

September 10, 2020

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

Approval: Geotechnical Reports Permits: GRD20-0021 County of Orange - OC Public Works OC Development Services APPROVED

Building&Safety: Ryan Rose

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

GMU Project 17-206-02

- Subject:Geotechnical Review of Precise Grading Plans, Dana Point Harbor Parking
Structure, 24650 Dana Point Harbor Drive, City of Dana Point, California
- References: (1) Dana Point Harbor Parking Structure Precise Grading Plans, prepared by Tait Engineers, dated September 10, 2020.
 - (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU 17-206-02).

Dear Mr. Ward:

INTRODUCTION

The purpose of this correspondence is to confirm in writing that that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) precise grading plans, which included the latest Submittal 3 Geopier plans, for the subject site. The precise grading is to support site grading and design and construction of the proposed parking structure, the adjacent boater services building, and other site improvements (i.e. Golden Lantern private street, roadways, parking lots, site walls, exterior concrete flatwork, etc.). The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south. It is our understanding that the proposed development will consist of a 3-story on-grade cast-in-place concrete parking structure, supported on Geopiers, and an adjacent 1-story boater services building at its southeast corner with surface parking at the east and south ends of the site, located south of existing of Dana Point Harbor Drive and east of existing Golden Lantern. We also understand that 2H:1V fill slopes are planned to be placed against the northerly and western sides of the parking structure and supporting site retaining wall on the north side.

Our review of the Tait Engineering precise grading plans (reference (1)) presented herein provides recommendations specific to the precise grading shown on these plans only for final construction. To support the precise grading plans and Geopier plans, GMU previously performed a geotechnical foundation investigation and compiled our detailed site recommendations in our reference (2) report. The subject supporting geotechnical foundation investigation report contains:

- Geotechnical Map and Cross Sections
- Drill Hole and CPT logs
- o Laboratory testing
- Infiltration test results
- o Geotechnical engineering analyses, and
- Project recommendations

REVIEW OF PRECISE GRADING PLANS



The precise grading reflected on the reference (1) plans consist mainly of number cuts and fills of so any county up to 3-feet on the parking structure pad and the boater services building pad, along with adjacent roadway and site work. The planned precise grading also reflects fills into the 2: Presenting slope below both Dana Point Harbor Drive on the north and Golden Lantern on the west. We have attached a grading exhibit, Plate 1 – Benched Fill Over Existing Engineered Fill, to illustrate our recommended keyway and benching requirements for those slopes. This exhibit is also shown on sheet 13 of the reference (1) precise grading plans.

SLOPE STABILITY

It is our opinion that the permanent 2:1 slopes shown on sections X-X and Y-Y, shown on sheet 7 of the reference (1) precise grading plans, Dana Point Harbor Drive on the north side and Golden Lantern on the west side, respectively, will be grossly and surficially stable during the construction of the parking structure and should be periodically monitored by GMU personnel during construction and the owner after completion of construction.

TEMPORARY EXCAVATIONS

Temporary excavations for during construction are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 4 feet high will generally be stable; however, all temporary excavations should be observed by a representative of GMU to evaluate their stability. Our recommendations for temporary excavations are as follows:

- Temporary, unsurcharged excavation sides within artificial fill material over 4 feet in height should be sloped no steeper than 1.5H:1V (horizontal: vertical).
- Temporary, unsurcharged excavation sides within bedrock material over 4 feet in height should be sloped no steeper than 1H:1V (horizontal: vertical).
- 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.

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 and temporary slope construction, maintenance, and safety are the responsibility of the contractor.

APPROVED

Hadi Tabatabaee BUILDING OFFICIAL

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Precise Grading Plans, Dana Point Harbor Parking Structure, 24650 Dana Point Harbor Drive, City of Dana Point, