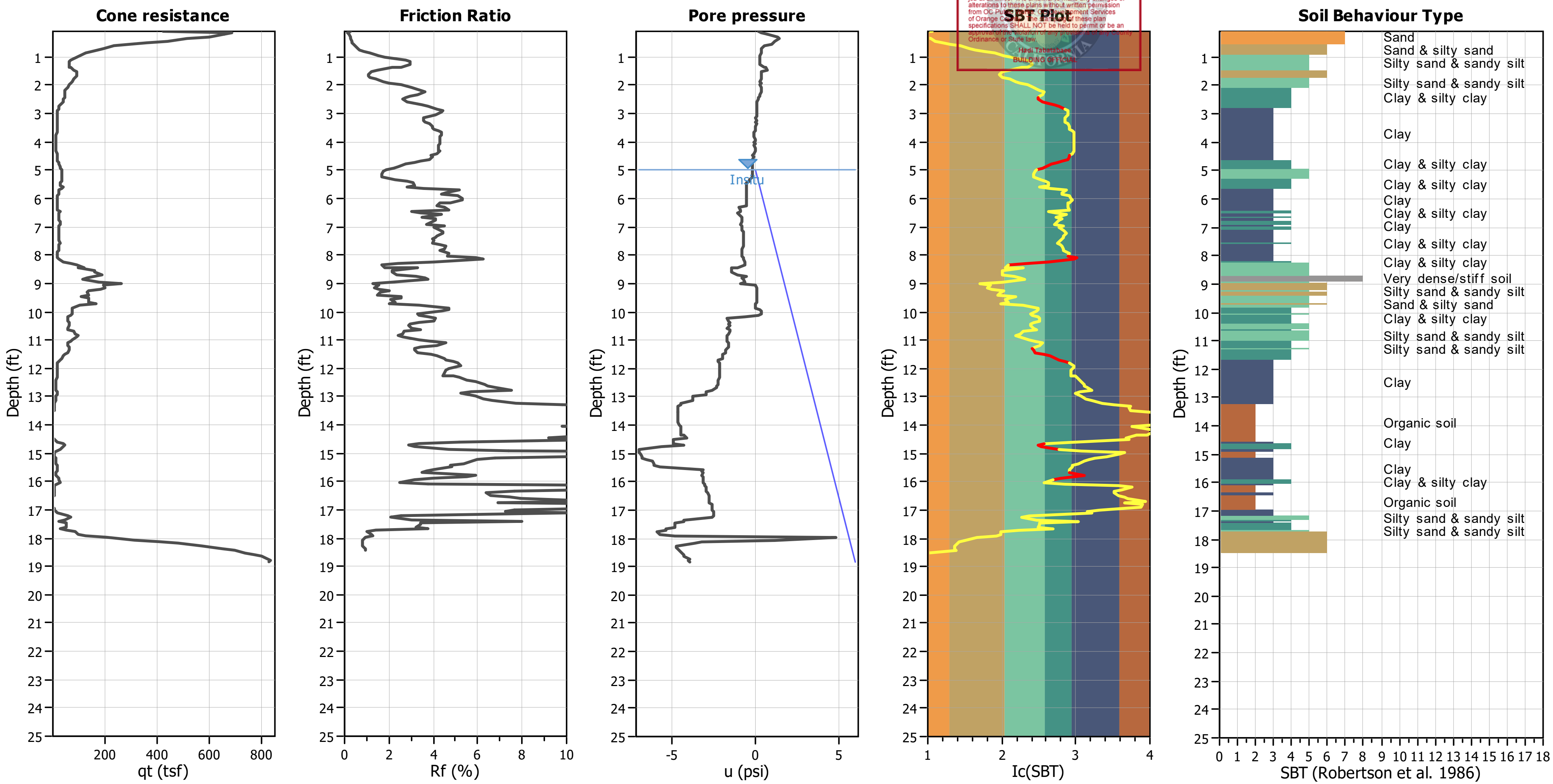
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
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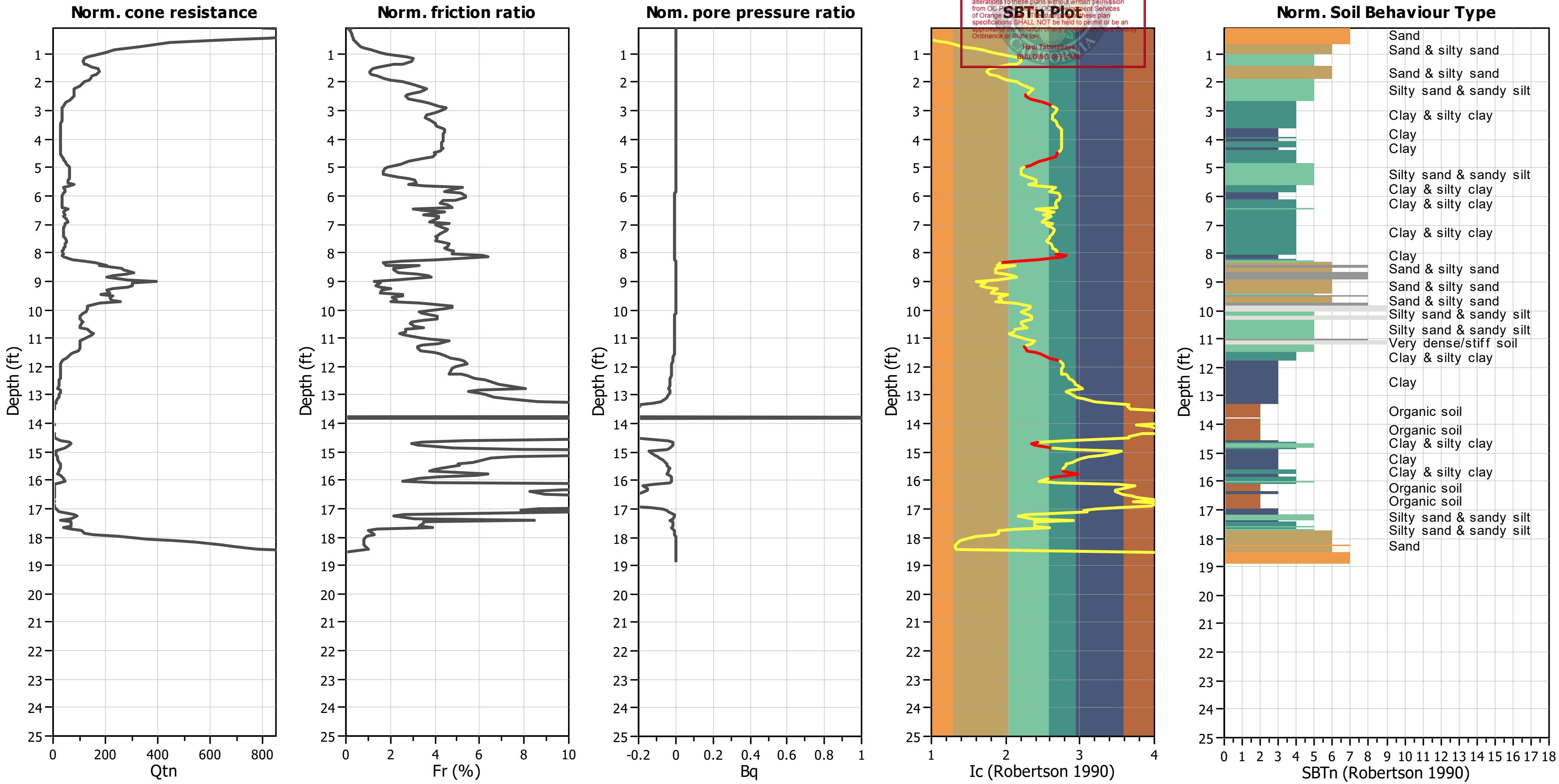
CPT basic interpretation plots (normalized)



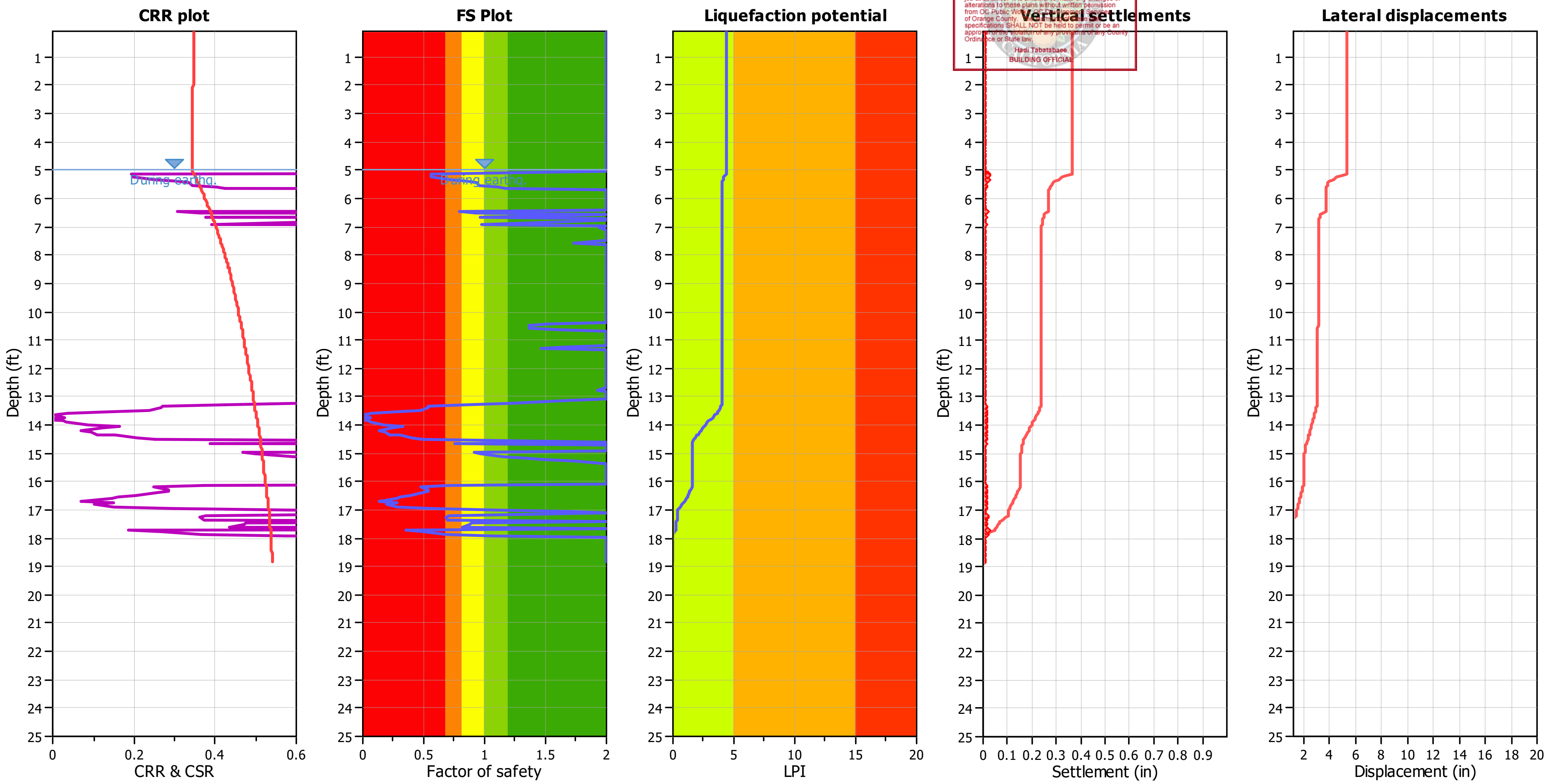
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

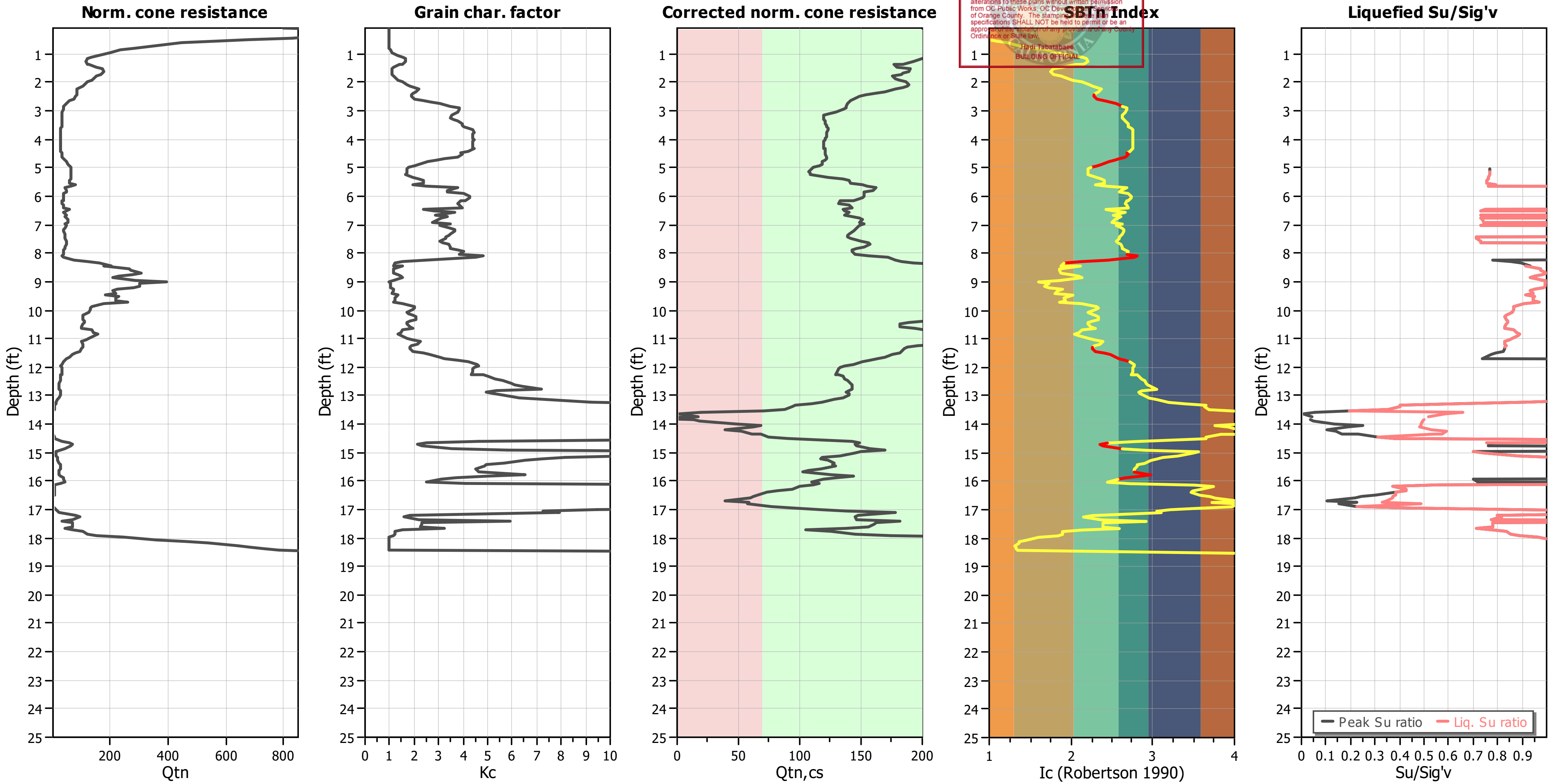
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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Rancho Santa Margarita, CA 92688
http://www.gmugeo.com

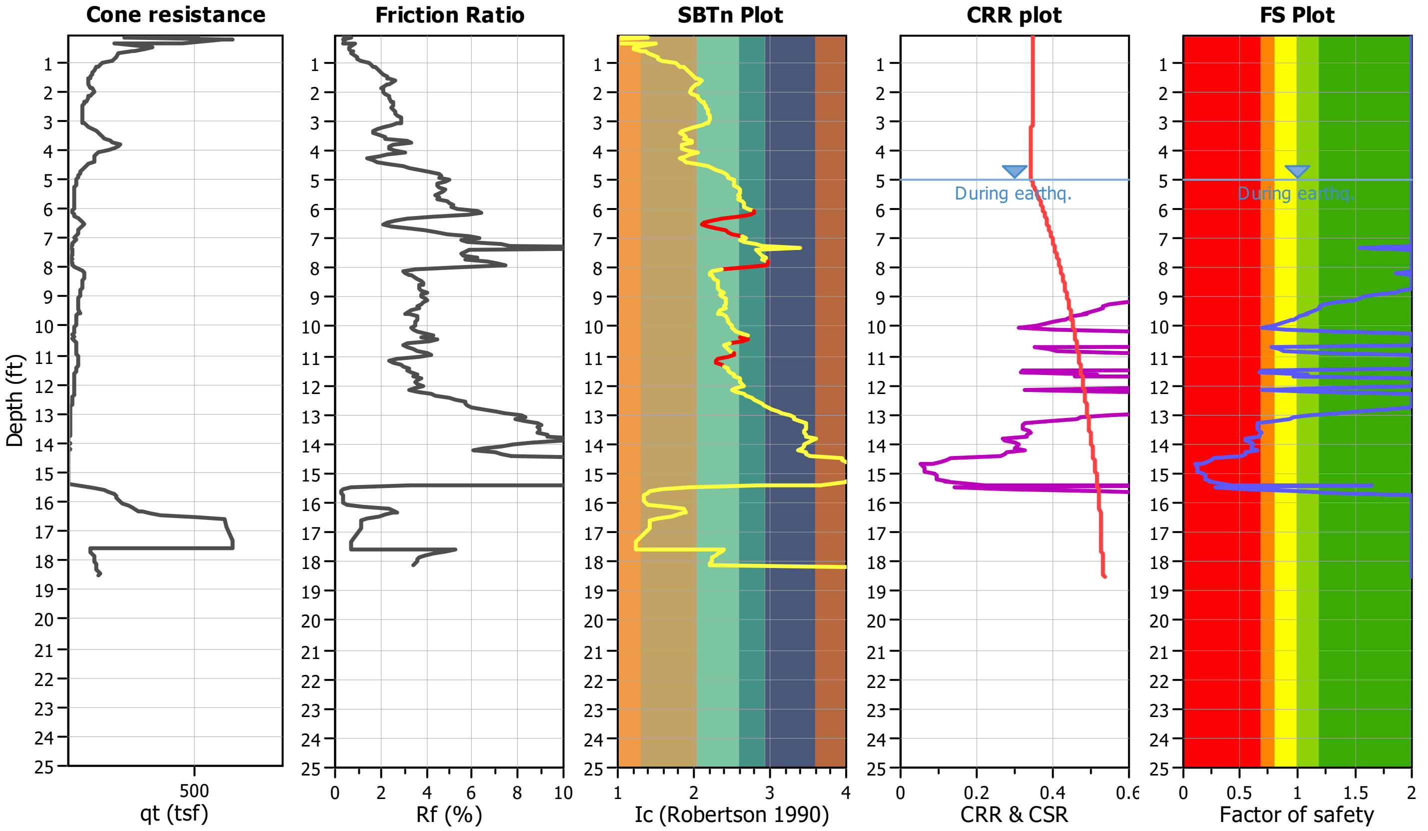
LIQUEFACTION ANALYSIS REPORT

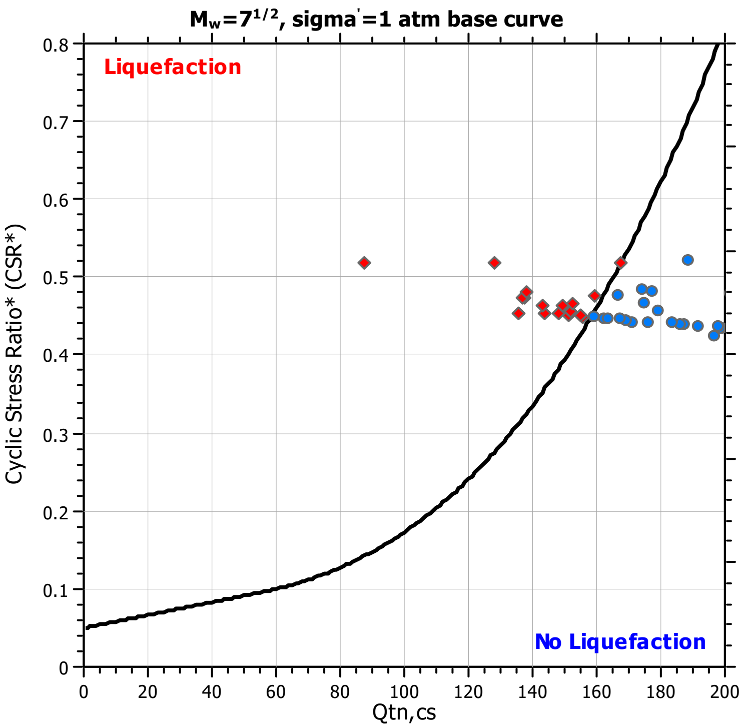
Project title : 11-161-00 **Location :**

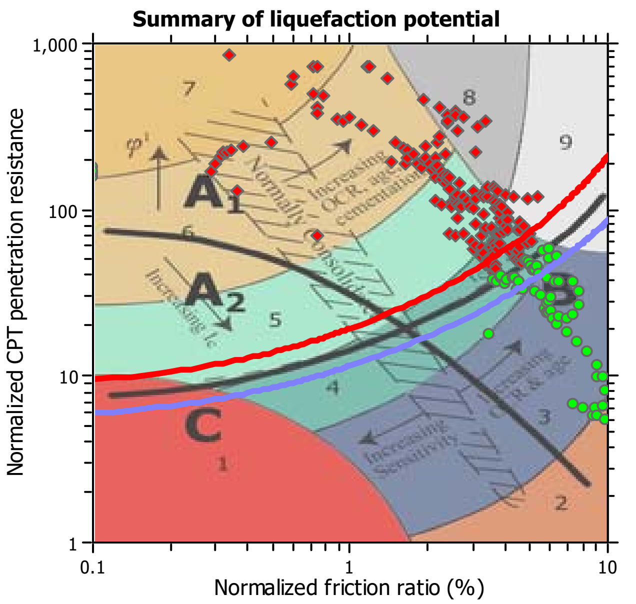
CPT file : 17-206-02 CPT-5A

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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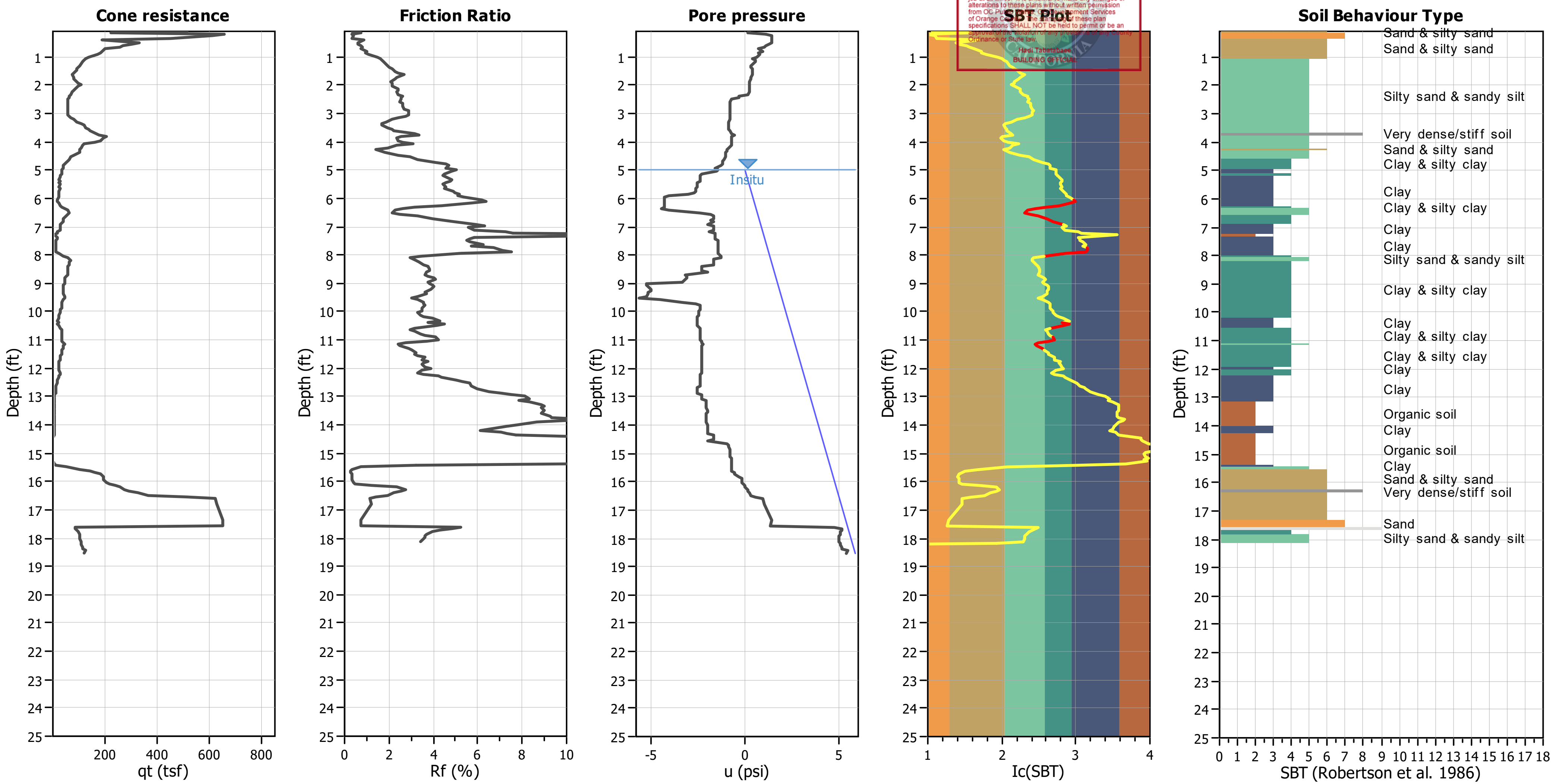
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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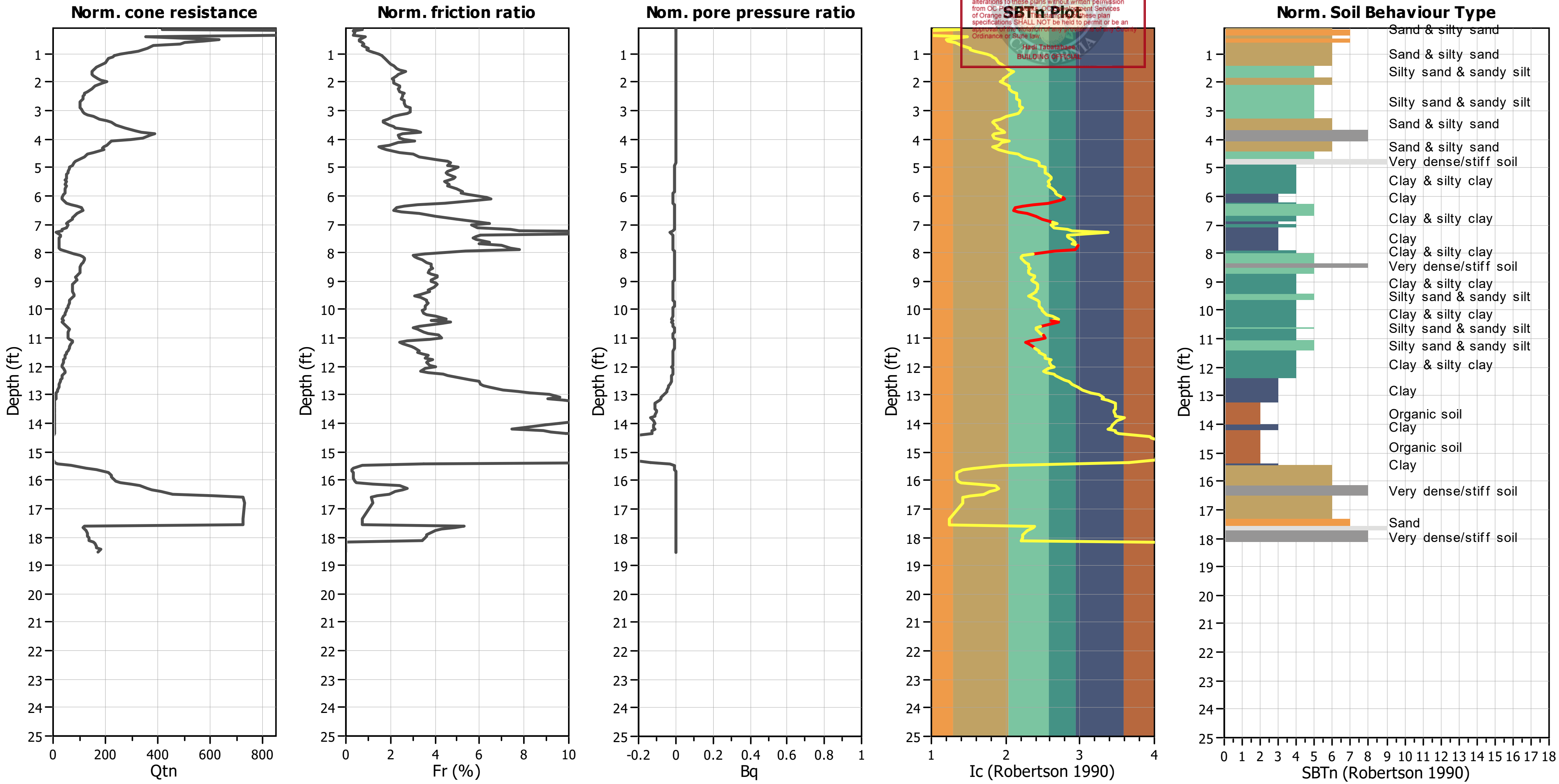
CPT basic interpretation plots (normalized)



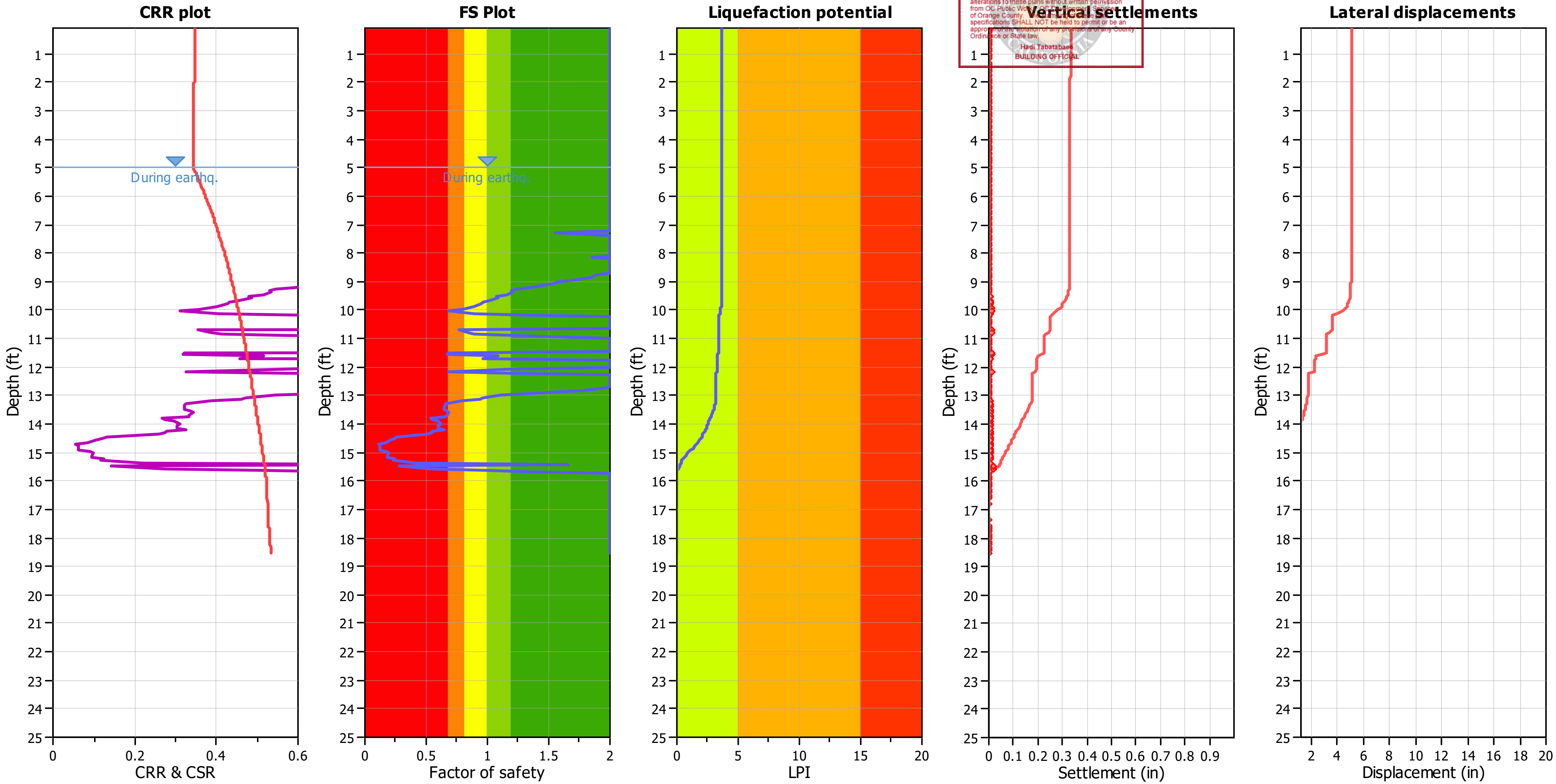
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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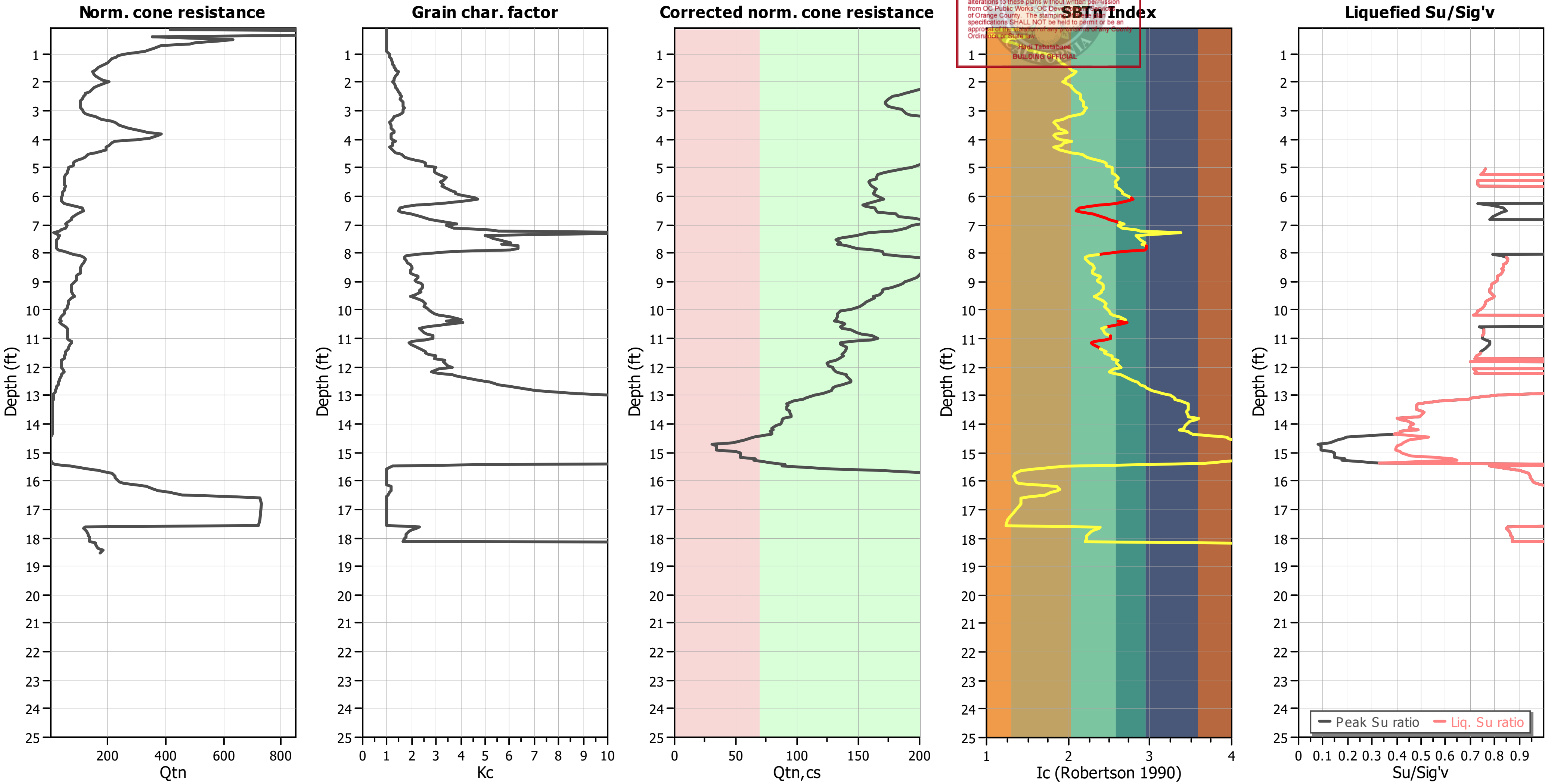
Hadi Tabatabaee
BUILDING OFFICIAL

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

APPENDIX E

Lateral Spread Analysis

Project No. 17-206-02
Section A-A'
April 2021

Static Analysis, Run 1.1_s
Post Earthquake Condition
Horz Seismic Coef.: 0
Block Search

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 395 psf
Phi': 31 °

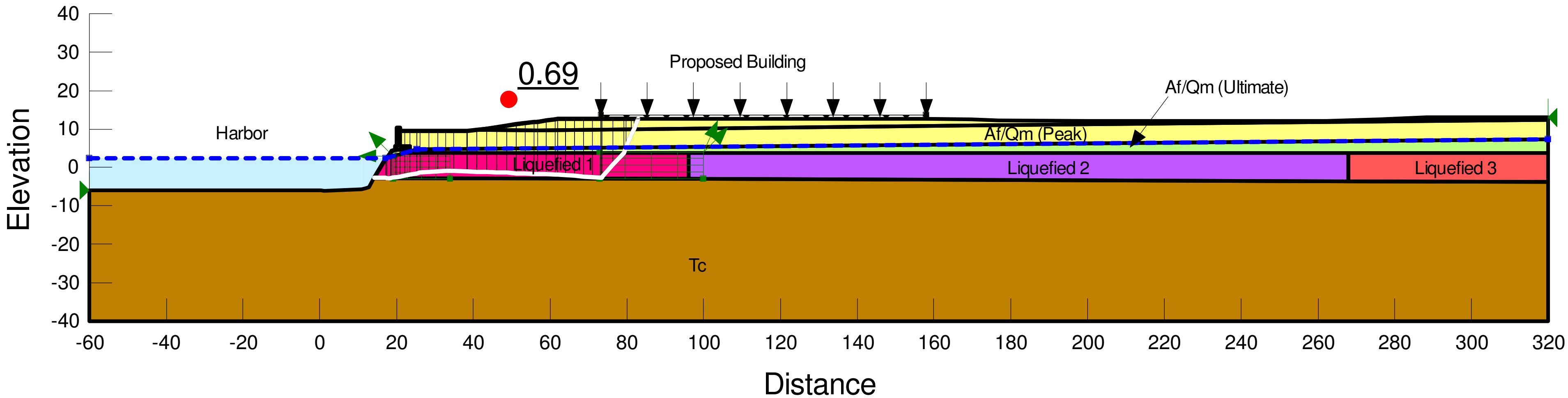
Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 30 °

Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 695 psf
Phi': 34 °

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.17

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.5



Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

Project No. 17-206-02
Section A-A'
April 2021

Deformation Analysis, Run 1.1_ky
Post Earthquake Condition
Horz Seismic Coef.: 0.01
Block Search
Deformation > 90 inches

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 395 psf
Phi': 31 °

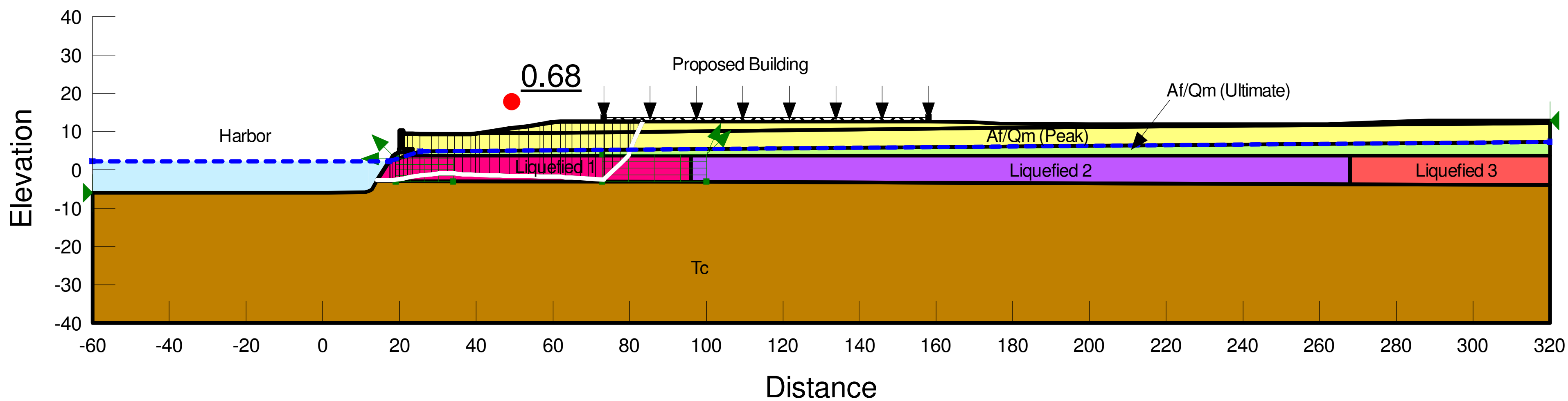
Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 30 °

Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 695 psf
Phi': 34 °

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.17

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.5



GMU Project No. 17-206-02 - Dana Point Harbor Revitalization - Buildings 1 through 12
Average Seismic Displacement
Block Search for ky
Liq Layer 1
MCE Event

Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2)	150.84 cm or	59.39 inch

1cm = 0.393701 in.

Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax]	302.13 cm	118.95 inch
Average Displacement =	226.49 cm	89.17 inch

DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

Project: 17-206-02 Dana Point Harbor - Section A-A' Liq1 (Based on 11-161-00 CPT-5)

INPUT:

Slide h (ft):	12.00
Slide Vs (ft/sec):	837.99
Depth to Rx (km):	0.01
Ave. Vs(30) (m/s):	360
Ave. Site Class:	C
Mean Magnitude:	6.80
Mean Dist. (km):	7.4
ky:	0.01

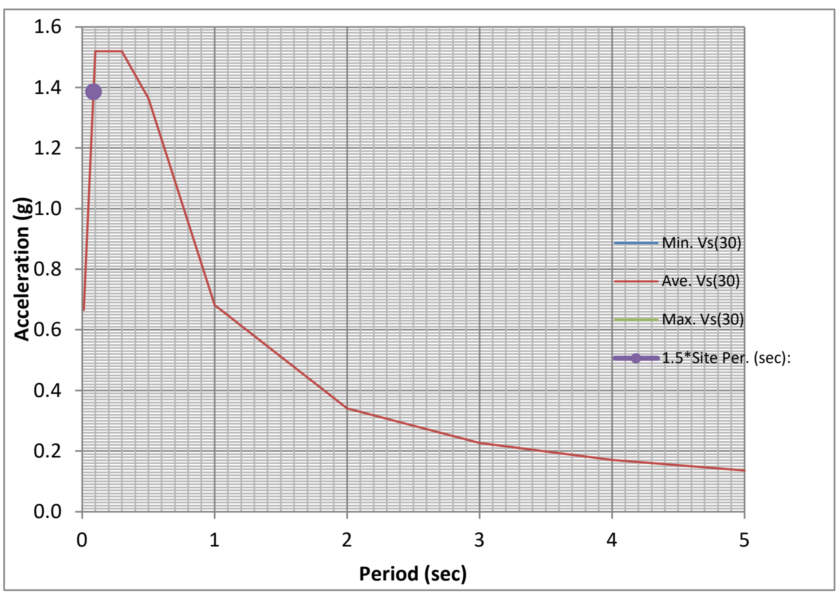
RESULTS:

Site Period, Ts (sec):	0.0573
1.5*Site Per. (sec):	0.0859
EQ Mean Period, Tm (sec):	0.472
Ts/Tm:	0.12
Estimated PGV (cm/sec):	91.37
Duration (D_5-D_{95}) (sec):	13.2
Sa(1.5Ts) Min $Vs_{(30)}$	0.0000
Sa(1.5Ts) Ave $Vs_{(30)}$	1.3856
Sa(1.5Ts) Max $Vs_{(30)}$	0.0000

5-Percent Damped Spectra

Period	Min. $Vs_{(30)}$	Ave. $Vs_{(30)}$	Max. $Vs_{(30)}$
0.01		0.6660	
0.1		1.5190	
0.2		1.5190	
0.3		1.5190	
0.5		1.3640	
1.0		0.6820	
2.0		0.34100	
3.0		0.22700	
4.0		0.17100	
5.0		0.13600	

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)



Slide Mass Area =	940
Lengh of Slide Mass =	80
Average Slide H (ft) =	11.75

Simplified Procedure for Estimating Earthquake Induced Deviatoric Slope Displacements
by Jonathan D. Bray and Thaleia Travasarou
Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters			
Yield Coefficient (ky)	0.01		Based on pseudostatic analysis
Initial Fundamental Period (Ts)	0.0573	seconds	1D: Ts=4H/Vs 2D: Ts=2.6H/Vs
Degraded Period (1.5Ts)	0.09	seconds	
Moment Magnitude (Mw)	6.8		
Spectral Acceleration (Sa(1.5Ts))	1.385552	g	

Additional Input Parameters		
Probability of Exceedance #1 (P1)	84	%
Probability of Exceedance #2 (P2)	50	%
Probability of Exceedance #3 (P3)	16	%
Displacement Threshold (d_threshold)	30	cm

Intermediate Calculated Parameters			
Non-Zero Seismic Displacement Est (D)	150.84	cm	eq. (5) or (6)
Standard Deviation of Non-Zero Seismic D	0.66		

Results			
Probability of Negligible Displ. (P(D=0))	0.00		eq. (3)
D1	78.2	cm	calc. using eq. (7)
D2	150.8	cm	calc. using eq. (7)
D3	290.8	cm	calc. using eq. (7)
P(D>d_threshold)	0.99		eq. (7)

Notes

1. Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
2. Probability of Exceedance is the desired probability of exceeding a particular displacement value.
3. Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
   (e.g., the probability of exceeding displacement D1 is P1)
4. The 16%, 50%, and 84% percentile displacement values at selected ky values are shown to the right.
5. Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
6. ky may range between 0.01 and 0.5, Ts between 0 and 2 s, Sa between 0.002 and 2.7 g, M between 4.5 and 9
7. Rigid slope is assumed for Ts < 0.05 s
8. When a value for D is not calculated, D is < 1cm
9. ky may be estimated using the simplified equations shown below.
10. Examples of how Ts is estimated are shown below.
11. Vs = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, Vs = [(h1)(Vs1) + (h2)(Vs2)]/(h1 + h2)

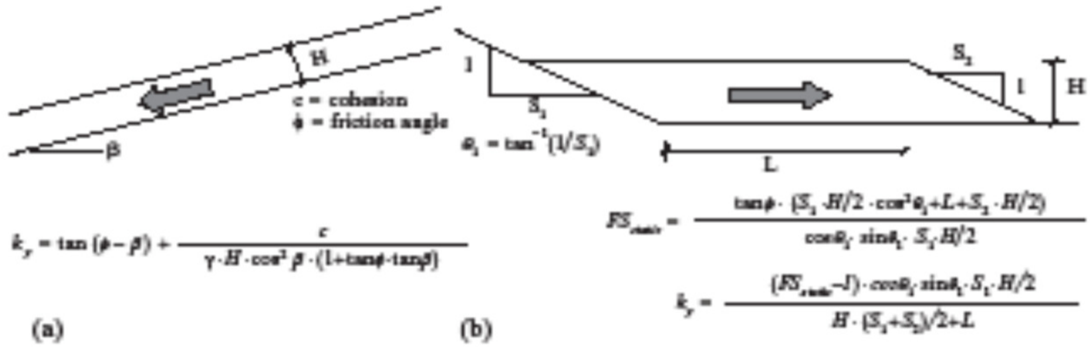


Fig. 14.1. Simplified estimates of the yield coefficient: (a) shallow sliding and (b) deep sliding

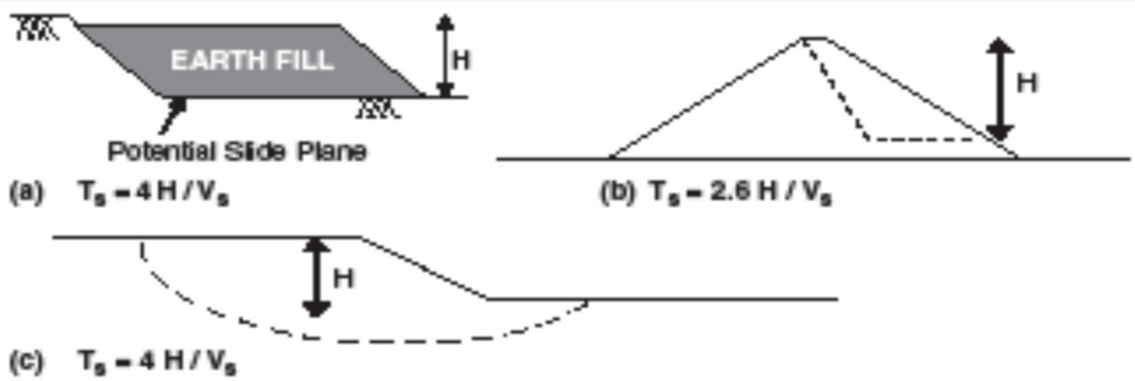
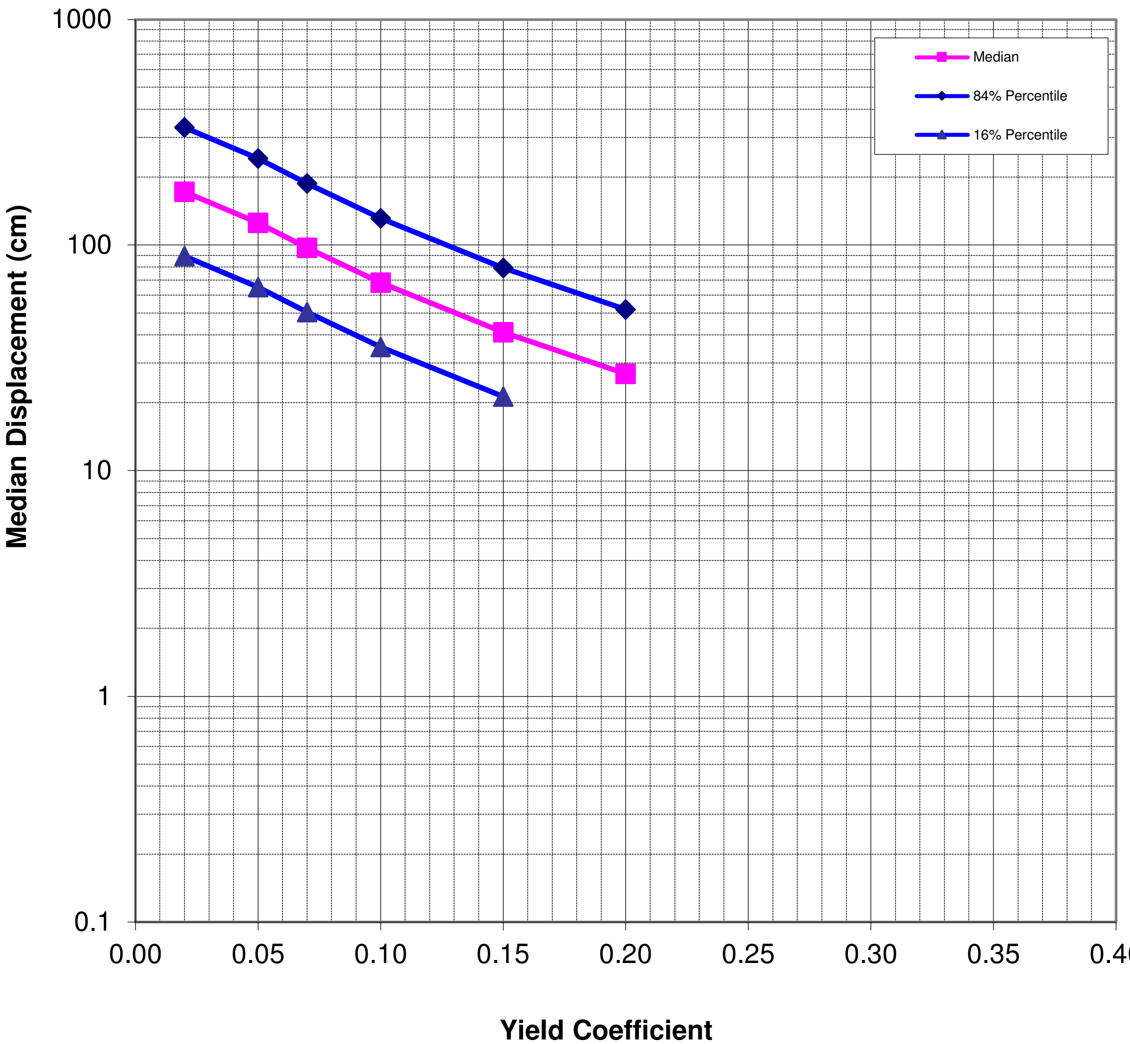


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Figures from Bray, J.D. (2007) “Chapter 14: Simplified Seismic Slope Displacement Procedures,” Earthquake Geotechnical Engineering, 4th Inter. Conf. on Earthquake Geotechnical Engineering - Invited Lectures, in Geotechnical, Geological, and Earthquake Engineering Series, Vol. 6, Pitilakis, Kyriazis D., Ed., Springer, Vol. 6, pp. 327-353.

Dependence on ky

ky	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.00	172.2	172.2	331.9	89.3
0.05	0.00	125.5	125.5	241.9	65.1
0.07	0.00	97.1	97.1	187.2	50.4
0.1	0.00	68.1	68.1	131.3	35.3
0.15	0.00	41.1	41.1	79.2	21.3
0.2	0.00	26.9	26.9	51.8	13.9
0.3	0.00	13.4	13.4	25.9	7.0
0.4	0.01	7.7	7.6	14.8	3.9



Sliding displacement models from Rathje and Antonakos (2011)

Prediction of dynamic response and sliding displacement of a sliding mass during earthquake shaking

Inputs	
PGA (g)	0.666
PGV (cm/s)	91.37
k_y (g)	0.01
T_m (s)	0.47246
T_s (s)	0.05728
M	6.80
T_s/T_m	0.12124

Dynamic Response			
	median	-1σ	+1σ
kmax (g)	0.661	0.514	0.848
k-velmax (cm/s)	91.37	91.37	91.37

Displacement Given Median Dynamic Response					
Displacement Model			Sliding Displacements, D (cm)		
	μ_{lnD}	σ_{lnD}	median	-1σ	+1σ
[kmax, M]	5.43	0.699	228.84	113.76	460.30
[kmax, k-velmax]	5.71	0.404	302.13	201.66	452.67
			Sliding Displacements, D (in)		
	μ_{lnD}	σ_{lnD}	median	-1σ	+1σ
[kmax, M]	5.43	0.699	90.09	44.79	181.22
[kmax, k-velmax]	5.71	0.404	118.95	79.39	178.22

PGA Peak Ground Acceleration (g)
PGV Peak Ground Velocity (cm/s)
k_y Critical or Yield Acceleration (g)
T_m Mean Period of an Earthquake Motion (s)
T_s Site Period or the Natural Period of a Sliding Mass (s). For rigid sliding set T_s = 0 s
M Earthquake Magnitude
kmax maximum seismic coefficient (g)
k-velmax the maximum velocity of the seismic coefficient-time history (cm/s)
D Predicted Sliding Displacment (cm)

Reference: Rathje, E.M. and Antonakos, G. 2011. "A Unified Model for Predicting Earthquake-Induced Sliding Displacements of Rigid and Flexible Slopes," Engineering Geology, 122, 51-60, doi:10.1016/j.enggeo.2010.12.004.

Project No. 17-206-02
Section A-A'
April 2021

Static Analysis, Run 2.1
Post Earthquake Condition
Horz Seismic Coef.: 0
Entry and Exit

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 395 psf
Phi': 31 °

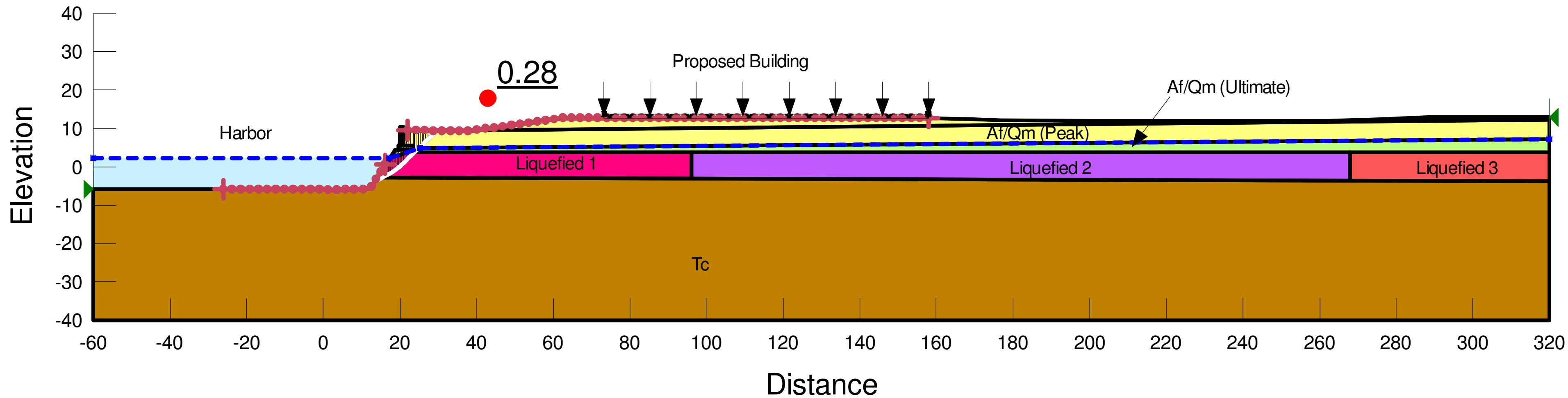
Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 30 °

Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 695 psf
Phi': 34 °

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.17

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.5



Project No. 17-206-02
Section A-A'
April 2021

Deformation Analysis, Run 2.1_ky
Post Earthquake Condition
Horz Seismic Coef.: 0.01
Entry and Exit
Deformation > 115 inches

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 395 psf
Phi': 31 °

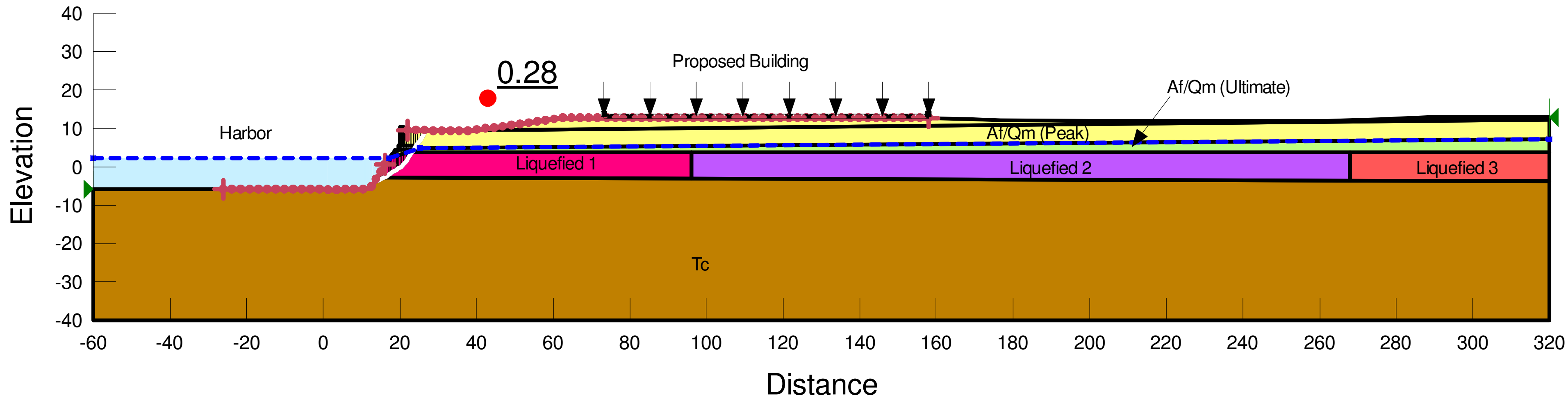
Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 80 psf
Phi': 30 °

Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 695 psf
Phi': 34 °

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.17

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125 pcf
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.5



GMU Project No. 17-206-02 - Dana Point Harbor Revitalization - Buildings 1 through 12
Average Seismic Displacement
Block Search for ky
Liq Layer 1
MCE Event

Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2)	295.28 cm or	116.25 inch
1cm = 0.393701 in.		
Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax]	286.80 cm	112.91 inch
Average Displacement =	291.04 cm	114.58 inch

DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

Project: 17-206-02 Dana Point Harbor - Section A-A' Liq1 (Based on 11-161-00 CPT-5)

INPUT:

Slide h (ft):	5.00
Slide Vs (ft/sec):	838
Depth to Rx (km):	0.01
Ave. Vs(30) (m/s):	360
Ave. Site Class:	C
Mean Magnitude:	6.80
Mean Dist. (km):	7.4
ky:	0.01

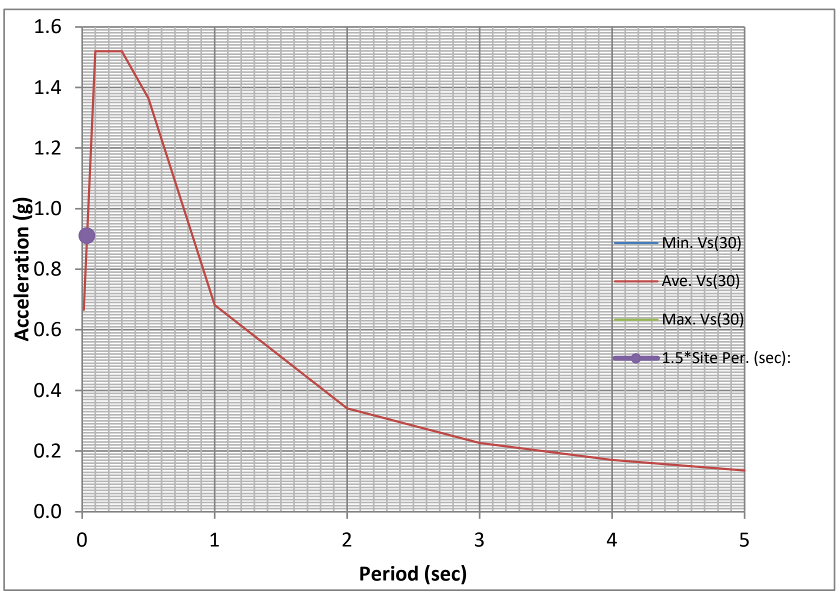
RESULTS:

Site Period, Ts (sec):	0.0239
1.5*Site Per. (sec):	0.0358
EQ Mean Period, Tm (sec):	0.472
Ts/Tm:	0.05
Estimated PGV (cm/sec):	91.37
Duration (D_5-D_{95}) (sec):	13.2
Sa(1.5Ts) Min $Vs_{(30)}$	0.0000
Sa(1.5Ts) Ave $Vs_{(30)}$	0.9105
Sa(1.5Ts) Max $Vs_{(30)}$	0.0000

5-Percent Damped Spectra

Period	Min. $Vs_{(30)}$	Ave. $Vs_{(30)}$	Max. $Vs_{(30)}$
0.01		0.6660	
0.1		1.5190	
0.2		1.5190	
0.3		1.5190	
0.5		1.3640	
1.0		0.6820	
2.0		0.34100	
3.0		0.22700	
4.0		0.17100	
5.0		0.13600	

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)



Slide Mass Area =	67
Lengh of Slide Mass =	15
Average Slide H (ft) =	4.47

Simplified Procedure for Estimating Earthquake Induced Deviatoric Slope Displacements
by Jonathan D. Bray and Thaleia Travasarou
Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters			
Yield Coefficient (ky)	0.01		Based on pseudostatic analysis
Initial Fundamental Period (Ts)	0.0239	seconds	1D: Ts=4H/Vs 2D: Ts=2.6H/Vs
Degraded Period (1.5Ts)	0.04	seconds	
Moment Magnitude (Mw)	6.8		
Spectral Acceleration (Sa(1.5Ts))	0.910526	g	

Additional Input Parameters		
Probability of Exceedance #1 (P1)	84	%
Probability of Exceedance #2 (P2)	50	%
Probability of Exceedance #3 (P3)	16	%
Displacement Threshold (d_threshold)	30	cm

Intermediate Calculated Parameters			
Non-Zero Seismic Displacement Est (D)	295.28	cm	eq. (5) or (6)
Standard Deviation of Non-Zero Seismic D	0.66		

Results			
Probability of Negligible Displ. (P(D=0))	0.00		eq. (3)
D1	153.2	cm	calc. using eq. (7)
D2	295.3	cm	calc. using eq. (7)
D3	569.2	cm	calc. using eq. (7)
P(D>d_threshold)	1.00		eq. (7)

Notes
1. Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
2. Probability of Exceedance is the desired probability of exceeding a particular displacement value.
3. Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
   (e.g., the probability of exceeding displacement D1 is P1)
4. The 16%, 50%, and 84% percentile displacement values at selected ky values are shown to the right.
5. Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
6. ky may range between 0.01 and 0.5, Ts between 0 and 2 s, Sa between 0.002 and 2.7 g, M between 4.5 and 9
7. Rigid slope is assumed for Ts < 0.05 s
8. When a value for D is not calculated, D is < 1cm
9. ky may be estimated using the simplified equations shown below.
10. Examples of how Ts is estimated are shown below.
11. Vs = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, Vs = [(h1)(Vs1) + (h2)(Vs2)]/(h1 + h2)

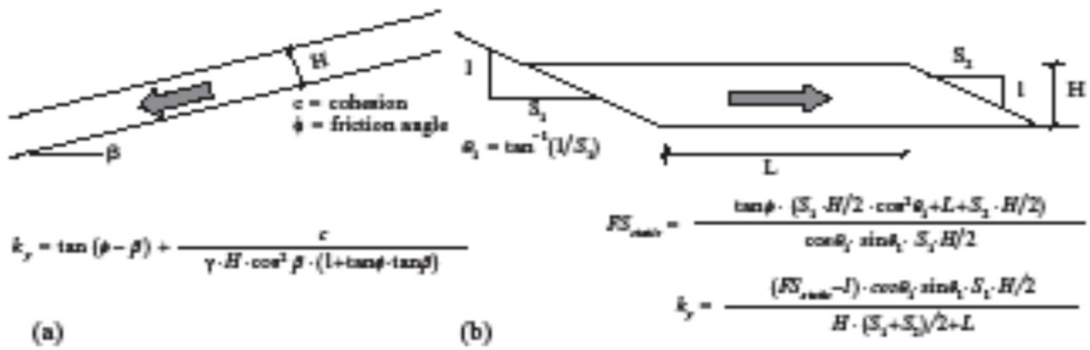


Fig. 14.1. Simplified estimates of the yield coefficient: (a) shallow sliding and (b) deep sliding

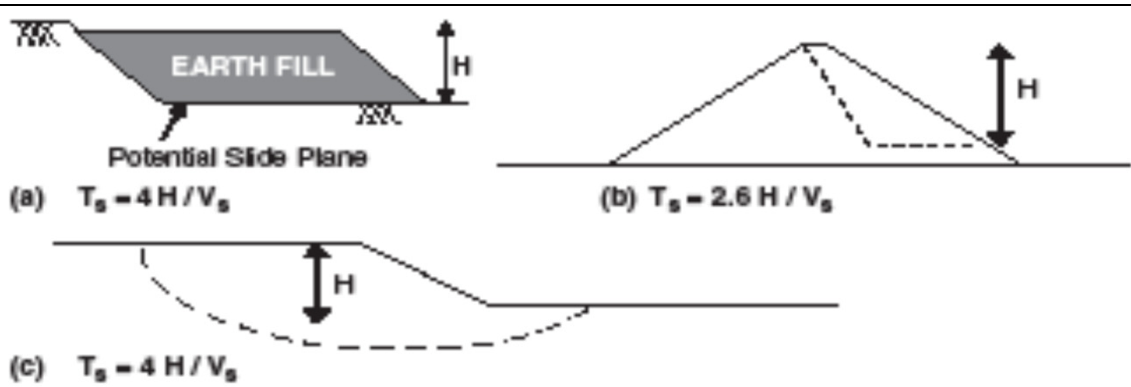
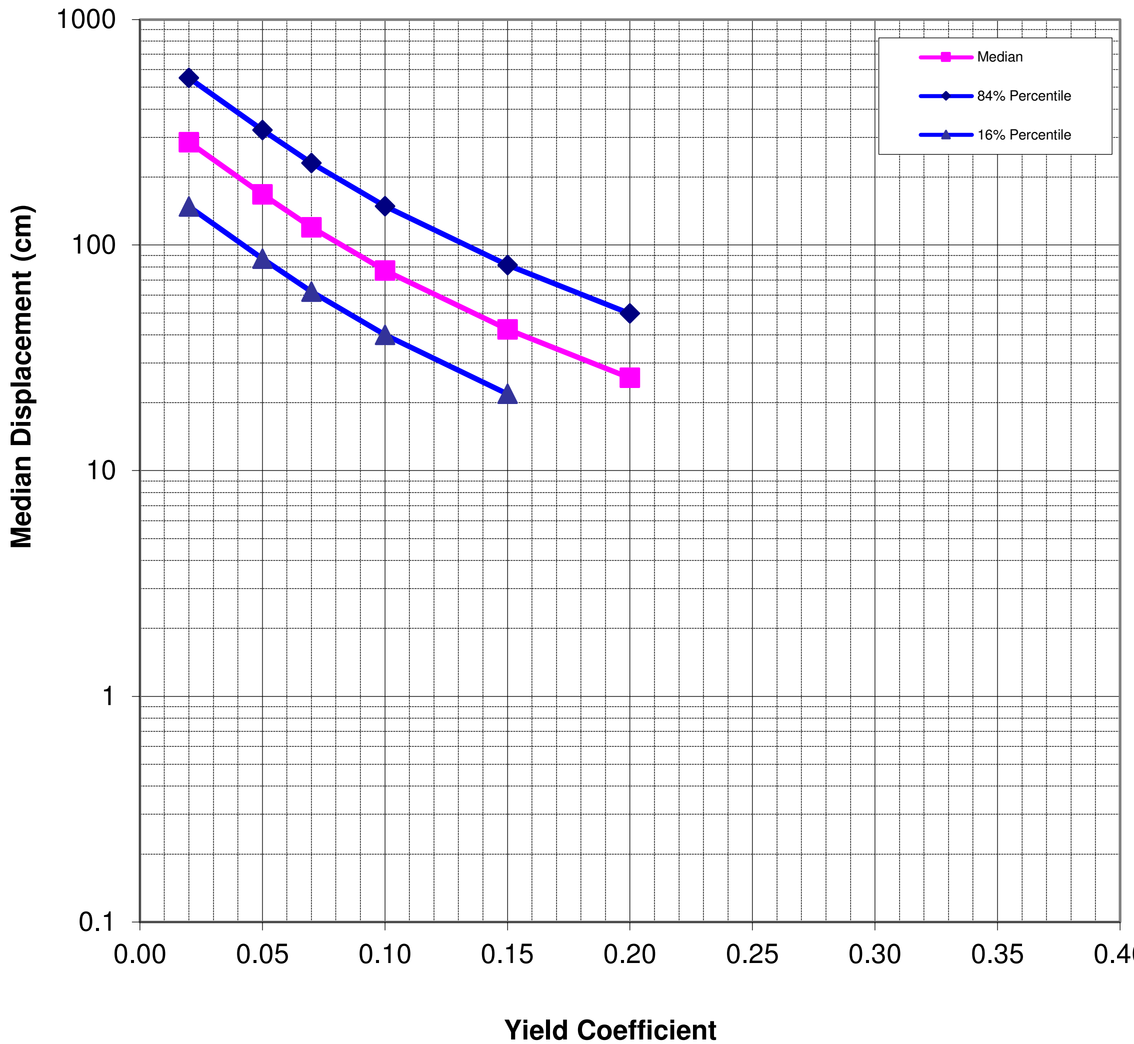


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Figures from Bray, J.D. (2007) “Chapter 14: Simplified Seismic Slope Displacement Procedures,” Earthquake Geotechnical Engineering, 4th Inter. Conf. on Earthquake Geotechnical Engineering - Invited Lectures, in Geotechnical, Geological, and Earthquake Engineering Series, Vol. 6, Pitilakis, Kyriazis D., Ed., Springer, Vol. 6, pp. 327-353.

Dependence on ky

ky	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.00	285.9	285.9	551.0	148.3
0.05	0.00	167.6	167.6	323.1	86.9
0.07	0.00	119.7	119.7	230.8	62.1
0.1	0.00	77.2	77.2	148.8	40.0
0.15	0.00	42.3	42.3	81.5	21.9
0.2	0.00	25.8	25.8	49.7	13.4
0.3	0.04	11.7	11.4	22.2	5.6
0.4	0.19	6.3	5.1	11.0	<1



Sliding displacement models from Rathje and Antonakos (2011)

Prediction of dynamic response and sliding displacement of a sliding mass during earthquake shaking

Inputs	
PGA (g)	0.666
PGV (cm/s)	91.37
k_y (g)	0.01
T_m (s)	0.47246
T_s (s)	0.02387
M	6.80
T_s/T_m	0.05052

Dynamic Response			
	median	-1σ	+1σ
kmax (g)	0.666	0.666	0.666
k-velmax (cm/s)	91.37	91.37	91.37

Displacement Given Median Dynamic Response					
Displacement Model			Sliding Displacements, D (cm)		
	$\mu_{\ln D}$	$\sigma_{\ln D}$	median	-1σ	+1σ
[kmax, M]	5.32	0.699	204.30	101.57	410.94
[kmax, k-velmax]	5.66	0.404	286.80	191.43	429.69
			Sliding Displacements, D (in)		
	$\mu_{\ln D}$	$\sigma_{\ln D}$	median	-1σ	+1σ
[kmax, M]	5.32	0.699	80.43	39.99	161.79
[kmax, k-velmax]	5.66	0.404	112.91	75.37	169.17

PGA Peak Ground Acceleration (g)
PGV Peak Ground Velocity (cm/s)
k_y Critical or Yield Acceleration (g)
T_m Mean Period of an Earthquake Motion (s)
T_s Site Period or the Natural Period of a Sliding Mass (s). For rigid sliding set T_s = 0 s
M Earthquake Magnitude
kmax maximum seismic coefficient (g)
k-velmax the maximum velocity of the seismic coefficient-time history (cm/s)
D Predicted Sliding Displacment (cm)

Reference: Rathje, E.M. and Antonakos, G. 2011. “A Unified Model for Predicting Earthquake-Induced Sliding Displacements of Rigid and Flexible Slopes,” Engineering Geology, 122, 51-60, doi:10.1016/j.enggeo.2010.12.004.

Project No. 17-206-02
Section C-C'
April 2021

Static Analysis, Run 1.1_s
Post-Earthquake Condition
Horz Seismic Coef.: 0
Slip Surface Option: Block

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 395
Phi': 31

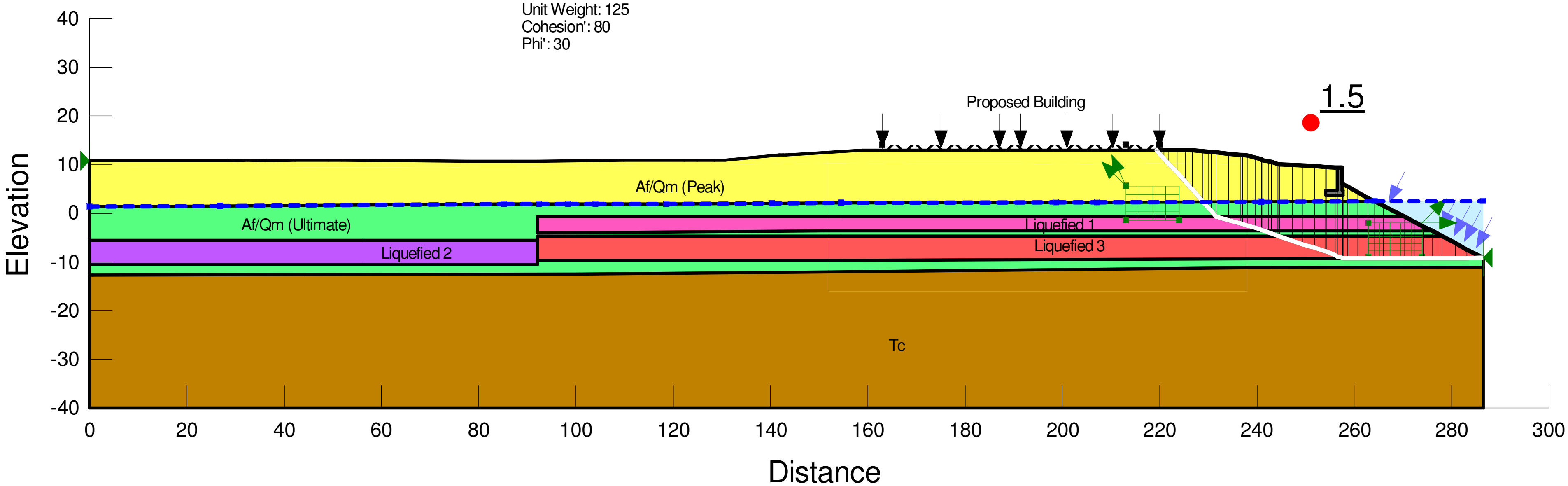
Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 695
Phi': 34

Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 80
Phi': 30

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.25

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.35



Project No. 17-206-02
Section C-C'
April 2021

Deformation Analysis, Run 1.1_ky
Post-Earthquake Condition
Horz Seismic Coef.: 0.1
Slip Surface Option: Block
Deformation = 39 inches

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 395
Phi': 31

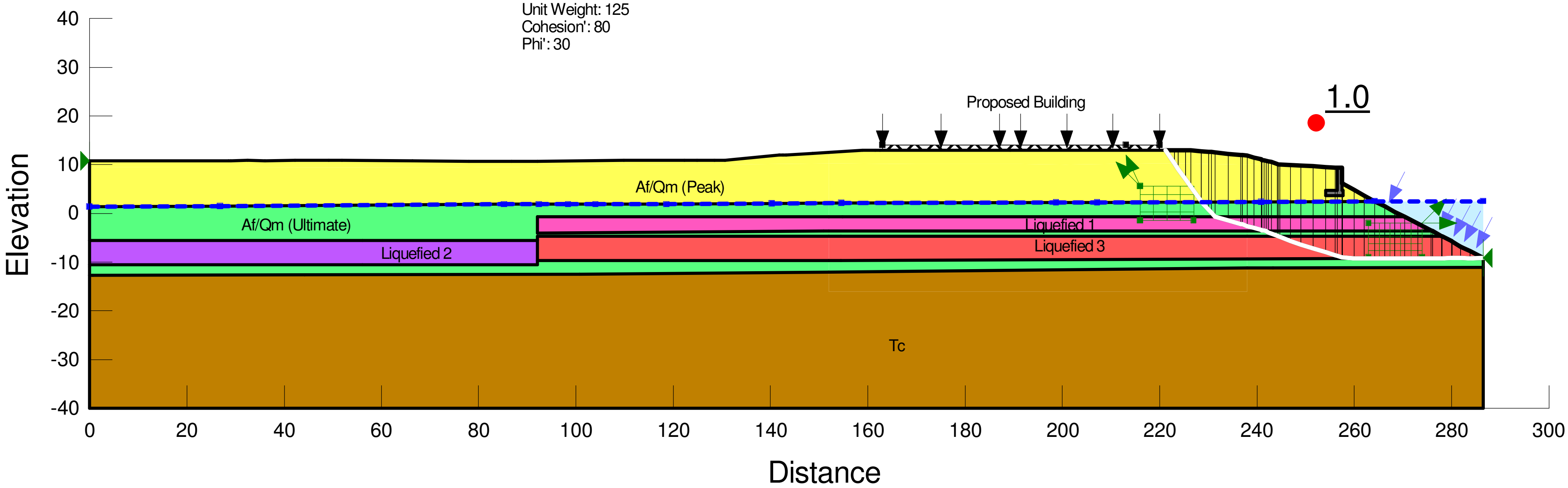
Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 695
Phi': 34

Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 80
Phi': 30

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.25

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.35



GMU Project No. 17-206-02 - Dana Point Harbor Revitalization - Buildings 1 through 12
Average Seismic Displacement
Section C-C'
Block Search for ky
Liq Layer 3
MCE Event

Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2)	80.32 cm or	31.62 inch
1cm = 0.393701 in.		
Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax]	116.41 cm	45.83 inch
Average Displacement =	98.37 cm	38.73 inch

DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

Project: 17-206-02 Dana Point Harbor - Section C-C' Liq3

INPUT:

Slide h (ft):	15.00
Slide Vs (ft/sec):	837.99
Depth to Rx (km):	0.01
Ave. Vs(30) (m/s):	360
Ave. Site Class:	C
Mean Magnitude:	6.80
Mean Dist. (km):	7.4
ky:	0.10

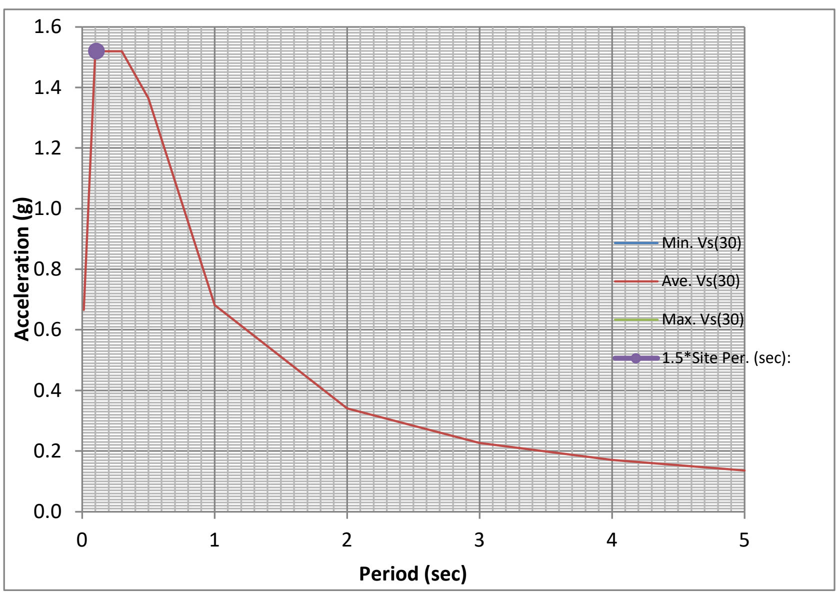
RESULTS:

Site Period, Ts (sec):	0.0716
1.5*Site Per. (sec):	0.1074
EQ Mean Period, Tm (sec):	0.472
Ts/Tm:	0.15
Estimated PGV (cm/sec):	91.37
Duration (D_5-D_{95}) (sec):	13.2
Sa(1.5Ts) Min $Vs_{(30)}$	0.0000
Sa(1.5Ts) Ave $Vs_{(30)}$	1.5190
Sa(1.5Ts) Max $Vs_{(30)}$	0.0000

5-Percent Damped Spectra

Period	Min. $Vs_{(30)}$	Ave. $Vs_{(30)}$	Max. $Vs_{(30)}$
0.01		0.6660	
0.1		1.5190	
0.2		1.5190	
0.3		1.5190	
0.5		1.3640	
1.0		0.6820	
2.0		0.34100	
3.0		0.22700	
4.0		0.17100	
5.0		0.13600	

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)



Slide Mass Area =	594
Lengh of Slide Mass =	40
Average Slide H (ft) =	14.85

Simplified Procedure for Estimating Earthquake Induced Deviatoric Slope Displacements
by Jonathan D. Bray and Thaleia Travasarou
Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters			
Yield Coefficient (ky)	0.1		Based on pseudostatic analysis
Initial Fundamental Period (Ts)	0.0716	seconds	1D: Ts=4H/Vs 2D: Ts=2.6H/Vs
Degraded Period (1.5Ts)	0.11	seconds	
Moment Magnitude (Mw)	6.8		
Spectral Acceleration (Sa(1.5Ts))	1.519	g	

Additional Input Parameters		
Probability of Exceedance #1 (P1)	84	%
Probability of Exceedance #2 (P2)	50	%
Probability of Exceedance #3 (P3)	16	%
Displacement Threshold (d_threshold)	30	cm

Intermediate Calculated Parameters			
Non-Zero Seismic Displacement Est (D)	80.32	cm	eq. (5) or (6)
Standard Deviation of Non-Zero Seismic D	0.66		

Results			
Probability of Negligible Displ. (P(D=0))	0.00		eq. (3)
D1	41.7	cm	calc. using eq. (7)
D2	80.3	cm	calc. using eq. (7)
D3	154.8	cm	calc. using eq. (7)
P(D>d_threshold)	0.93		eq. (7)

Notes

1. Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
2. Probability of Exceedance is the desired probability of exceeding a particular displacement value.
3. Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
   (e.g., the probability of exceeding displacement D1 is P1)
4. The 16%, 50%, and 84% percentile displacement values at selected ky values are shown to the right.
5. Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
6. ky may range between 0.01 and 0.5, Ts between 0 and 2 s, Sa between 0.002 and 2.7 g, M between 4.5 and 9
7. Rigid slope is assumed for Ts < 0.05 s
8. When a value for D is not calculated, D is < 1cm
9. ky may be estimated using the simplified equations shown below.
10. Examples of how Ts is estimated are shown below.
11. Vs = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, Vs = [(h1)(Vs1) + (h2)(Vs2)]/(h1 + h2)

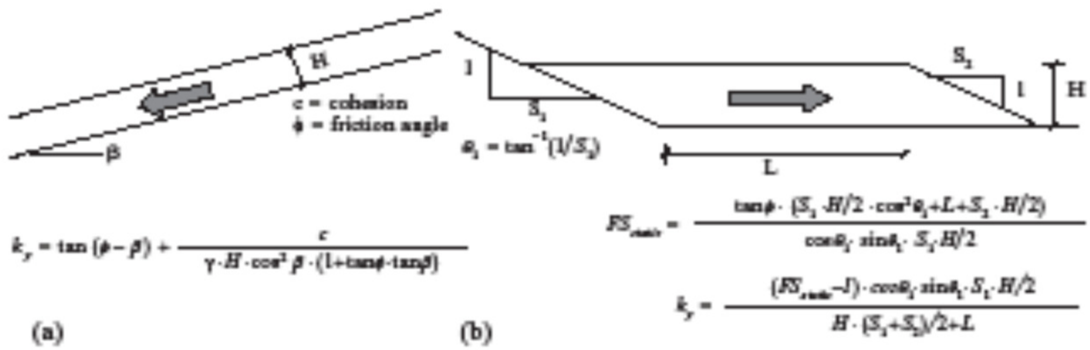


Fig. 14.1. Simplified estimates of the yield coefficient: (a) shallow sliding and (b) deep sliding

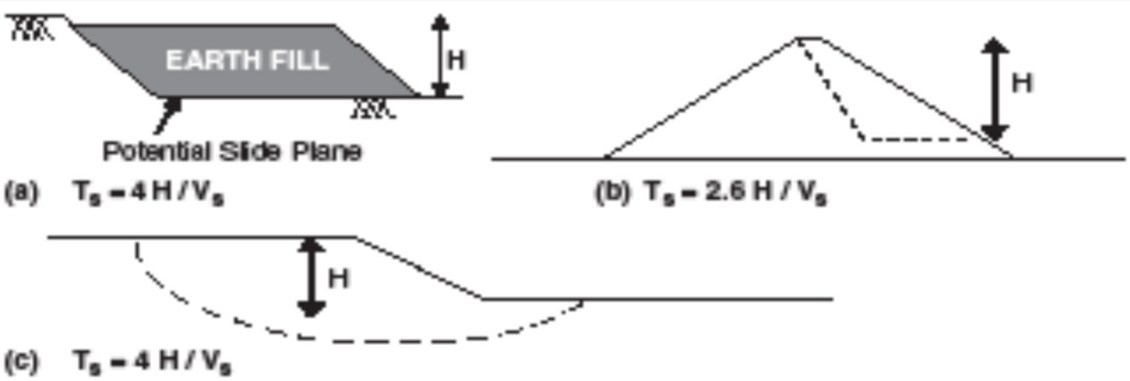
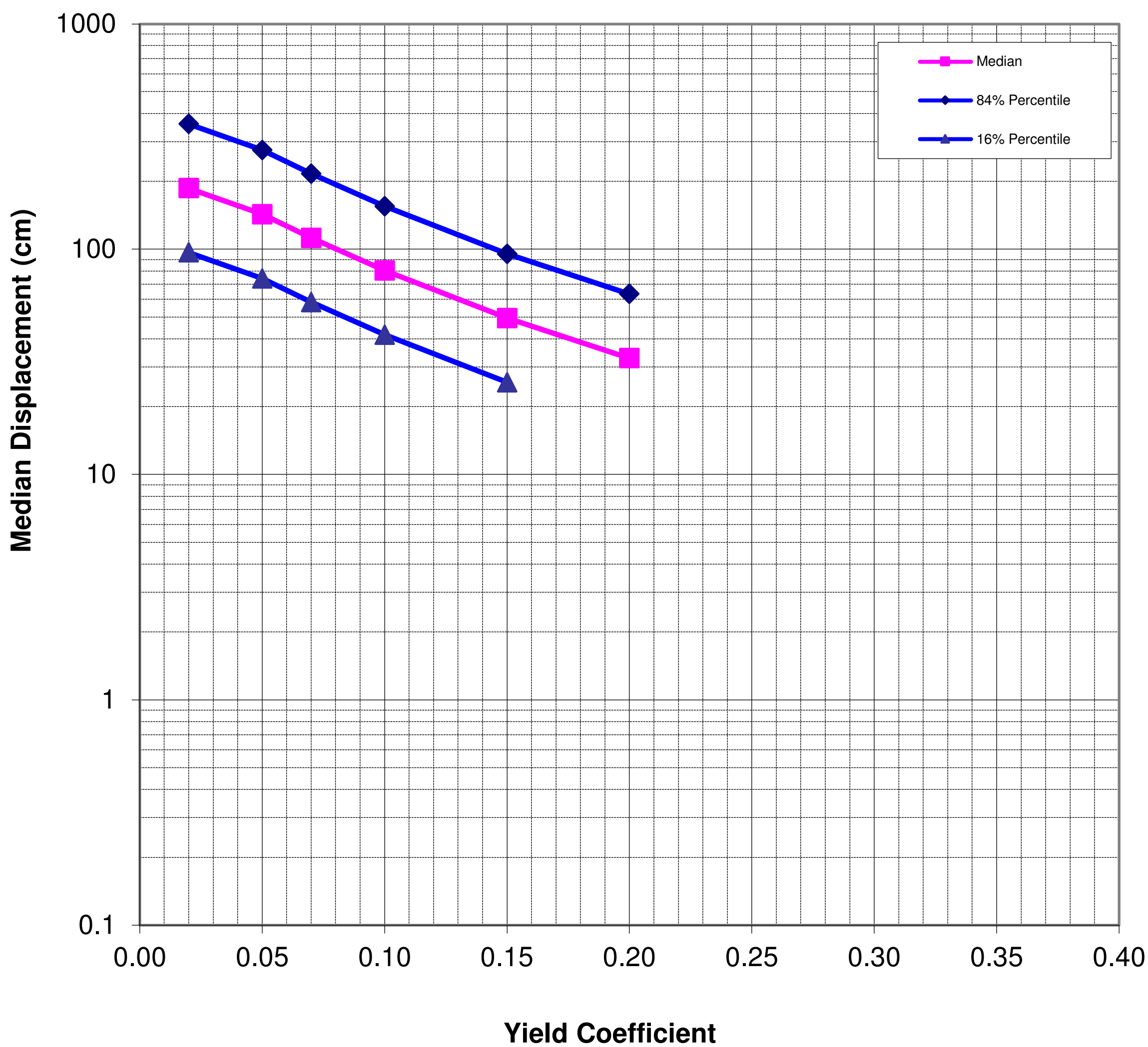


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Figures from Bray, J.D. (2007) “Chapter 14: Simplified Seismic Slope Displacement Procedures,” Earthquake Geotechnical Engineering, 4th Inter. Conf. on Earthquake Geotechnical Engineering - Invited Lectures, in Geotechnical, Geological, and Earthquake Engineering Series, Vol. 6, Pitilakis, Kyriazis D., Ed., Springer, Vol. 6, pp. 327-353.

Dependence on ky

ky	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.00	186.6	186.6	359.8	96.8
0.05	0.00	142.7	142.7	275.1	74.0
0.07	0.00	112.4	112.4	216.6	58.3
0.1	0.00	80.3	80.3	154.8	41.7
0.15	0.00	49.5	49.5	95.4	25.7
0.2	0.00	32.8	32.8	63.3	17.0
0.3	0.00	16.8	16.8	32.3	8.7
0.4	0.00	9.7	9.7	18.8	5.0



Sliding displacement models from Rathje and Antonakos (2011)

Prediction of dynamic response and sliding displacement of a sliding mass during earthquake shaking

Inputs	
PGA (g)	0.666
PGV (cm/s)	91.37
k_y (g)	0.1
T_m (s)	0.47246
T_s (s)	0.0716
M	6.80
T_s/T_m	0.15155

Dynamic Response			
	median	-1σ	+1σ
kmax (g)	0.644	0.501	0.826
k-velmax (cm/s)	91.37	91.37	91.37

Displacement Given Median Dynamic Response					
Displacement Model			Sliding Displacements, D (cm)		
	μ_{lnD}	σ_{lnD}	median	-1σ	+1σ
[kmax, M]	4.46	0.744	86.26	40.99	181.53
[kmax, k-velmax]	4.76	0.444	116.41	74.67	181.50
			Sliding Displacements, D (in)		
	μ_{lnD}	σ_{lnD}	median	-1σ	+1σ
[kmax, M]	4.46	0.744	33.96	16.14	71.47
[kmax, k-velmax]	4.76	0.444	45.83	29.40	71.46

PGA Peak Ground Acceleration (g)
PGV Peak Ground Velocity (cm/s)
k_y Critical or Yield Acceleration (g)
T_m Mean Period of an Earthquake Motion (s)
T_s Site Period or the Natural Period of a Sliding Mass (s). For rigid sliding set T_s = 0 s
M Earthquake Magnitude
kmax maximum seismic coefficient (g)
k-velmax the maximum velocity of the seismic coefficient-time history (cm/s)
D Predicted Sliding Displacment (cm)

Reference: Rathje, E.M. and Antonakos, G. 2011. “A Unified Model for Predicting Earthquake-Induced Sliding Displacements of Rigid and Flexible Slopes,” Engineering Geology, 122, 51-60, doi:10.1016/j.enggeo.2010.12.004.

Project No. 17-206-02
Section C-C'
April 2021

Static Analysis, Run 2.1_s
Post-Earthquake Condition
Horz Seismic Coef.: 0
Slip Surface Option: Entry and Exit

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 395
Phi': 31

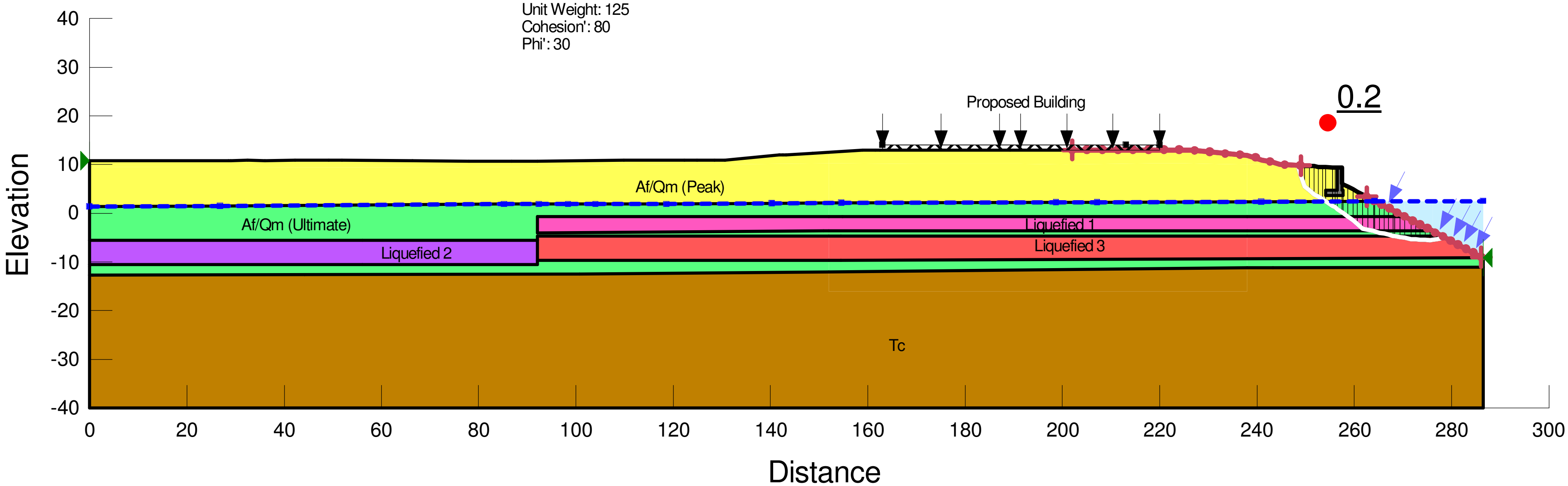
Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 695
Phi': 34

Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 80
Phi': 30

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.25

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.35



Project No. 17-206-02
Section C-C'
April 2021

Deformation Analysis, Run 2.1_ky
Post-Earthquake Condition
Horz Seismic Coef.: 0.01
Slip Surface Option: Entry and Exit
Deformation > 115 inches

Name: Af/Qm (Peak)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 395
Phi': 31

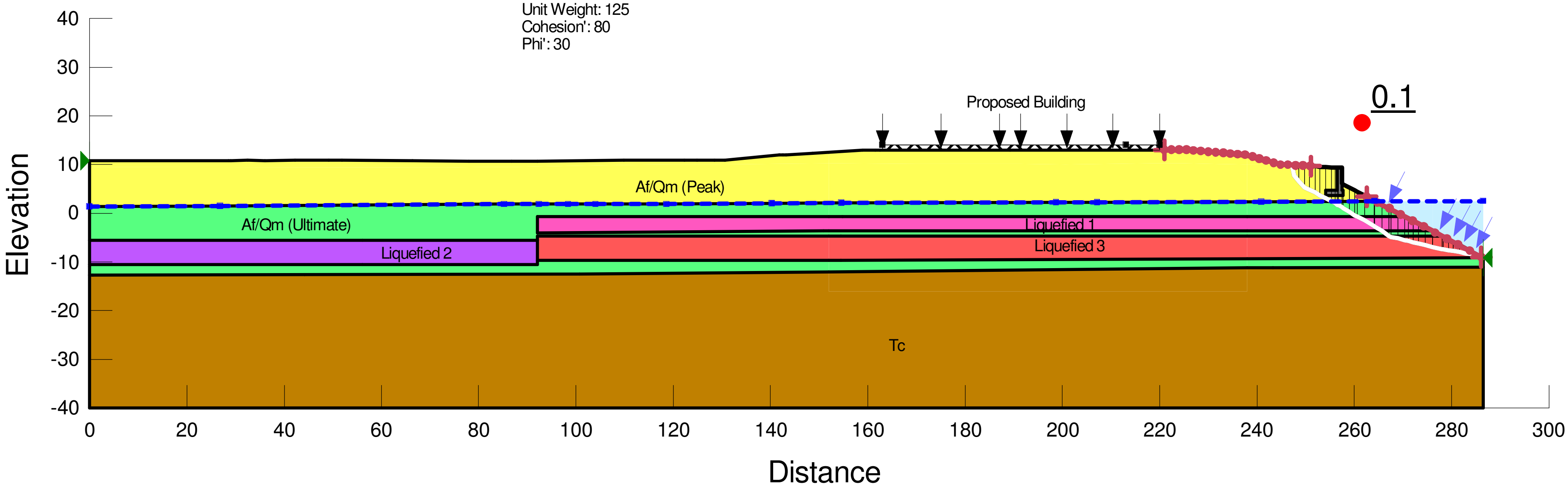
Name: Tc
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 695
Phi': 34

Name: Af/Qm (Ultimate)
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 80
Phi': 30

Name: Liquefied 1
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.25

Name: Liquefied 2
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.1

Name: Liquefied 3
Model: SHANSEP
Unit Weight: 125
Tau/Sigma Ratio: 0.35



GMU Project No. 17-206-02 - Dana Point Harbor Revitalization - Buildings 1 through 12
Average Seismic Displacement
Section C-C'
Block Search for ky
MCE Event

Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2)	295.28 cm or	116.25 inch

1cm = 0.393701 in.

Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax]	286.80 cm	112.91 inch
Average Displacement =	291.04 cm	114.58 inch

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
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Hadi Tabatabaee
BUILDING OFFICIAL

DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

Project: 17-206-02 Dana Point Harbor - Section C-C'

INPUT:

Slide h (ft):	5.00
Slide Vs (ft/sec):	837.99
Depth to Rx (km):	0.01
Ave. Vs(30) (m/s):	360
Ave. Site Class:	C
Mean Magnitude:	6.80
Mean Dist. (km):	7.4
ky:	0.01

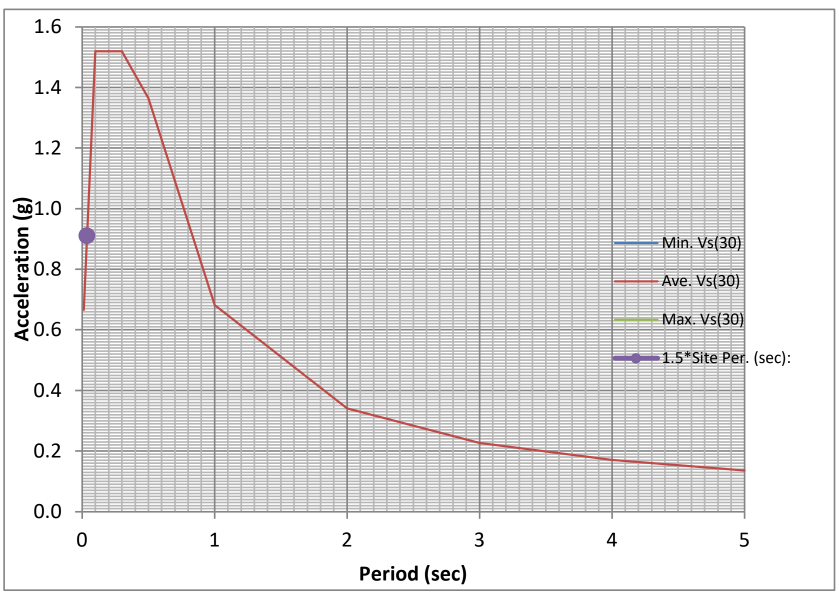
RESULTS:

Site Period, Ts (sec):	0.0239
1.5*Site Per. (sec):	0.0358
EQ Mean Period, Tm (sec):	0.472
Ts/Tm:	0.05
Estimated PGV (cm/sec):	91.37
Duration (D_5-D_{95}) (sec):	13.2
Sa(1.5Ts) Min $Vs_{(30)}$	0.0000
Sa(1.5Ts) Ave $Vs_{(30)}$	0.9105
Sa(1.5Ts) Max $Vs_{(30)}$	0.0000

5-Percent Damped Spectra

Period	Min. $Vs_{(30)}$	Ave. $Vs_{(30)}$	Max. $Vs_{(30)}$
0.01		0.6660	
0.1		1.5190	
0.2		1.5190	
0.3		1.5190	
0.5		1.3640	
1.0		0.6820	
2.0		0.34100	
3.0		0.22700	
4.0		0.17100	
5.0		0.13600	

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)



Slide Mass Area =	161
Lengh of Slide Mass =	30
Average Slide H (ft) =	5.37

Simplified Procedure for Estimating Earthquake Induced Deviatoric Slope Displacements
by Jonathan D. Bray and Thaleia Travasarou
Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters			
Yield Coefficient (ky)	0.01		Based on pseudostatic analysis
Initial Fundamental Period (Ts)	0.0239	seconds	1D: Ts=4H/Vs 2D: Ts=2.6H/Vs
Degraded Period (1.5Ts)	0.04	seconds	
Moment Magnitude (Mw)	6.8		
Spectral Acceleration (Sa(1.5Ts))	0.910526	g	

Additional Input Parameters		
Probability of Exceedance #1 (P1)	84	%
Probability of Exceedance #2 (P2)	50	%
Probability of Exceedance #3 (P3)	16	%
Displacement Threshold (d_threshold)	30	cm

Intermediate Calculated Parameters			
Non-Zero Seismic Displacement Est (D)	295.28	cm	eq. (5) or (6)
Standard Deviation of Non-Zero Seismic D	0.66		

Results			
Probability of Negligible Displ. (P(D=0))	0.00		eq. (3)
D1	153.2	cm	calc. using eq. (7)
D2	295.3	cm	calc. using eq. (7)
D3	569.2	cm	calc. using eq. (7)
P(D>d_threshold)	1.00		eq. (7)

Notes
1. Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
2. Probability of Exceedance is the desired probability of exceeding a particular displacement value.
3. Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
   (e.g., the probability of exceeding displacement D1 is P1)
4. The 16%, 50%, and 84% percentile displacement values at selected ky values are shown to the right.
5. Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
6. ky may range between 0.01 and 0.5, Ts between 0 and 2 s, Sa between 0.002 and 2.7 g, M between 4.5 and 9
7. Rigid slope is assumed for Ts < 0.05 s
8. When a value for D is not calculated, D is < 1cm
9. ky may be estimated using the simplified equations shown below.
10. Examples of how Ts is estimated are shown below.
11. Vs = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, Vs = [(h1)(Vs1) + (h2)(Vs2)]/(h1 + h2)

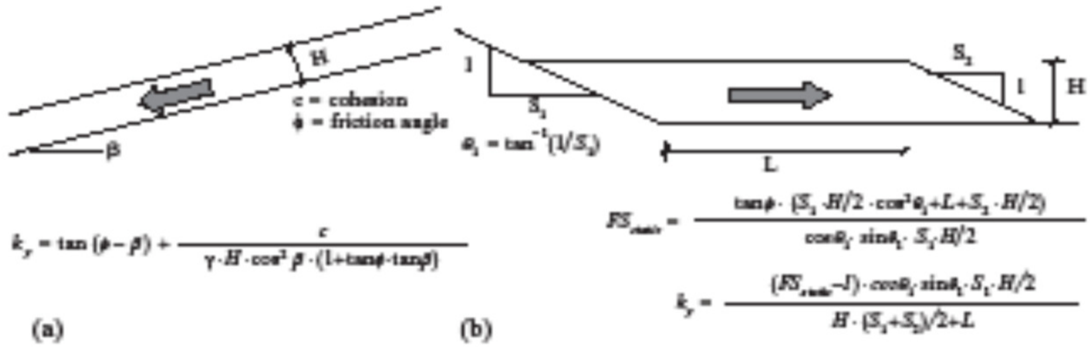


Fig. 14.1. Simplified estimates of the yield coefficient: (a) shallow sliding and (b) deep sliding

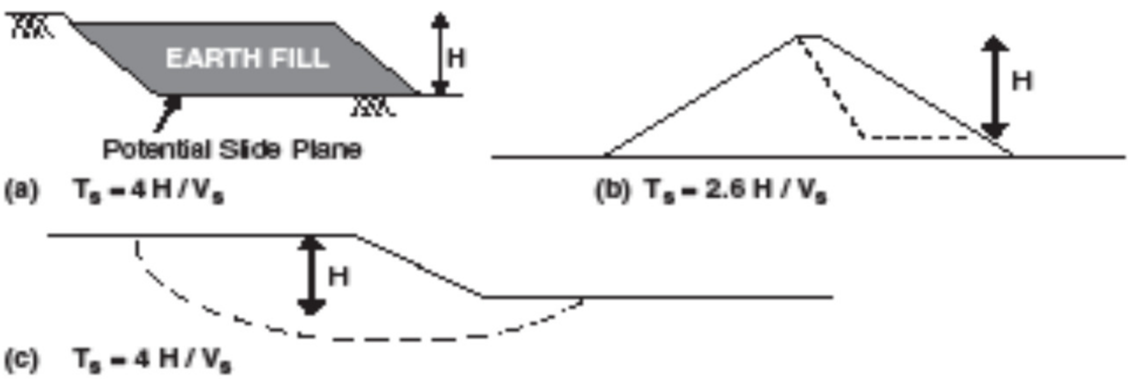
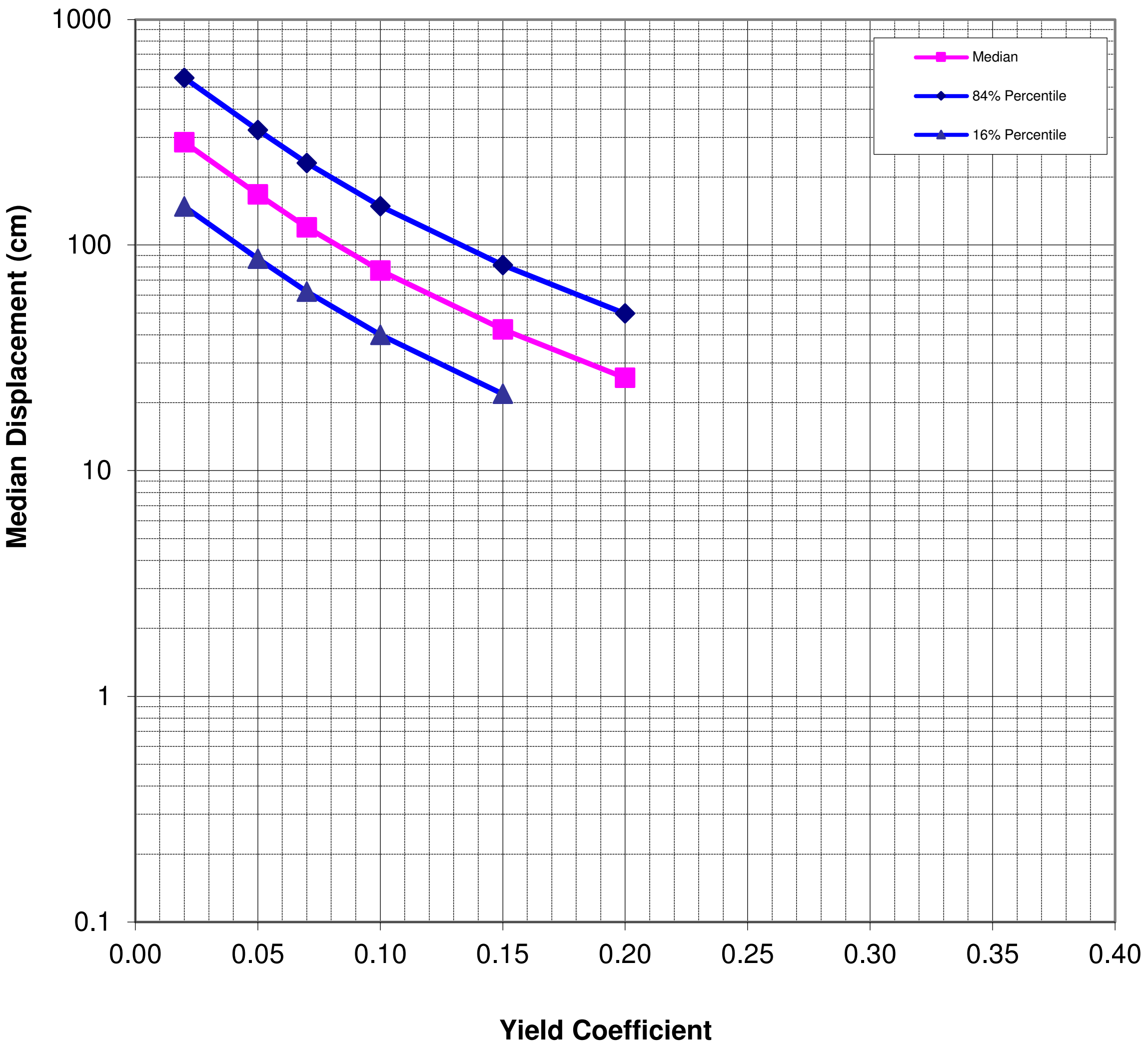


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Figures from Bray, J.D. (2007) “Chapter 14: Simplified Seismic Slope Displacement Procedures,” Earthquake Geotechnical Engineering, 4th Inter. Conf. on Earthquake Geotechnical Engineering - Invited Lectures, in Geotechnical, Geological, and Earthquake Engineering Series, Vol. 6, Pitilakis, Kyriazis D., Ed., Springer, Vol. 6, pp. 327-353.

Dependence on ky

ky	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.00	285.9	285.9	551.0	148.3
0.05	0.00	167.6	167.6	323.1	86.9
0.07	0.00	119.7	119.7	230.8	62.1
0.1	0.00	77.2	77.2	148.8	40.0
0.15	0.00	42.3	42.3	81.5	21.9
0.2	0.00	25.8	25.8	49.7	13.4
0.3	0.04	11.7	11.4	22.2	5.6
0.4	0.19	6.3	5.1	11.0	<1



Sliding displacement models from Rathje and Antonakos (2011)

Prediction of dynamic response and sliding displacement of a sliding mass during earthquake shaking

Inputs	
PGA (g)	0.666
PGV (cm/s)	91.37
k_y (g)	0.01
T_m (s)	0.47246
T_s (s)	0.02387
M	6.80
T_s/T_m	0.05052

Dynamic Response			
	median	-1σ	+1σ
kmax (g)	0.666	0.666	0.666
k-velmax (cm/s)	91.37	91.37	91.37

Displacement Given Median Dynamic Response					
Displacement Model			Sliding Displacements, D (cm)		
	$\mu_{\ln D}$	$\sigma_{\ln D}$	median	-1σ	+1σ
[kmax, M]	5.32	0.699	204.30	101.57	410.94
[kmax, k-velmax]	5.66	0.404	286.80	191.43	429.69
			Sliding Displacements, D (in)		
	$\mu_{\ln D}$	$\sigma_{\ln D}$	median	-1σ	+1σ
[kmax, M]	5.32	0.699	80.43	39.99	161.79
[kmax, k-velmax]	5.66	0.404	112.91	75.37	169.17

PGA Peak Ground Acceleration (g)
PGV Peak Ground Velocity (cm/s)
k_y Critical or Yield Acceleration (g)
T_m Mean Period of an Earthquake Motion (s)
T_s Site Period or the Natural Period of a Sliding Mass (s). For rigid sliding set T_s = 0 s
M Earthquake Magnitude
kmax maximum seismic coefficient (g)
k-velmax the maximum velocity of the seismic coefficient-time history (cm/s)
D Predicted Sliding Displacment (cm)

Reference: Rathje, E.M. and Antonakos, G. 2011. “A Unified Model for Predicting Earthquake-Induced Sliding Displacements of Rigid and Flexible Slopes,” Engineering Geology, 122, 51-60, doi:10.1016/j.enggeo.2010.12.004.

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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BUILDING OFFICIAL

APPENDIX F

Flatwork/Hardscape Table

TABLE F - FLATWORK RECOMMENDATIONS
DANA POINT HARBOR – COMMERCIAL

Description	Subgrade Preparation	Minimum Concrete Thickness (Full)	Edge Thickness	Reinforcement[2]	Joint Spacing (Maximum)	Cement Type	Sulfate Resistance
Isolated Concrete Sidewalks and Walkways[4]	1) 2% over optimum to 12" [1], 2) 4" of CAB or CMB compacted to a minimum of 95% relative compaction above moisture conditioned subgrade.	4 inches	Per Landscape Architect	1) No. 3 bars at 24" o.c. [2] if within 5' of top-of-slope conditions; otherwise not required, 2) where adjacent to curbs or structures and at cold joints/ expansion joints use dowels: No. 3 bars at 24" o.c. [5]	6 feet	II/V	(3)
Vehicular Concrete and Driveways	1) 2% over optimum to 12" [1], 2) 6" of CAB or CMB compacted to a minimum of 95% relative compaction above moisture conditioned subgrade.	8 inches	Per Landscape Architect	1) No. 3 bars at 24" o.c. [2] if within 5' of top-of-slope conditions; otherwise not required, 2) where adjacent to curbs or structures and at cold joints/ expansion joints use dowels: No. 3 bars at 24" o.c. [5]	6 feet	II/V	(3)
Concrete Interlocking Pavers (non-vehicular)[4,6]	1) 2% over optimum to 12"[1], 2) 13" of CAB or CMB compacted to a minimum of 95% relative compaction.	Not Required	Where adjacent to asphalt pavement and landscape areas - 4" of PCC over 4" of CAB or CMB compacted to a minimum of 95% relative compaction Min. 6" width	1) Thickened Edge: one No. 3 bar placed in long direction, 2) dowel into adjacent curbs or structures and across cold joints/ expansion joints w/No. 3 bars at 24" o.c. [5]	N/A	II/V	(3)
Concrete Interlocking Pavers (vehicular) [4, 6]	Subgrade: 2% over optimum to 12"[1] Parking Stall Access: 13 inches of CAB or CMB compacted to 95% relative compaction over Mirafi 600X or equivalent geotextile. Fire Access: 22 inches of CAB or CMB compacted to 95% over Mirafi 600X or equivalent.	Not Required	Where adjacent to asphalt pavements and landscape areas - 8" of PCC over 6" of CAB or CMB compacted to a minimum of 95% relative compaction Min. 6" width	1) Thickened Edge: one No. 3 bar placed in long direction, 2) dowel into adjacent curbs or structures and across cold joints/ expansion joints w/No. 3 bars at 24" o.c. [5]	N/A	II/V	(3)

(1) The moisture content of the subgrade must be verified by the geotechnical consultant prior to sand/rock placement.
(2) Reinforcement to be placed both ways and at or above the mid-point of the slab (i.e., a minimum of 2.0 to 2.5 inches above the prepared subgrade).
(3) Soils having moderate levels of sulfates as defined by CBC are expected. Concrete mix design shall be selected by the concrete designer. Concrete mix design is outside the geotechnical engineer's purview.
(4) Where concrete/ flatwork is adjacent a stucco surface, a ¼" to ½" foam separation/expansion joint should be used.
(5) If dowels are placed in cored holes, the core holes shall be placed at alternating in-plane angles (i.e., not cored straight into slab).
(6) Pavers to be installed per minimum manufacturers recommendations. *The minimum thickness of pavers should be 2 3/8" for pedestrian application and 3 1/8" for vehicular application, and should be installed per minimum manufacturer's recommendations, including min. 1" sand bedding. It is highly recommended that if vehicular pavers are to be constructed, they <u>should maintain an aspect ratio of 3 to 1 or less</u> (where the length of the paver is 3 times the thickness of the paver or less) in order to minimize edge cracking.*

General Note: Minor deviations to the above recommendations may be required at the discretion of the soils engineer or his representative.

APPENDIX G

Advanced GeoSolutions (AGI) Mitigation Plans

Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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Hadi Tabatabaee
BUILDING OFFICIAL

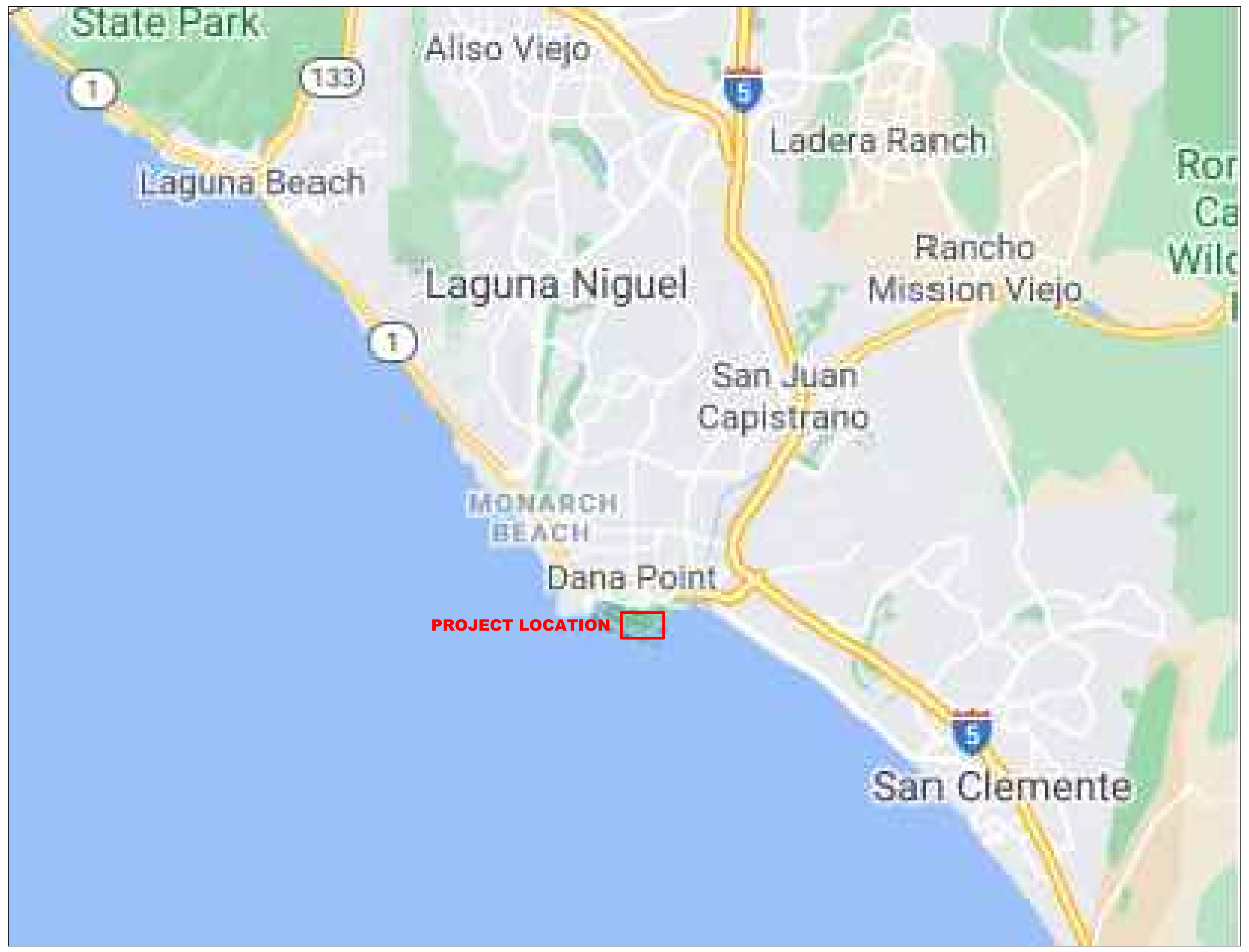
DANA POINT HARBOR
COMMERCIAL COMPONENT
DEEP SOIL MIXING
DANA POINT, CALIFORNIA

ADVANCED GEOSOLUTIONS Inc.
13 Orchard Rd, Suite 105
Lake Forest, CA 92630
Phone (310) 796-9000 | Fax (310) 796-9001
www.advgeosolutions.com

SHEET INDEX

GROUND IMPROVEMENT DESGINER:	ADVANCED GEOSOLUTIONS, INC.
CIVIL ENGINEER:	TAIT & ASSOCIATES, INC.
STRUCTURAL ENGINEER:	KPFF
GEOTECHNICAL ENGINEER:	GMU GEOTECHNICAL, INC.

VICINITY MAP



MAP DATA: GOOGLE 2020

LOCATION MAP

MAP DATA: GOOGLE 2020

REVISIONS

NO.	DATE	DESCRIPTION
–	–	–

C 91763
THOMAS TRAN
REGISTERED PROFESSIONAL ENGINEER
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

COVER SHEET

PROJECT NO. –	SHEET NUMBER:
DATE: 05/27/2021	GI-1
SCALE: AS SHOWN	

S:\Leads\Dana Point Harbor (L19-1748)\AGI Takeoff\AGI_Sheet_DSM.dwg

PART 1 – GENERAL

1.1 SCOPE

A. DEEP SOILS MIXING (DSM) SHALL BE INSTALLED TO MITIGATE POTENTIAL FOR LATERAL SPREADING AND UNCERTAIN PERFORMANCE OF UNDOCUMENTED ARTIFICIAL FILL.

B. A LOAD TRANSFER PLATFORM (LTP) SHALL BE CONSTRUCTED THROUGHOUT ALL BUILDING FOOTPRINTS TO TRANSFER FLOOR SLAB LOADING TO UNDERLYING DSM COLUMNS AND PREVENT ADVERSE SETTLEMENT IN FLOOR SLAB AREAS THAT MAY RESULT FROM NEW LOADING APPLIED TO UNDERLYING UNDOCUMENTED ARTIFICIAL FILL.

C. THE DSM PLAN IS PREPARED IN ACCORDANCE WITH THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT PREPARED BY GMU DATED 5/27/2021.

D. THIS DESIGN IS BASED ON THE GEOTECHNICAL CHARACTERIZATION AND SOIL PARAMETERS PRESENTED IN THE REFERENCED GEOTECHNICAL REPORT, AS WELL AS LOAD REQUIREMENTS INDICATED ON THE STRUCTURAL DRAWINGS. THIS DESIGN WAS CONDUCTED IN A MANNER CONSISTENT WITH THE LEVEL OF CARE AND SKILL ORDINARILY EXERCISED BY MEMBERS OF THE GEOTECHNICAL ENGINEERING PROFESSION CURRENTLY PRACTICING UNDER SIMILAR CONDITIONS AND IN THE SAME LOCALITY. NO WARRANTY IS MADE NOR IMPLIED.

1.2 REFERENCES

A. GEOTECHNICAL INVESTIGATION REPORT, VOLUMES 1, 2, AND 3, DANA POINT HARBOR REVITALIZATION BUILDINGS 1 THROUGH 12, COMMERCIAL COMPONENT – REPORT NO. 17-206-02 PREPARED BY GMU DATED MAY 27, 2021.

B. ASTM C150 – SPECIFICATION FOR PORTLAND CEMENT

C. ASTM D1633 – STANDARD TEST METHODS FOR COMPRESSIVE STRENGTH OF MOLDED SOIL-CEMENT CYLINDERS

D. ASTM D4380 – DENSITY OF BENTONITE SLURRIES

F. FEDERAL HIGHWAY ADMINISTRATION DESIGN MANUAL: DEEP MIXING FOR EMBANKMENT, AND FOUNDATION SUPPORT, PUBLICATION NO. FHWA-HRT-13-046, OCTOBER 2013.

1.3 DEFINITIONS

A. DEEP SOIL MIXING (DSM) – A SOIL IMPROVEMENT TECHNIQUE USED TO CONSTRUCT IN SITU SOIL STRUCTURES OR TREAT SOILS IN PLACE, WITHOUT EXCAVATION OR DEWATERING. SOIL MIXING USES A LARGE, CRANE OR DRILL RIG – MOUNTED TURNTABLE TO INSERT A LARGE-DIAMETER (TYPICALLY 3- TO 8 -FOOT DIAMETER) TOOL INTO THE GROUND WHILE INJECTING AND MIXING A GROUT WITH THE SOIL. STABILIZED SOIL COLUMNS ARE CREATED THAT MAY BE JOINED TOGETHER BY OVERLAPPING TO FORM RETAINING WALLS OR FOUNDATION ELEMENTS, OR TO TREAT A LARGE BLOCK OF SOIL OR SLUDGE.

B. ASTM – ASTM INTERNATIONAL.

C. OWNER – THE OWNER AS REFERRED TO HEREIN IS DANA POINT HARBOR PARTNERS, LLC, C/O BURNHAM-WARD PROPERTIES.

D. ENGINEER – THE ENGINEER IS THE OWNER'S GEOTECHNICAL ENGINEER OF RECORD TO ACT ON ITS BEHALF IN THE EXECUTION OF THESE SPECIFICATIONS.

E. CONTRACTOR – REFERS TO THE GENERAL CONTRACTOR DIRECTLY CONTRACTED WITH THE OWNER AND SUBCONTRACTING THE DSM SCOPE TO THE DSM SUBCONTRACTOR.

F. DEEP SOIL MIXING SUBCONTRACTOR (DSM SUBCONTRACTOR) – AN INDIVIDUAL OR COMPANY WHO HAS HAD PROVEN AND SUCCESSFUL EXPERIENCE IN SOIL MIXING CONSTRUCTION.

G. GROUT – A STABLE COLLOIDAL SUSPENSION OF POWDERED CEMENT, BENTONITE, ADDITIVES AND/OR OTHER SIMILAR MATERIALS IN WATER. THE TERMS "GROUT" AND "SLURRY" ARE USED INTERCHANGEABLY IN THESE SPECIFICATIONS.

H. INJECTION RATIO – A VOLUMETRIC RATIO OF GROUT TO SOILS (E.G., 100 GALLONS/CUBIC YARD) TO BE MIXED IN A DSM COLUMN. THE GROUT INJECTION RATIO IS DETERMINED FOR EACH COLUMN BASED ON THE COLUMN DIMENSIONS, SOIL DENSITY, PATTERN OF TREATMENT, AND DESIRED APPLICATION RATE.

I. DSM COLUMN – ONE COMPLETED INSERTION, INJECTION AND MIXING OF THE SOIL WITH THE MIXING AUGER TO THE DESIGN DEPTH. THIS CREATES A COLUMN OF TREATED SOIL THE SAME DIAMETER AS THE MIXING AUGER. THE COLUMN MAY BE PRIMARY (THROUGH VIRGIN SOILS), SECONDARY (CONNECTING PRIMARY COLUMNS), TERTIARY, ETC.

J. WORKING PLATFORM – THE WORKING PLATFORM IS THE LEVELED AND STABLE SURFACE FROM WHICH THE DSM EQUIPMENT OPERATES.

K. MIXING AUGER/TOOL – THE SPECIAL TOOL THAT ATTACHES TO THE KELLY BAR AND IS INSERTED INTO THE GROUND TO MIX THE SOILS. THE TOOL MAY BE FITTED WITH PORTS FOR INJECTING GROUT, MIXING PADDLES, AUGER BLADES, ETC.

L. BLADE ROTATION NUMBER (BRN) – NUMBER OF BLADES X (RATE OF PENETRATION PLUS RATE OF WITHDRAWAL (IN REVOLUTIONS/METER). FOR EXAMPLE FOR 5 BLADES, RATE OF PENETRATION = 1 REVOLUTION/25 MM (40 REVOLUTIONS/M), AND RATE OF WITHDRAWAL = 1 REVOLUTION/20 MM (50 REVOLUTIONS/M), THE BRN = 5 X (40 + 50) = 450.

M. OBSTRUCTION – OBSTRUCTIONS ARE DEFINED AS MATERIALS CLASSIFIED AS UNDERGROUND UTILITIES, TREES (OR PARTS THEREOF), METAL, MAN-MADE OBJECTS, WOODEN/CONCRETE/STEEL OR ANY OTHER TYPE OF PILE OR DEEP FOUNDATION, OR NATURAL GROUND MATERIALS LARGER THAN A MAXIMUM COBBLE SIZE (8 INCHES MAXIMUM DIMENSION).

N. MIXING BLADE – A SINGLE MIXING BLADE SHALL CONSTITUTE A PAIR OF MIXING PADDLES ATTACHED TO THE SHAFT OF THE MIXING TOOL AT THE SAME ELEVATION. THE CUTTING PADDLES MAY ALSO BE CONSIDERED AS A MIXING BLADE.

O. DOSAGE – EXPRESSED AS THE MASS OF BINDER INTRODUCED PER VOLUME OF MIXED IN-SITU SOIL (E.G. KG/M^3).

1.4 SUBMITTALS

A. DSM WORK PLAN INCLUDING:

I. ASSIGNED NUMBER OF EACH COLUMN AS ID FOR INSTALLATION RECORD

II. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE INSTALLATION PER PLANS AND SPECIFICATIONS, INCLUDING SPECIFICATIONS OF THE GROUT BATCHING AND VERTICAL DRILL EQUIPMENT INTENDED FOR USE ON THE PROJECT.

III. NARRATIVE OF PLANNED MEANS AND METHODS TO EXECUTE THE QUALITY CONTROL REQUIREMENTS PER PLANS AND SPECIFICATIONS.

IV. PRELIMINARY SOIL MIX DESIGN INDICATING TYPE OF BINDER MATERIAL AND VOLUMETRIC PROPORTIONS FOR INITIAL TRIALS ON-SITE TO BE ADJUSTED BASED ON FIELD OBSERVATIONS AND EARLY STRENGTH RESULTS (SEE PART 3.2 TEST SECTION).

B. ACCURATE DAILY RECORDS OF THE WORK TO BE SUBMITTED BY CLOSE OF BUSINESS THE FOLLOWING DAY, INCLUDING:

I. COLUMN ID

II. DIAMETER

III. WORKING PAD ELEVATION

IV. MIXING DEPTH

V. START TIME

VI. TIME AT TIP ELEVATION

VII. FINISH TIME

VIII. MIXING DURATION

IX. GROUT MIX DETAILS (PERCENT WATER AND REAGENT BINDER)

X. GROUT INJECTION WITH DEPTH

XI. TOTAL INJECTED GROUT

XII. BLADE ROTATION NUMBER (BRN) WITH DEPTH

D. ANY PROPOSED CHANGE IN THE WORK PROCEDURES PLAN MADE NECESSARY BY CONDITIONS ENCOUNTERED DURING CONSTRUCTION FOR REVIEW AND APPROVAL BY THE ENGINEER.

E. MATERIAL CERTIFICATIONS FOR CEMENT BINDER TO BE USED IN THE PROJECT.

F. WEIGHTS: CERTIFICATES OF BATCH WEIGHTS FOR EACH TRUCK LOAD DELIVERED IF ON-SITE BATCH PLANT IS NOT USED.

G. ADMIXTURES/POZZOLANS/ADDITIVES SUBJECT TO THE APPROVAL OF THE ENGINEER, IF USED.

H. QC TEST RESULTS: SUBMIT ALL QC TEST RESULTS WITHIN 48 HOURS OF TESTING.

I. REPORT SUMMARIZING TEST SECTION RESULTS AND CALIBRATION OF DRILLING EFFORT CRITERIA FOR COLUMN DEPTH TERMINATION APPROVED BY THE ENGINEER.

J. AS-BUILT REPORT DOCUMENTING THE CONSTRUCTED LOCATIONS AND DIMENSIONS OF ALL DSM COLUMNS, COMPILATION OF ALL QUALITY CONTROL AND QUALITY ASSURANCE DATA COLLECTED FOR THE PROJECT, AND EXPLANATION OF ANY DEVIATION FROM THE PLANS AND SPECIFICATIONS PREVIOUSLY REVIEWED APPROVED TO THE SATISFACTION OF THE ENGINEER.

K. THE CONTRACTOR WILL SUBMIT A WORK PLAN DETAILING THE CONSTRUCTION AND QA/QC OF THE LTP, MEETING THE DESIGN REQUIREMENTS HEREIN AND IN THE GEOTECHNICAL REPORT.

1.5 ACCEPTANCE

A. ACCEPTANCE OF THE DSM WORK WILL BE BASED ON COMPLIANCE WITH THE STRENGTH AND GEOMETRY REQUIREMENTS OF THE PLANS AND SPECIFICATIONS AS VERIFIED BY THE ENGINEER'S QA TESTING. THE MATERIAL FORMED BY MIXING THE GROUT WITH THE IN SITU SOIL SHALL MEET A MINIMUM REQUIRED UNCONFINED COMPRESSIVE STRENGTH OF 150 POUNDS PER SQUARE INCH (PSI) AT 28 DAYS. TESTS WILL BE CONSIDERED PASSING IF THEY ARE AT LEAST 90% OF THE 150 PSI STRENGTH REQUIREMENT PROVIDED THAT NO MORE THAN 10% OF ALL TESTS FALL BELOW THE REQUIREMENT AND THE OVERALL AVERAGE STRENGTH EXCEEDS THE REQUIREMENT. IF THE UNCONFINED COMPRESSIVE STRENGTH RESULTS DO NOT MEET THAT CRITERIA, THE DSM SUBCONTRACTOR SHALL SUBMIT A MITIGATION PLAN FOR REVIEW AND APPROVAL BY THE ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS

A. FRESH OR RECLAIMED WATER, FREE OF ANY DELETERIOUS SUBSTANCE THAT COULD ADVERSELY AFFECT THE GROUT PROPERTIES SHALL BE USED.

B. BINDER AGENT USED FOR THE PROJECT SHALL CONSIST OF PORTLAND CEMENT TYPE II/V CONFORMING TO ASTM DESIGNATION C150. THE CEMENT SHALL BE ADEQUATELY PROTECTED FROM MOISTURE AND CONTAMINATION WHILE IN TRANSIT AND STORAGE AT THE JOB SITE. RECLAIMED CEMENT OR CEMENT CONTAINING LUMPS OR DELETERIOUS MATTER SHALL NOT BE USED.

C. THE WATER AND CEMENT SHALL BE PREMIXED TO FORM A GROUT FOR INJECTION AND MIXING WITH THE IN-SITU SOIL. MATERIALS SHALL BE COMBINED IN PREDETERMINED WEIGHED PROPORTIONS WITH ITS QUALITY EVALUATED BY SPECIFIC GRAVITY MONITORED AT LEAST ONCE PER INSTALLATION BY MUD BALANCE.

D. THE DESIGN UNCONFINED COMPRESSIVE STRENGTH OF THE SOIL-CEMENT MATERIAL COMPRISING THE DSM COLUMNS IS 150 PSI AT 28 DAYS.

PART 3 – EXECUTION

3.1 EQUIPMENT

A. A PURPOSE BUILT HOLLOW STEM AND MIXING PADDLE TOOL ATTACHED TO A HIGH TORQUE ROTARY DRILL ON TRACKS SHALL BE USED TO ACCOMPLISH THE DSM. MIXING TOOLS OF 4- AND 6-FOOT-DIAMETER WILL BE IMPLEMENTED FOR THIS PROJECT. MIXING TOOLS SHALL CONSIST OF A MINIMUM OF FOUR (4) MIXING BLADES (4 PAIRS OF MIXING PADDLES).

B. CEMENT WILL BE STORED IN PURPOSE BUILT SILOS.

C. WATER SHALL BE MIXED WITH CEMENT IN A PURPOSE-BUILT WEIGH-BATCH MIXER TO PRODUCE SLURRY WITH A CONSISTENT SPECIFIC GRAVITY OR WATER:CEMENT RATIO FOR PROPER MIXING. JET VALVE MIXING OR OTHER CONTINUOUS MIXING METHODS WILL NOT BE ALLOWED.

D. GROUT SHALL BE DELIVERED TO THE MIXING RIG BY APPROPRIATELY SIZED POSITIVE DISPLACEMENT PUMPS. PROGRESSIVE CAVITY PUMPS SHALL NOT BE ALLOWED.

3.2 TEST SECTION

A. LOCATIONS: PRIOR TO INITIATING PRODUCTION WORK, DSM SUBCONTRACTOR SHALL INSTALL A MINIMUM OF TWO DSM COLUMNS WITH VARYING MIX DESIGN DOSAGE AT EACH OF THE SIX TEST SECTION LOCATIONS INDICATED ON THE PLANS.

B. EVALUATION GOALS: THE PURPOSE OF THE TEST SECTION IS TO EVALUATE THE FOLLOWING ITEMS PRIOR TO INITIATING PRODUCTION WORK. THE DSM SUBCONTRACTOR MAY PROCEED IMMEDIATELY TO PRODUCTION WHILE TEST SECTION EVALUATION RESULTS ARE PENDING BUT DOES SO AT ITS OWN RISK.

I. COLUMN DEPTH: COLUMN INSTALLATION DEPTHS FOR THE PROJECT ARE CONTROLLED BY THE DEPTH TO THE CAPISTRANO FORMATION CONTACT AS DESCRIBED IN SECTION 3.3.G. DURING TEST SECTION INSTALLATION ADJACENT TO EXISTING EXPLORATION DATA, DSM SUBCONTRACTOR SHALL MONITOR AND RECORD INDICATORS OF DRILLING EFFORT (E.G. ROTARY TORQUE APPLIED AND CROWD PRESSURE). DSM SUBCONTRACTOR SHALL PROPOSE A READILY IDENTIFIABLE METRIC SUBJECT TO THE ENGINEER'S APPROVAL FOR THE DRILL OPERATOR TO OBSERVE DURING INSTALLATION AS EVIDENCE OF ENCOUNTERING THE CAPISTRANO FORMATION.

II. MIX CONSISTENCY: DURING TEST SECTION MIXING THE DSM SUBCONTRACTOR AND ENGINEER SHALL OBSERVE

III. STRENGTH: A MINIMUM OF TWO WET-GRAB SAMPLES SHALL BE COLLECTED FROM EACH TEST SECTION COLUMN INSTALLED AT DEPTHS OF 1/3 AND 2/3 THE TOTAL INSTALLATION DEPTH. EACH SAMPLE COLLECTED SHALL BE CAST INTO CYLINDERS FOR UNCONFINED COMPRESSION STRENGTH TESTING AND EVALUATION AS DESCRIBED IN SECTION 3.4.B.

IV. LOAD TEST: DSM SUBCONTRACTOR SHALL CONDUCT A MINIMUM OF FOUR LOAD TESTS PER THE REQUIREMENTS OF THIS SPECIFICATION TO ASSESS THE 4-FOOT-DIAMETER DSM COLUMN GEOTECHNICAL CAPACITY ADJACENT TO EXPLORATORY TEST DATA. SEE PROPOSED LOAD TEST LOCATIONS ON SHEET GI-3.

3.3 CONSTRUCTION

A. INSTALL DSM COLUMNS AT THE LOCATIONS AND TO THE DEPTH INDICATED ON THE DSM PLAN.

B. HORIZONTAL ALIGNMENT: THE DSM COLUMNS SHALL BE CAREFULLY SURVEYED AND STAKED OUT PRIOR TO INSTALLATION. THE COLUMNS SHALL BE CONSTRUCTED WITHIN 4 INCHES OF THE LOCATIONS SHOWN ON THE DRAWINGS.

C. VERTICAL ALIGNMENT: VERTICAL ALIGNMENT OF THE AUGER STROKE WILL BE CONTROLLED BY THE EQUIPMENT OPERATOR. THE COLUMN VERTICALITY SHALL HAVE A TOLERANCE OF 1:50 MAXIMUM DEVIATION.

D. MIXING SHAFT SPEED: THE MIXING SHAFT SPEED (RPMS) SHALL BE ADJUSTED TO ACCOMMODATE AN ADEQUATE RATE OF MIXING SHAFT PENETRATION BASED ON THE DEGREE OF DRILLING DIFFICULTY. THE MIXING SHAFT SPEED CAN BE ADJUSTED ACCORDING TO DRILLING DIFFICULTY.

E. BOTTOM MIXING: THE BOTTOM OF THE COLUMNS SHALL BE DOUBLE MIXED BY RAISING THE MIXING SHAFTS FIVE FEET OFF THE BOTTOM AND THEN REINSERTING THEM FOR REMIXING.

F. GROUT TAKE: THE GROUT TAKE (OR INJECTION RATE) PER VERTICAL FOOT OF COLUMN WILL BE ADJUSTED TO THE REQUIREMENTS OF THE DESIGN MIX. APPROPRIATE DELIVERY PUMPS SHALL BE USED TO TRANSFER THE GROUT FROM THE MIX PLANT TO THE DSM RIG. A FLOW MONITORING DEVICE WILL BE INSTALLED IN THE GROUT LINE TO DETECT LINE BLOCKAGE AND ELECTRONICALLY RECORD INJECTION RATES AND VOLUMES VERSUS DEPTH AND TIME FOR QUALITY CONTROL MONITORING.

I. THE RATE OF APPLICATION MAY BE CONTROLLED AND MONITORED BY ADJUSTING THE PUMP OUTPUT TO THE PENETRATION RATE SO THAT A PRESET GROUT TAKE CAN BE ACHIEVED. TYPICALLY, THE APPLICATION RATE CAN BE SUCCESSFULLY CONTROLLED BY EXPERIENCED OPERATORS ONCE THE PATTERN OF OPERATION IS ESTABLISHED.

II. SOME VARIATIONS OF THE GROUT TAKE WILL OCCUR DUE TO FIELD CONDITIONS. HOWEVER, THE OVERALL APPLICATION RATE TO EACH STROKE CAN BE MONITORED, CALCULATED AND CONTROLLED. ADDITIONAL MIXING IS TO BE USED WHEN NECESSARY TO DISTRIBUTE THE GROUT THROUGH THE ENTIRE COLUMN. THE INJECTION OF GROUT TO EACH STROKE WILL BE MONITORED, CHECKED BY CALCULATION AND RECORDED.

G. COLUMN DEPTH:

I. BUTTRESS COLUMNS: COLUMNS INSTALLED FOR THE LATERAL SPREAD BUTTRESS SHALL BE INSTALLED TO A MINIMUM OF 4 FEET BEYOND THE CAPISTRANO FORMATION CONTACT AS IDENTIFIED BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER. PRACTICAL REFUSAL (AS DEFINED IN SECTION 3.3.H) ENCOUNTERED PRIOR TO ACHIEVING THE REQUIRED 4-FOOT EMBEDMENT INTO CAPISTRANO FORMATION MAY BE APPROVED BY THE ENGINEER ON A CASE-BY-CASE BASIS BUT THE DSM SUBCONTRACTOR SHALL BE PREPARED TO INITIATE PREDRILLING IF NEEDED TO ACHIEVE THE REQUIRED EMBEDMENT AT NO ADDITIONAL COST TO THE OWNER.

II. BUILDING SUPPORT COLUMNS: DSM COLUMNS INTENDED FOR SUPPORT OF THE RETAIL BUILDINGS SHALL BE INSTALLED TO A MINIMUM OF 1 FOOT BEYOND THE CAPISTRANO FORMATION CONTACT OR TO PRACTICAL REFUSAL. MEANS OF IDENTIFYING THE CAPISTRANO FORMATION CONTACT WILL BE BASED ON THE DRILLING EFFORT CALIBRATION PERFORMED DURING THE TEST SECTION WORK AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

H. OBSTRUCTION/MIXING SHAFT PRACTICAL REFUSAL: IF OBSTRUCTIONS ARE ENCOUNTERED WHICH REDUCE THE RATE OF PENETRATION TO ONE FOOT PER MINUTE FOR TWO MINUTES UNDER FULL POWER, THE STROKE SHALL BE COMPLETED IN ACCORDANCE WITH THE SPECIFICATIONS AND REMEDIAL MEASURES WILL BE TAKEN. SUBCONTRACTOR SHALL NOTIFY CONTRACTOR TO INVESTIGATE, CONFIRM, AND REMOVE SAID OBSTRUCTIONS FROM THE SOIL MIXING AREA. ONCE CONTRACTOR REMOVES OBSTRUCTIONS AND BACKFILLS AND COMPACTS (IN LIFTS NOT TO EXCEED 3 FEET IN UNCOMPACTED THICKNESS) THE REMOVAL AREA WITH GRANULAR SAND OR SANDY GRAVEL MATERIAL, THE DSM SUBCONTRACTOR SHALL RETURN TO MIXING THE BACKFILLED AREAS AND REMAINING DSM COLUMNS PER PLANS AND SPECS. IF REMOVAL OF OBSTRUCTIONS BY CONTRACTOR DAMAGES A PREVIOUSLY INSTALLED DSM COLUMN, ASSOCIATED RE-INSTALLATION WORK SHALL BE COMPENSATED BY AS EXTRA AT THE CONTRACT UNIT PRICES. IF IT IS INFEASIBLE OR IMPRACTICAL TO CLEAR AN OBSTRUCTION FROM A DESIGN INSTALLATION LOCATION, CONTRACTOR MAY PROPOSE A MODIFICATION TO THE DESIGN PROVIDED THE ORIGINAL PERFORMANCE IS MAINTAINED SUBJECT TO THE REVIEW AND APPROVAL OF THE ENGINEER.

I. MIXING ENERGY: THE DSM SUBCONTRACTOR SHALL MIX EACH COLUMN WITH SUFFICIENT MIXING ENERGY THROUGHOUT TO PROPERLY PROCESS THE SOIL CEMENT PRODUCT. THE MIXING ENERGY SHALL BE DEMONSTRATED BY MEASURED AND RECORDED BRN REPORTED FOR EACH INSTALLATION AND THE MIXING ENERGY APPLIED SHALL MINIMALLY ACHIEVE THAT REQUIRED TO PRODUCE SATISFACTORY RESULTS DURING THE TEST SECTION.

J. NO EXCAVATION OR HEAVY GRADING BY CONTRACTOR SHALL PROCEED PRIOR TO 3 DAYS AFTER DSM COLUMN CONSTRUCTION UNLESS APPROVED BY THE DSM DESIGN ENGINEER.

K. UTILITY TRENCH: EXCAVATE THE COMPLETED DSM COLUMNS AS NECESSARY FOR UNDERGROUND UTILITIES. TRENCH BACKFILL WILL BE AS FOLLOW:

I. FOR TRENCHES CUT INTO BUTTRESS DSM AND ABOVE GWT: BACKFILL WILL NATIVE SOILS OR AS APPROVED BY THE ENGINEER.

II. FOR TRENCHES CUT INTO BUTTRESS DSM AND EXTEND BELOW GWT: BACKFILL WITH CEMENT SLURRY WITH COMPRESSIVE STRENGTH OF AT LEAST 300 PSI.

III. UTILITIES TRENCHES WILL AVOID CUTTING INTO THE DISCRETE 4' DIAMETER DSM COLUMNS SUPPORTING BUILDINGS AND SLABS.

L. MANAGEMENT OF SPOIL TO BE COORDINATED BETWEEN CONTRACTOR AND DSM SUBCONTRACTOR.

3.4 QUALITY CONTROL AND QUALITY ASSURANCE

A. PRIOR TO CONSTRUCTION, A PRELIMINARY MIX DESIGN SHALL BE GENERATED BY THE SUBCONTRACTOR. THE MIX DESIGN MAY BE OBTAINED BASED ON SITE SOILS AND LABORATORY TESTING, OR ALTERNATIVELY, BASED ON THE SUBCONTRACTORS DATABASE IN SIMILAR SOIL CONDITIONS AND STRENGTH REQUIREMENTS.

B. WET SAMPLING: THE DSM SUBCONTRACTOR SHALL OBTAIN WET BULK SAMPLES OF THE SOIL CEMENT MIX AND CAST IT IN CYLINDERS FOR SUBSEQUENT QUALITY CONTROL TESTING BY THE DSM SUBCONTRACTOR, AND QUALITY ASSURANCE TESTING AND ACCEPTANCE BY THE ENGINEER.

I. ONE SAMPLE WILL BE RETRIEVED PER WORK DAY PER RIG.

II. THE VOLUME OF SAMPLE RECOVERED DURING EACH SAMPLING SHALL BE SUFFICIENT TO CAST 6 SAMPLE CYLINDERS EACH MEASURING 3" DIAMETER BY 6" HIGH. A ½" SIEVE WILL BE USED TO SCREEN THE MATERIAL IN ORDER TO FACILITATE APPROPRIATE SCALING OF INCLUSIONS AND PROPER MODELING OF THE 3 INCH CYLINDERS.

III. OF THE 6 CYLINDERS CAST, 3 WILL BE PROVIDED TO THE ENGINEER FOR QUALITY ASSURANCE TESTING AND 3 WILL BE RETAINED BY THE DSM SUBCONTRACTOR FOR QUALITY CONTROL TESTING.

IV. TO AVOID DISTURBANCE, THE CYLINDERS ARE TO BE CURED ON SITE IN A COOLER WITH A SMALL AMOUNT OF WATER TO MAINTAIN A STABLE, COOL AND MOIST CURING ENVIRONMENT FOR 2 DAYS.

V. AFTER QUALITY ASSURANCE SAMPLES ARE RETRIEVED BY THE ENGINEER, ALL WET GRAB SAMPLES SHALL BE STORED IN A MOIST ROOM (NOT SUBMERGED) IN ACCORDANCE WITH ASTM C 192 UNTIL THE TEST DATE.

VI. THE QUALITY CONTROL SAMPLES WILL BE TESTED (BY THE DSM SUBCONTRACTOR) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 3-DAY, 7-DAY, AND 14-DAY AFTER CASTING. THE RESULTS WILL BE USED TO EXTRAPOLATE THE EXPECTED STRENGTH AT 28-DAYS.

VII. THE QUALITY ASSURANCE SAMPLES WILL BE TESTED (BY THE ENGINEER) FOR UCS IN ACCORDANCE WITH ASTM D1633, AT 7-DAY, 14-DAY, AND 28-DAY AFTER CASTING.

VII. WHEN TIME OR SCHEDULE DOES NOT PERMIT A 28-DAY CURING STRENGTH EVALUATION, THE FOLLOWING UCS AGING CORRELATION WILL BE TENTATIVELY APPLIED TO THIS JOB:

28 : 7 DAY, 1.57

VIII. THE ABOVE CORRELATION MAY BE ADJUSTED FOR SITE-SPECIFIC FINDINGS AS THE PROJECT DEVELOPS.

IX. THE DESIGN STRENGTH FOR THIS PROJECT AT 28-DAYS IS 150 PSI. SUBJECT TO THE APPROVAL OF THE ENGINEER, 7-DAY TEST RESULTS MAY BE ACCEPTED BASED ON THE CORRELATION ABOVE OR A REVISED CURING FACTOR BASED ON PROJECT-SPECIFIC STATISTICAL ANALYSIS OF AVAILABLE DATA.

C. LOAD TEST:

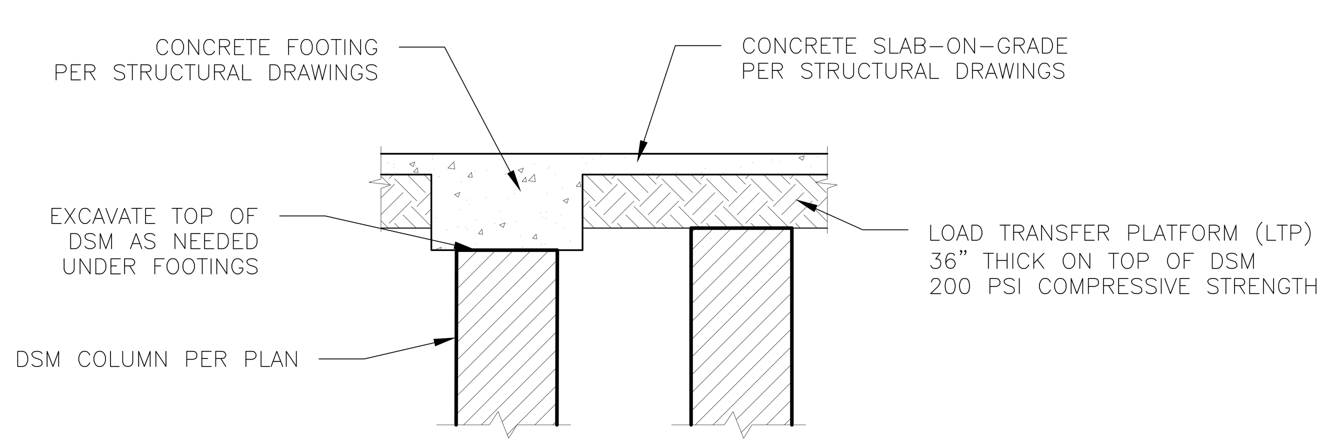
I. DSM SUBCONTRACTOR SHALL PERFORM A MINIMUM OF FOUR COMPRESSION LOAD TEST ON 4-FOOT-DIAMETER COLUMNS AT THE TEST SECTION LOCATION SPECIFIED FOR THE BUILDINGS ON THE DRAWINGS.

II. COMPRESSION LOAD TEST SHALL BE IN GENERAL ACCORDANCE WITH ASTM D1143. THE TEST COLUMN SHALL BE CONDUCTED TO AT LEAST 150% OF THE STATIC DESIGN LOAD.

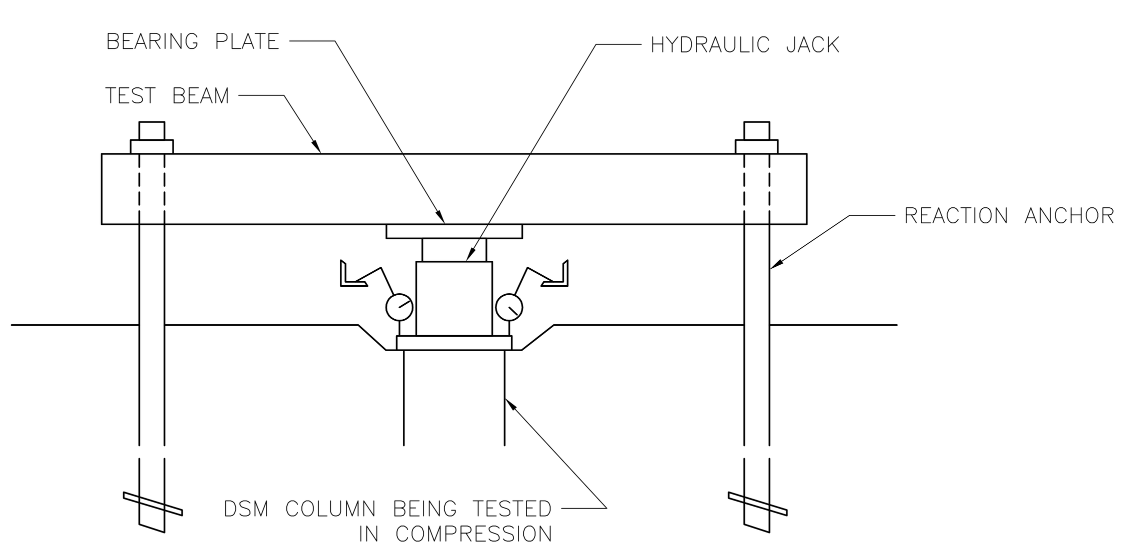
III. LOAD TEST WILL NOT BE PERFORMED BEFORE THE COLUMN HAS ACHIEVED SUFFICIENT UNCONFINED COMPRESSIVE STRENGTH AS DEMONSTRATED BY LABORATORY TESTING ON WET GRAB SAMPLES.

D. OBSERVATION: A REPRESENTATIVE OF THE ENGINEER SHALL BE PRESENT FULL-TIME DURING ALL INSTALLATION WORK TO OBSERVE THE CONSTRUCTION OF THE DSM COLUMNS, SAMPLING, AND TESTING TO VERIFY THE DSM SUBCONTRACTOR PERFORMS THE WORK IN SUBSTANTIAL CONFORMANCE WITH THESE SPECIFICATIONS. THE ENGINEER SHALL MAINTAIN PARALLEL HAND RECORDS OF PERTINENT INSTALLATION DATA FOR COMPARISON WITH REPORTED INSTALLATION LOGS AND OBTAIN TEST SPECIMENS OF THE WET-SAMPLES COLLECTED FOR QUALITY ASSURANCE TESTING.

END OF SECTION



TYPICAL BUILDING SUPPORT DETAIL
SCALE: NTS



LOAD TEST SETUP
SCALE: NTS

COMPRESSION TEST LOADING SCHEDULE		
DESIGN LOAD =	200	KIPS
PERCENT OF DL	LOAD VALUE	HOLD DURATION
(%)	(KIP)	(MIN)
5%	10	4
10%	20	4
15%	30	4
20%	40	4
25%	50	4
30%	60	4
35%	70	4
40%	80	4
45%	90	4
50%	100	4
55%	110	4
60%	120	4
65%	130	4
70%	140	4
75%	150	4
80%	160	4
85%	170	4
90%	180	4
95%	190	4
100%	200	4
105%	210	4
110%	220	4
115%	230	4
120%	240	4
125%	250	4
130%	260	4
135%	270	4
140%	280	4
145%	290	4
150%	300	4
125%	250	4
100%	200	4
75%	150	4
50%	100	4
25%	50	4
5%	10	4
0%	0	-

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REVISIONS		
NO.	DATE	DESCRIPTION
–	–	–

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

GENERAL NOTES AND DETAILS

PROJECT NO. –

SHEET NUMBER: GI-2

DATE: 05/27/2021

SCALE: AS SHOWN

S:\Leads\Dana Point Harbor (L19-1748)\AGI Takeoff\AGI_Sheet_DSM.dwg

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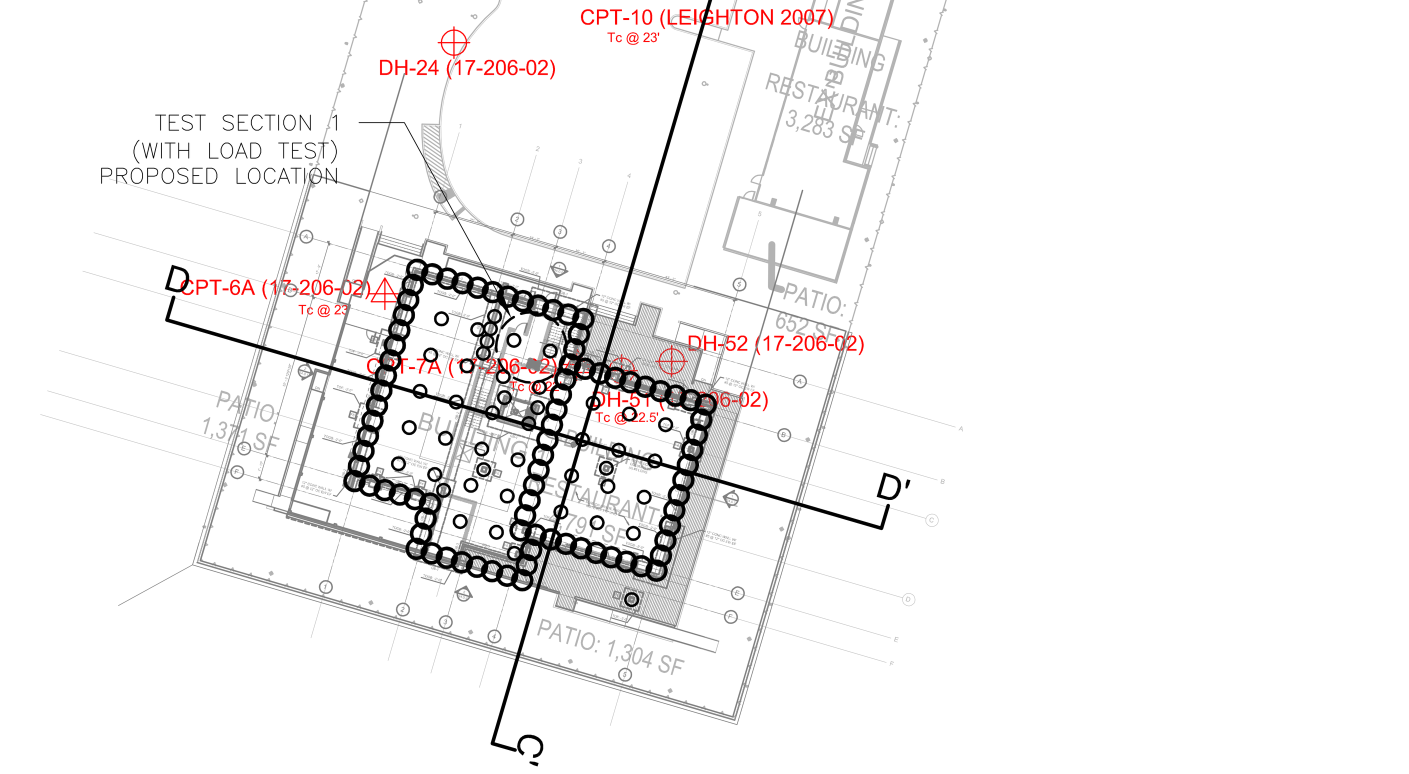


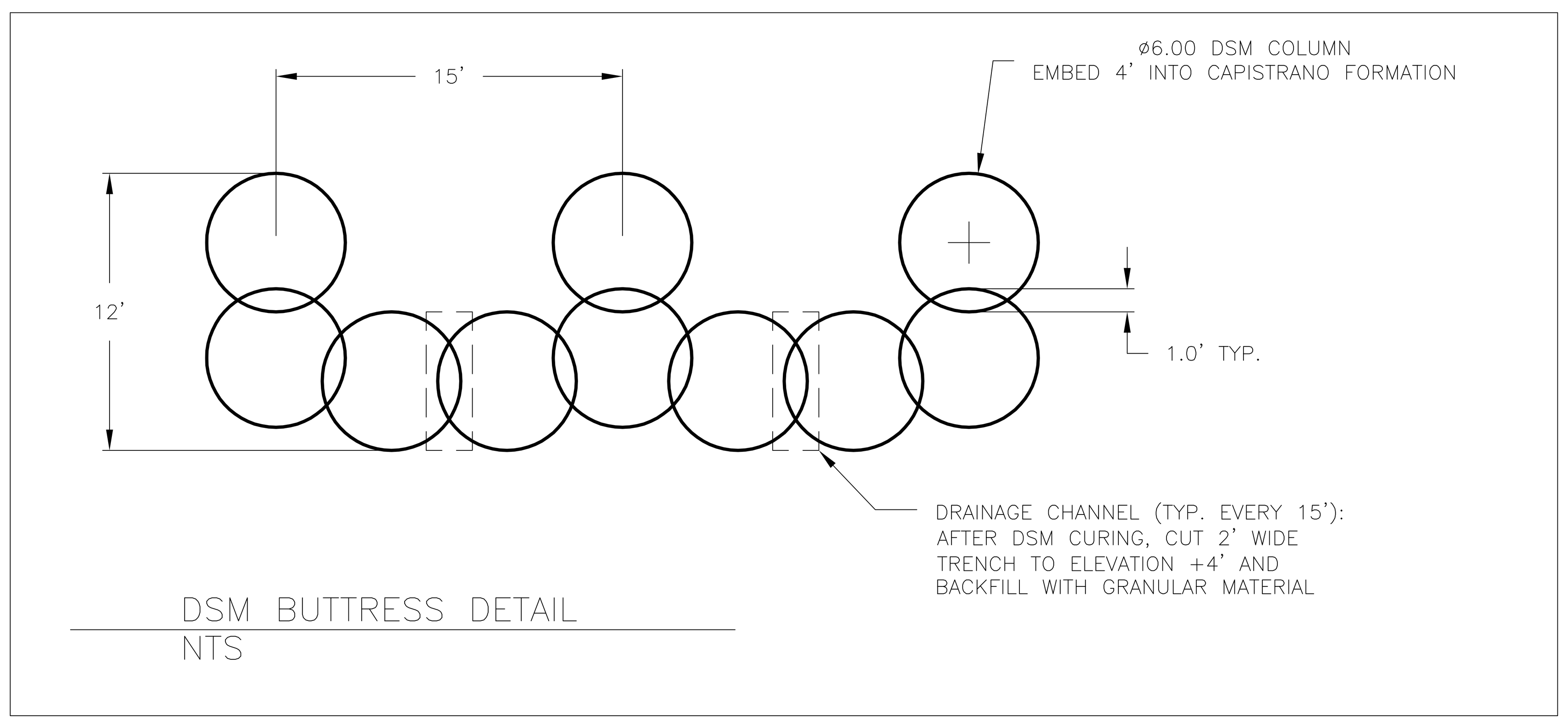
LEGEND:

CPT-4 (11-161-00) Tc @ 16' — APPROXIMATE LOCATION OF CPT
APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)

DH-17 (11-161-00) Tc @ 19' — APPROXIMATE LOCATION OF BORE HOLE
APPROXIMATE DEPTH TO CAPISTRANO FORMATION (Tc)

D — D' — GEOTECHNICAL CROSS-SECTION

NOTES:
1. SITE PLAN BACKGROUND BY TAIT DATED 5/27/2021 AND SHOWN FOR REFERENCE ONLY.
2. SEE REFERENCE GEOTECHNICAL REPORT FOR LOGS OF BORINGS AND CPTS.



DSM BUTTRESS DETAIL
NTS

DSM PLAN
SCALE: 1" = 40'

0' 40' 80'
SCALE: 1"=40'

REVISIONS		
NO.	DATE	DESCRIPTION
–	–	–

REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING PLAN

PROJECT NO.: –
SHEET NUMBER: GI-3
DATE: 05/27/2021
SCALE: AS SHOWN

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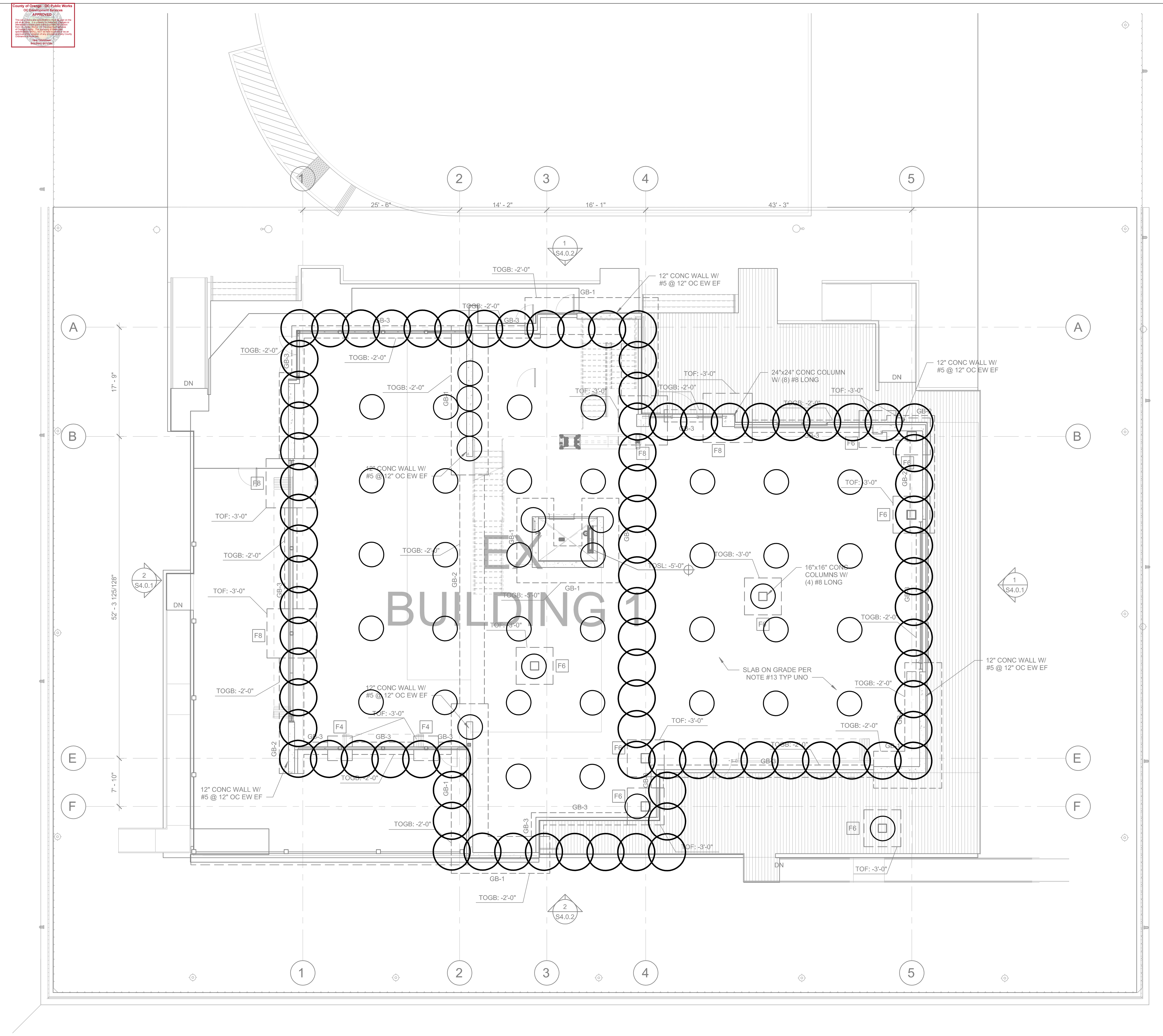

DSM COLUMN LAYOUT – BUILDING 1
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø BEARING ON CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 10/8/2020 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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www.advgeosolutions.com

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–	–	–

REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 1

PROJECT NO. –

DATE: 05/27/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.1

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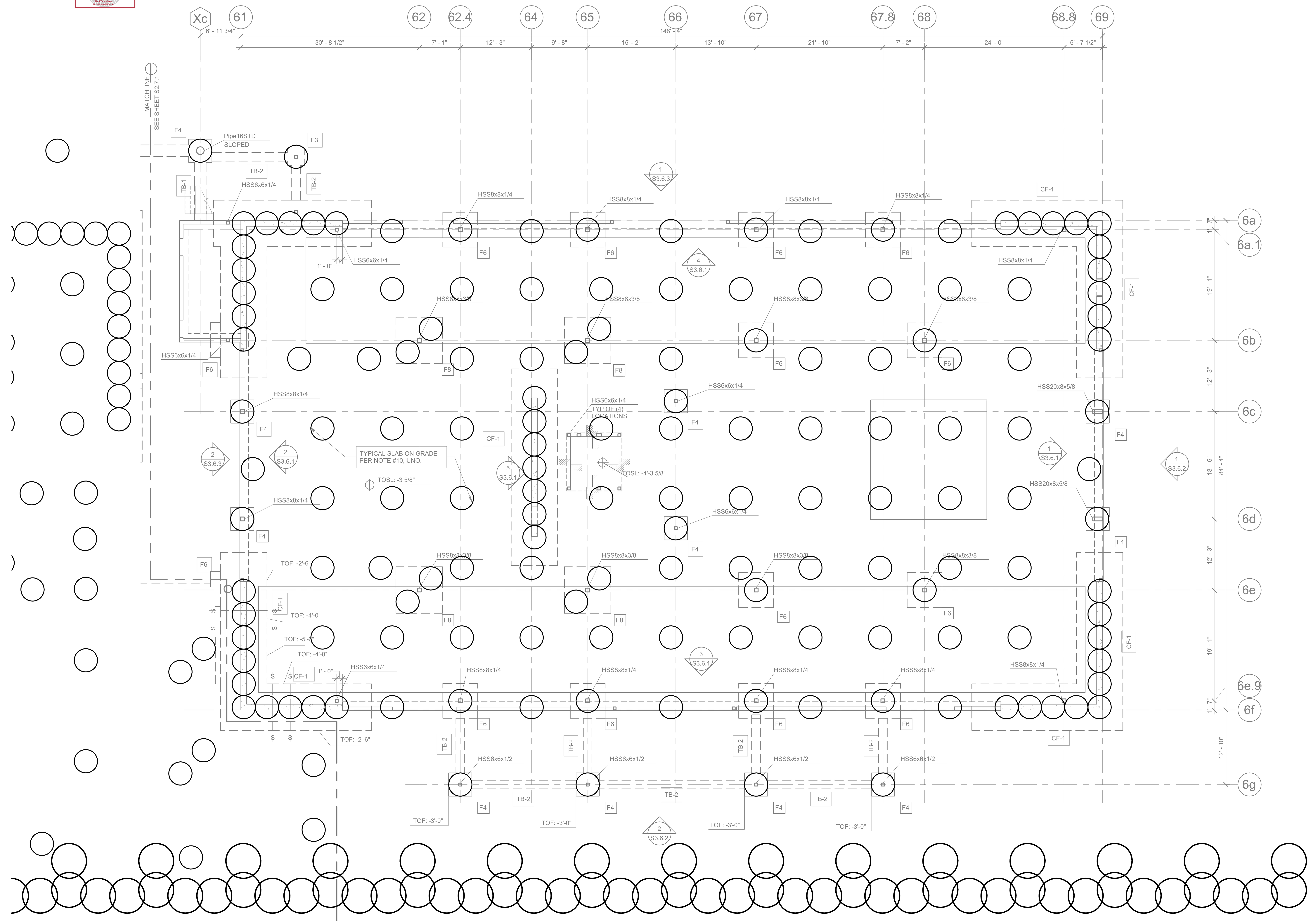

DSM COLUMN LAYOUT – BUILDING 6
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
1. FOUNDATION PLAN PREPARED BY KPFF DATED 4/9/2021 AND SHOWN FOR REFERENCE ONLY. SEE LATEST STRUCTURAL PLANS FOR LOCATION AND DIMENSIONS OF FOOTINGS.

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REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 6

PROJECT NO. –
DATE: 05/27/2021
SCALE: AS SHOWN
SHEET NUMBER: GI-4.2

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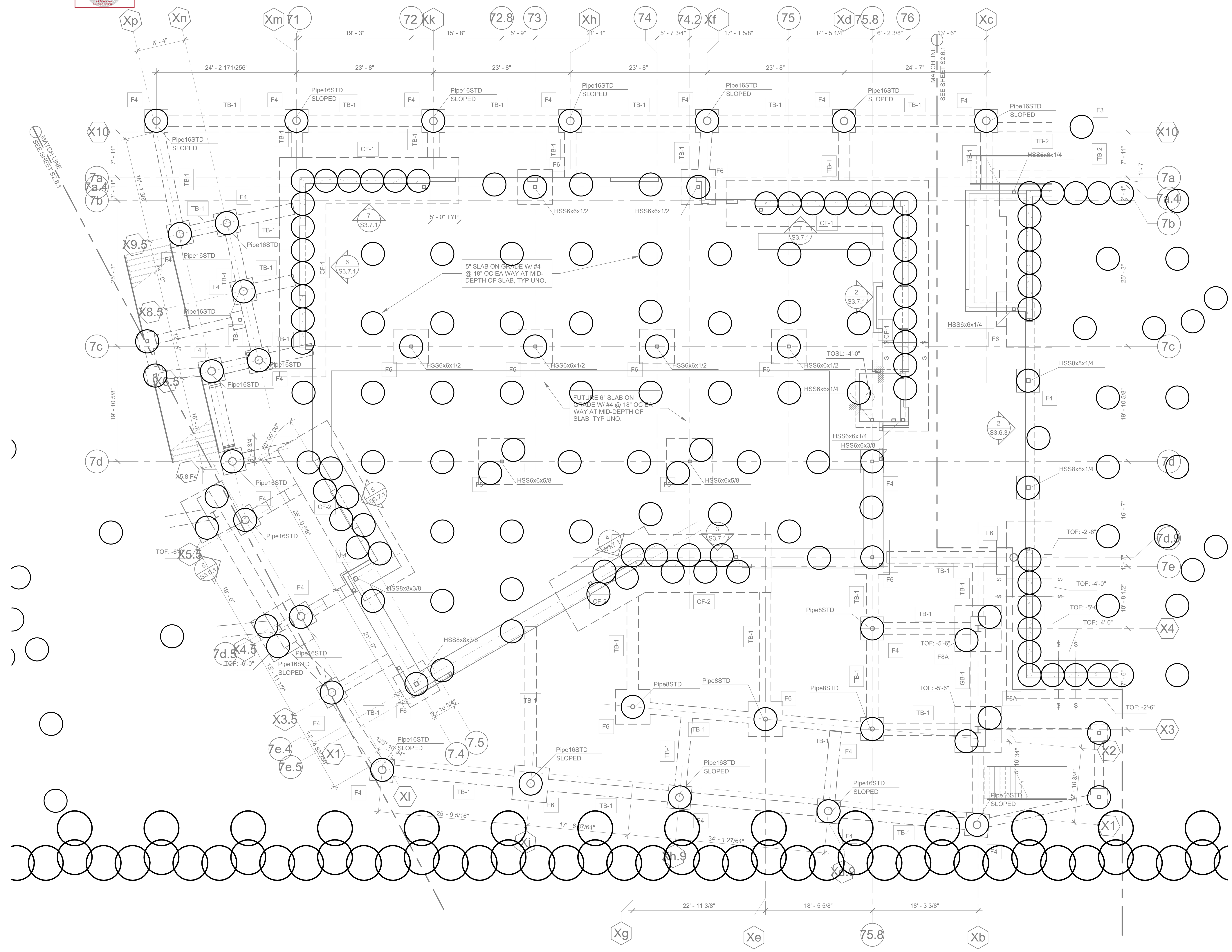
Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

County of Orange - OC Public Works
OC Development Services
APPROVED

This set of plans and specifications must be kept on the job at all times. It is unlawful to make any changes or alterations to these plans without written permission from OC Public Works, OC Development Services of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordinance or State law.

Hadi Tabatabaee
BUILDING OFFICIAL



DSM COLUMN LAYOUT – BUILDING 7
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 7

PROJECT NO. –

DATE: 05/27/2021

SCALE: AS SHOWN

SHEET NUMBER: GI-4.3

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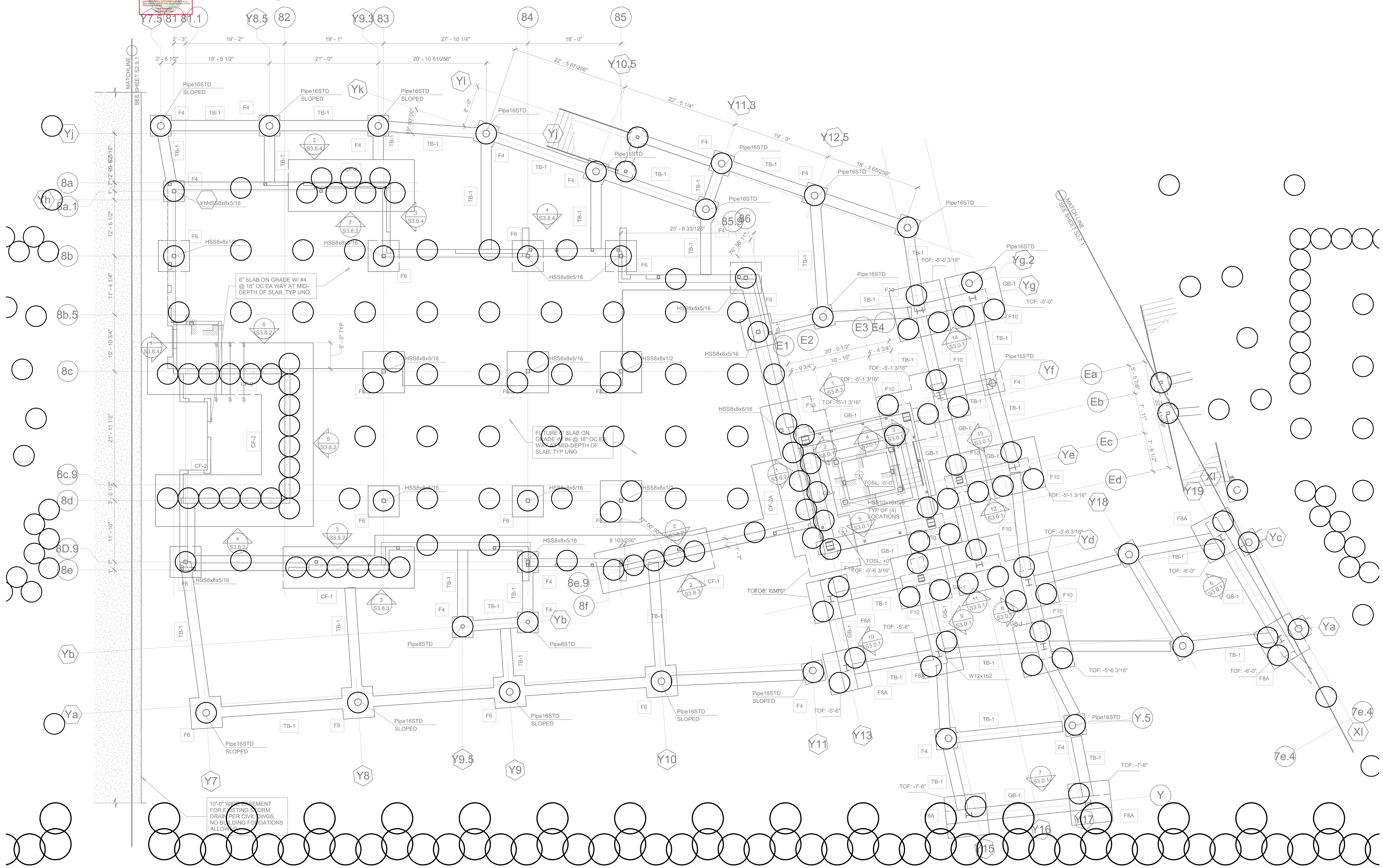

DSM COLUMN LAYOUT – BUILDING 8
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ⌀ EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ⌀ BEARING ON CAPISTRANO FORMATION

NOTES:
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REVISIONS		
NO.	DATE	DESCRIPTION
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C 91763 THOMAS TRAN CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 8

PROJECT NO. –

SHEET NUMBER: GI-4.4

DATE: 05/27/2021

SCALE: AS SHOWN

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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OC Development Services
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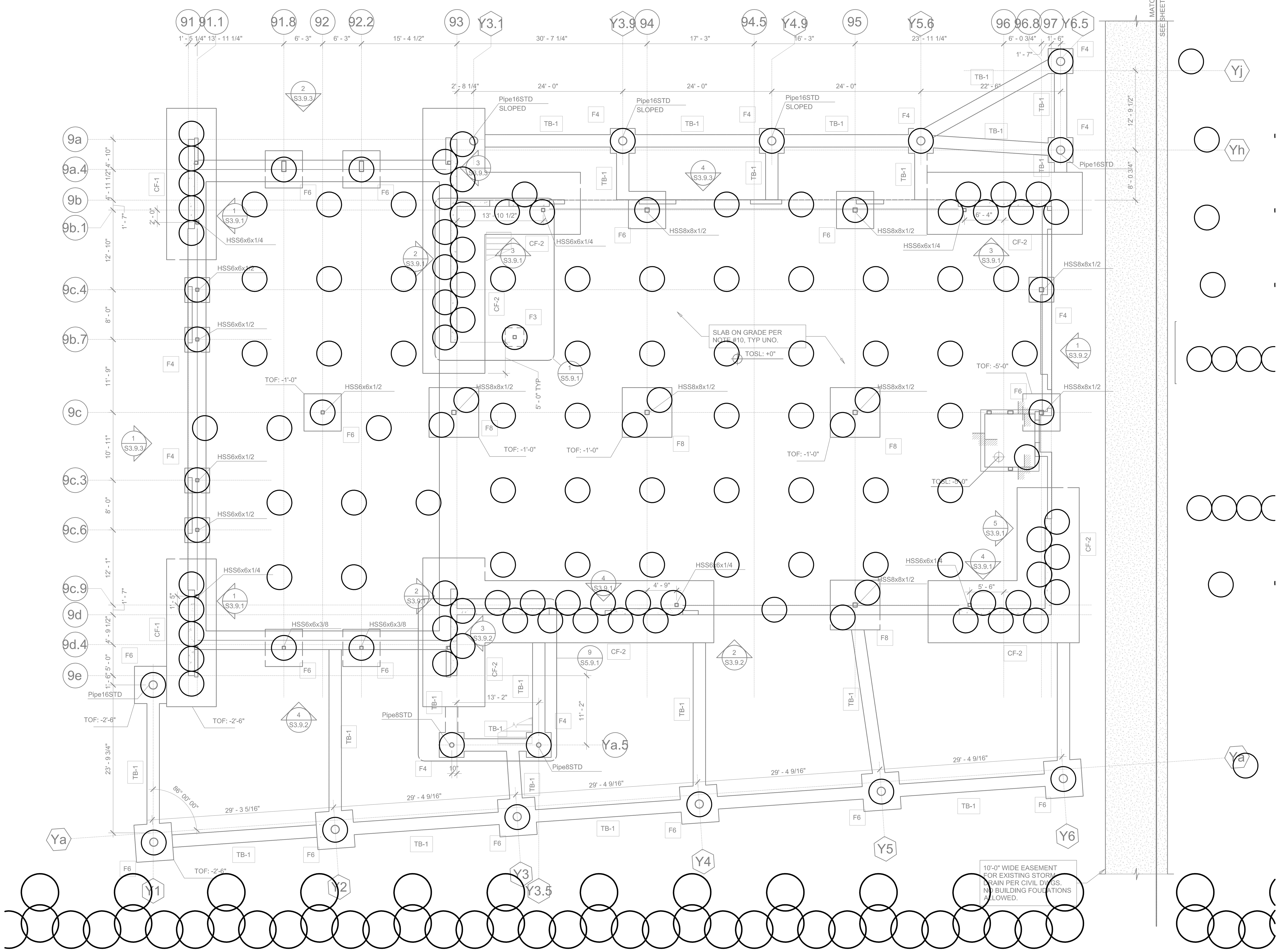

DSM COLUMN LAYOUT – BUILDING 9
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ⌀ EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ⌀ BEARING ON CAPISTRANO FORMATION

NOTES:
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REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT – BUILDING 9

PROJECT NO.	–	SHEET NUMBER:
DATE:	05/27/2021	GI-4.5
SCALE:	AS SHOWN	

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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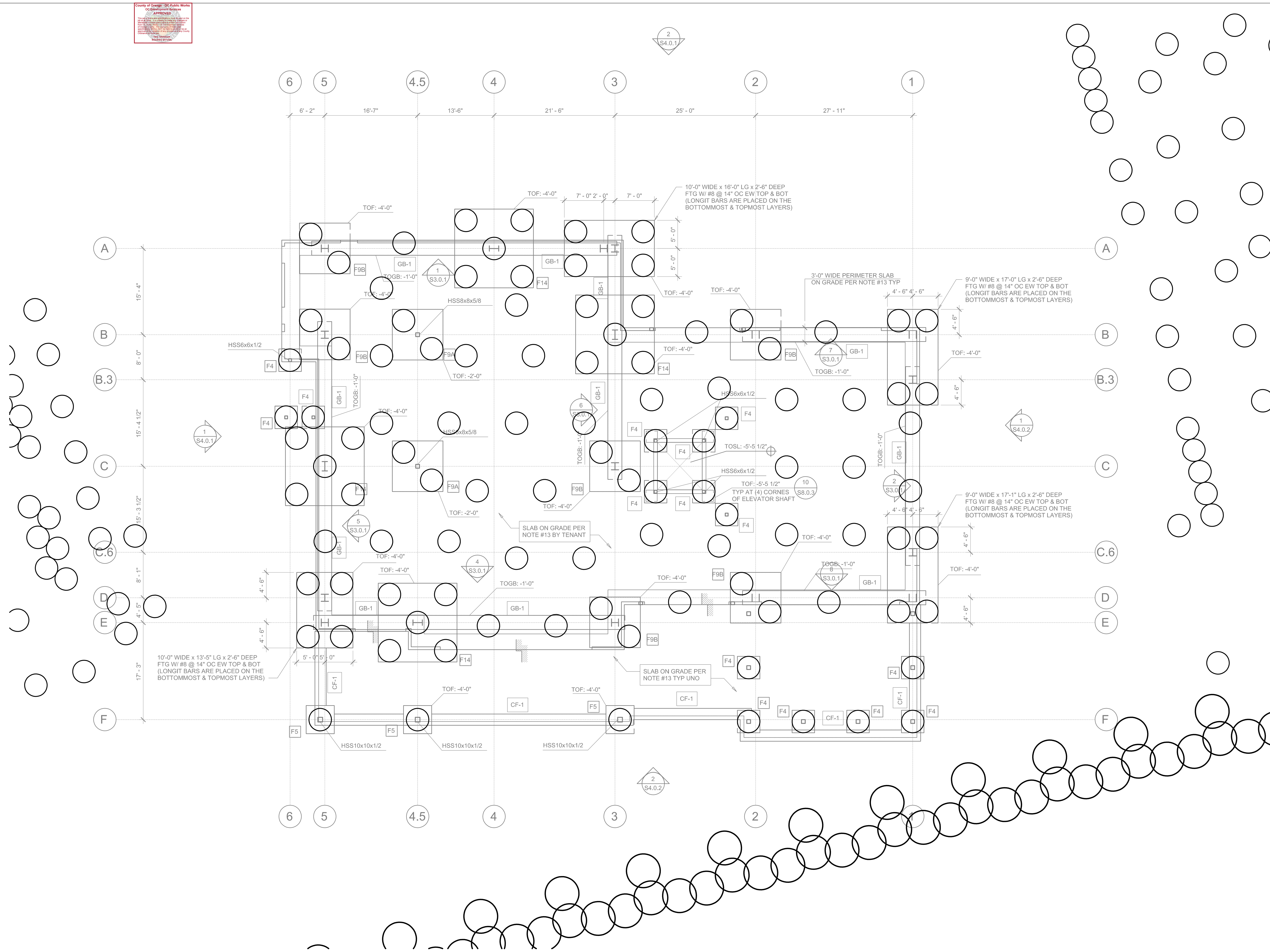

DSM COLUMN LAYOUT - BUILDING 10
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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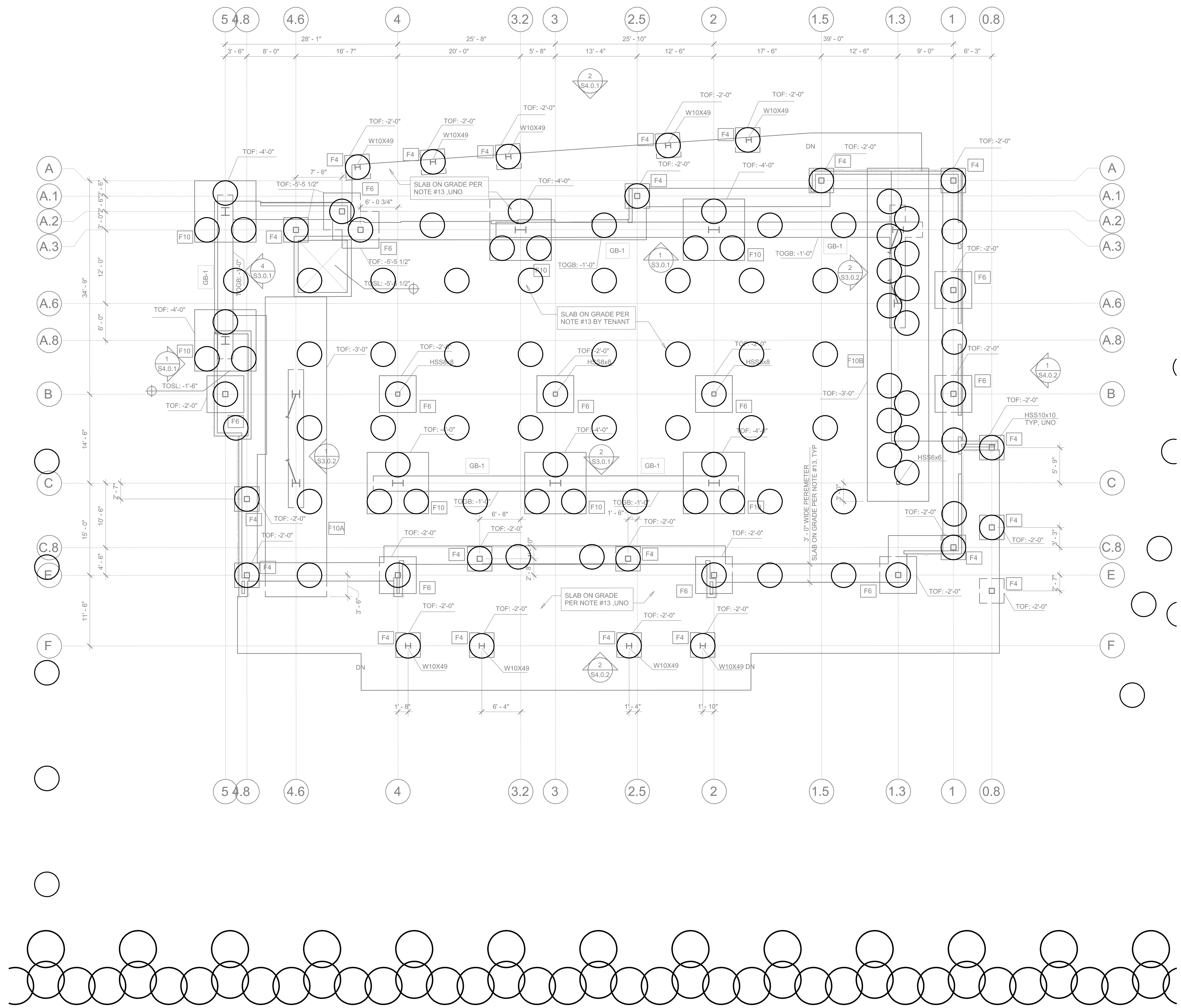
REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN C 91763 CIVIL STATE OF CALIFORNIA

PROJECT:
GROUND IMPROVEMENT FOR
DANA POINT HARBOR COMMERCIAL COMPONENT
DANA POINT, CA

SHEET TITLE:
DEEP SOIL MIXING LAYOUT - BUILDING 10

PROJECT NO. –
SHEET NUMBER: GI-4.6
DATE: 05/27/2021
SCALE: AS SHOWN



DSM COLUMN LAYOUT – BUILDING 11
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

DEEP SOIL MIXING LAYOUT – BUILDING 11

PROJECT NO.	SHEET NUMBER:
–	GI-4.7
DATE: 05/27/2021	
SCALE: AS SHOWN	

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Building&Safety: Ryan Rose 11/8/2024
Approval: Geotechnical Reports
Permits: BNR21-0245

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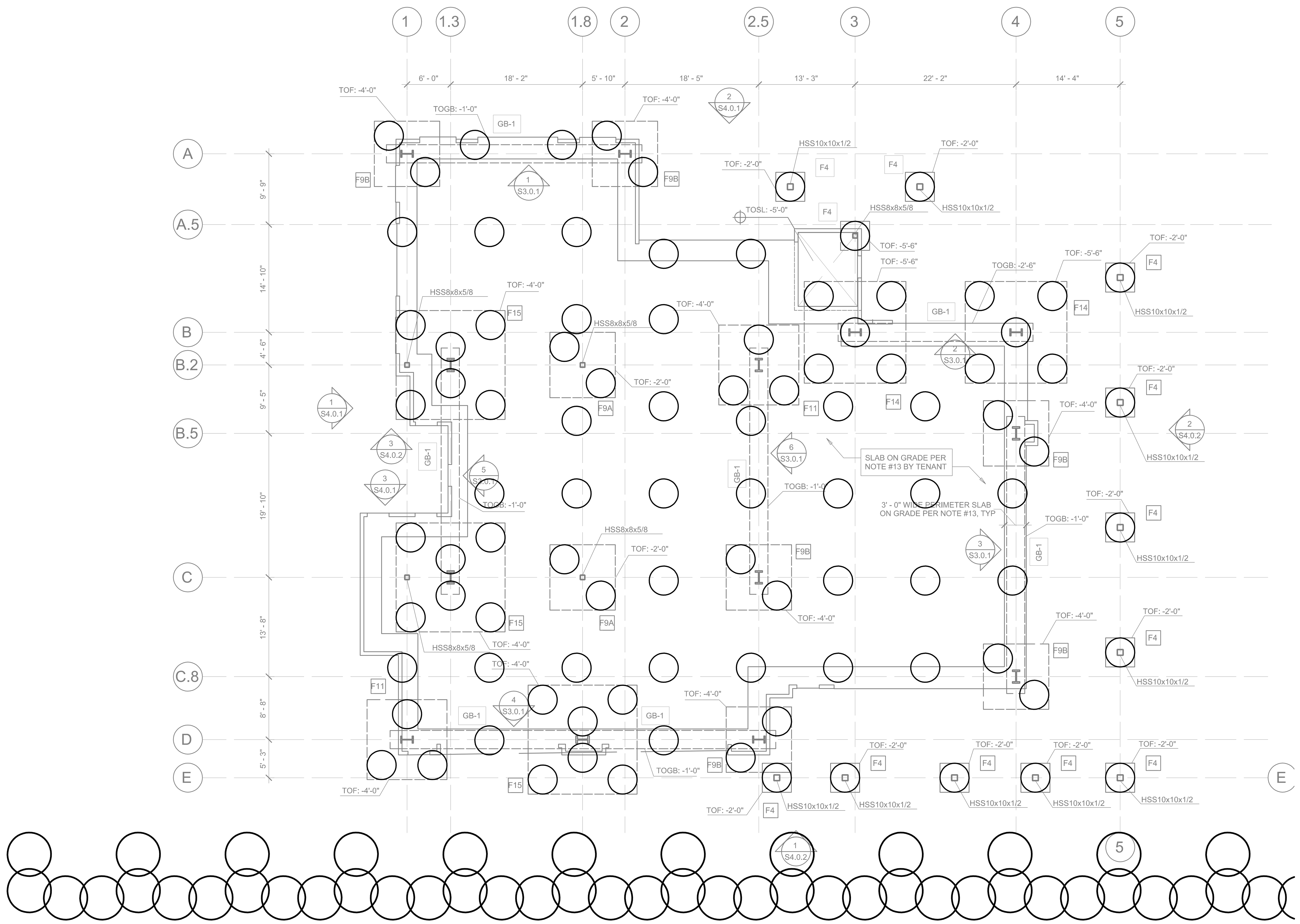

DSM COLUMN LAYOUT – BUILDING 12
SCALE: 1/8" = 1'

0' 8' 16'

LEGEND:

DSM COLUMN 6' ø EMBED 4' INTO CAPISTRANO FORMATION

DSM COLUMN 4' ø BEARING ON CAPISTRANO FORMATION

NOTES:
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NO.	DATE	DESCRIPTION
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REGISTERED PROFESSIONAL ENGINEER
THOMAS TRAN
C 91763
CIVIL
STATE OF CALIFORNIA

PROJECT:

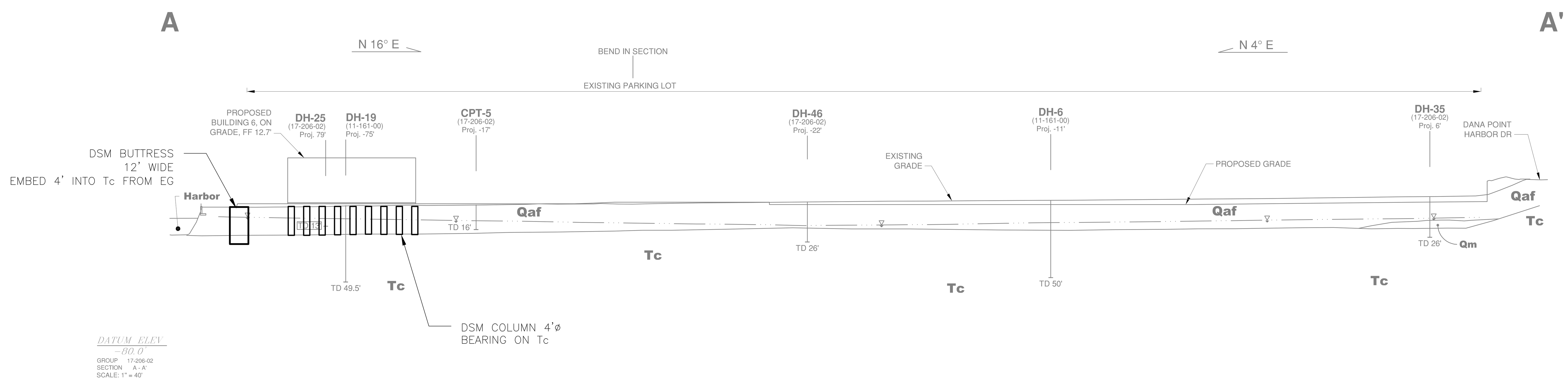
GROUND IMPROVEMENT FOR

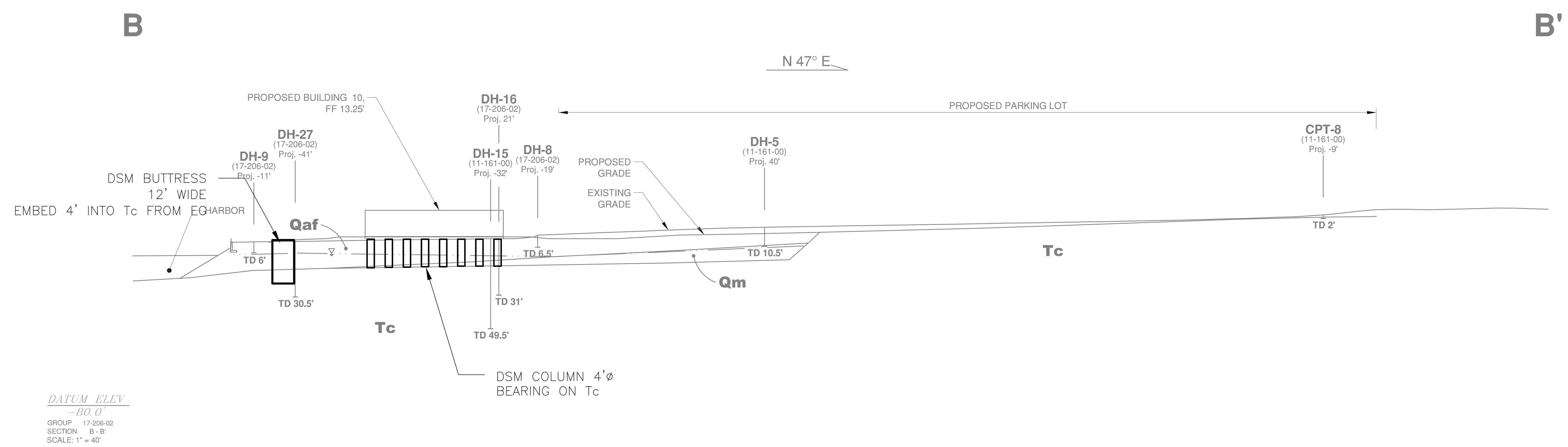
DANA POINT HARBOR
COMMERCIAL COMPONENT
DANA POINT, CA

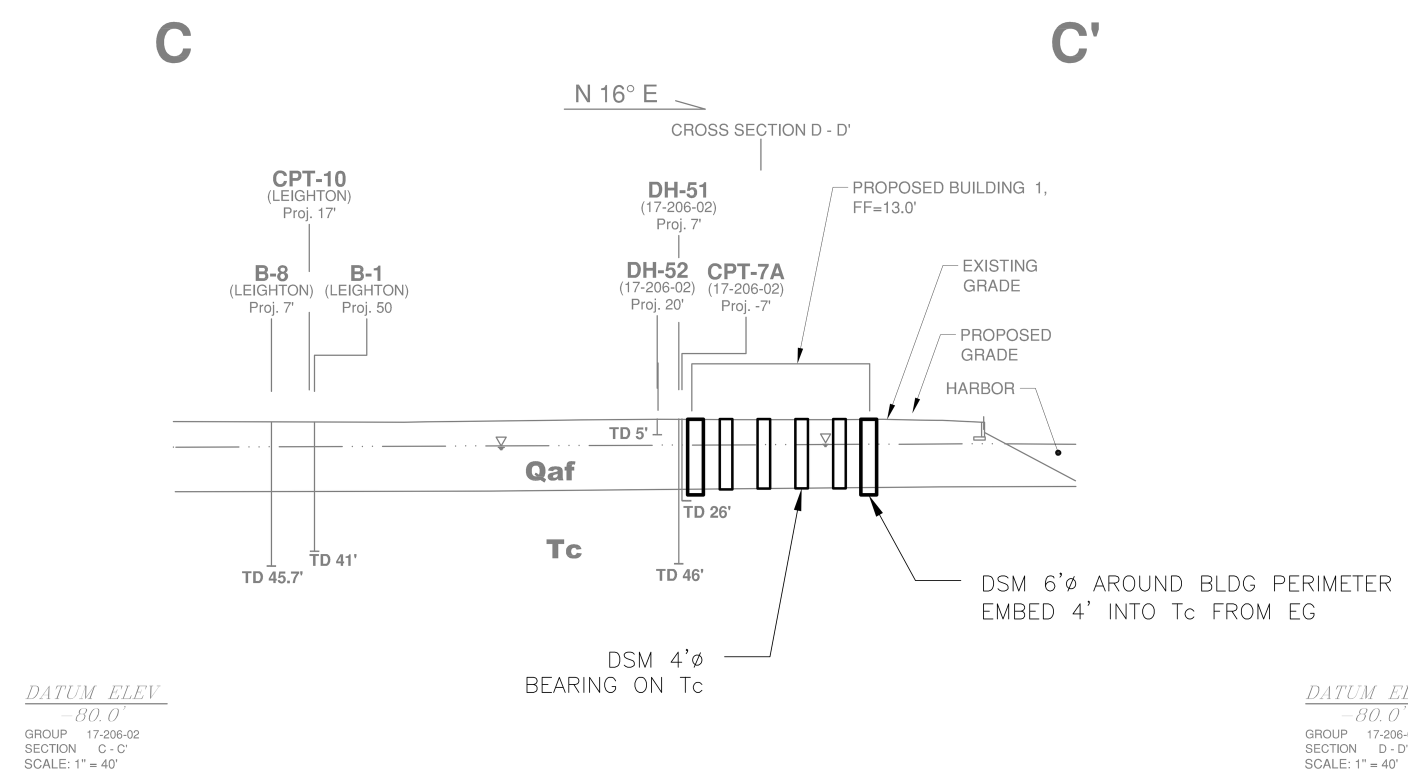
SHEET TITLE:

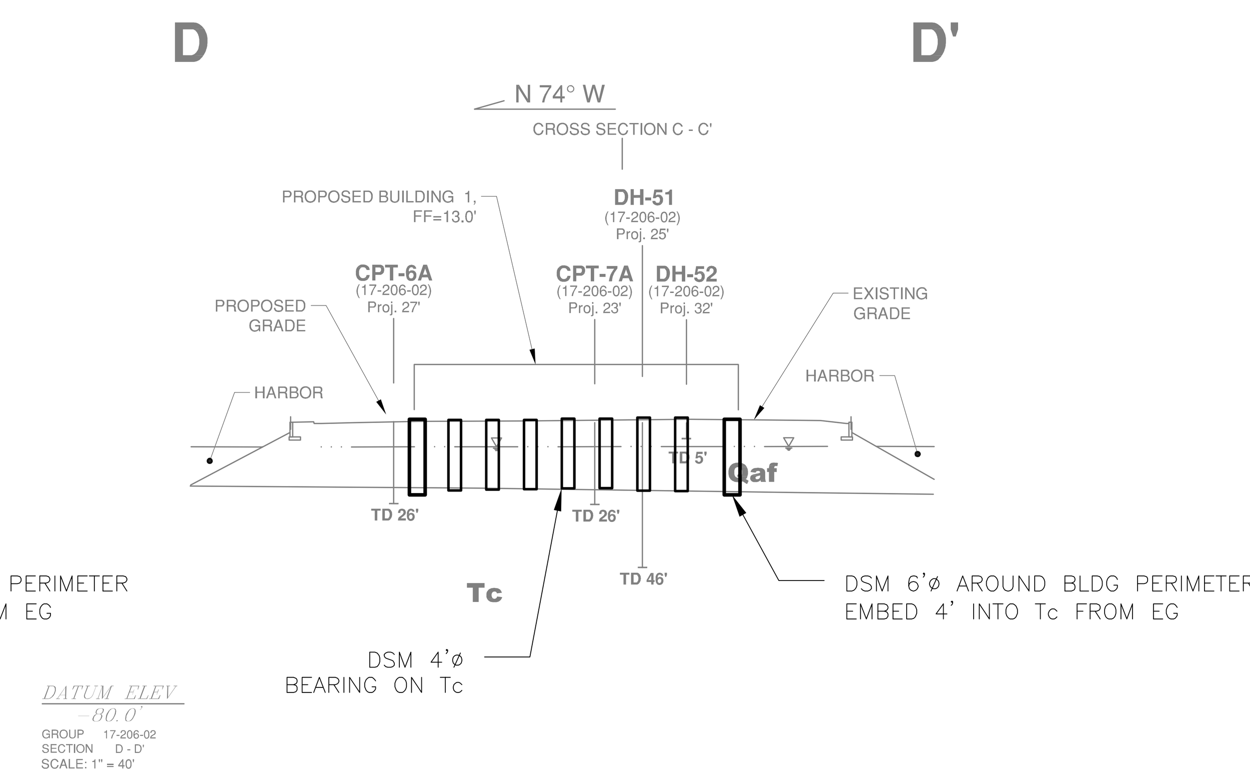
DEEP SOIL MIXING LAYOUT – BUILDING 12

PROJECT NO.	SHEET NUMBER:
–	GI-4.8
DATE: 05/27/2021	
SCALE: AS SHOWN	









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C 91763
REGISTERED PROFESSIONAL ENGINEER THOMAS TRAN CIVIL STATE OF CALIFORNIA

PROJECT:

GROUND IMPROVEMENT FOR

DANA POINT HARBOR COMMERCIAL COMPONENT DANA POINT, CA

SHEET TITLE:

GEOTECHNICAL SECTIONS

PROJECT NO. —

SHEET NUMBER: GI-5

DATE: 05/27/2021

SCALE: AS SHOWN

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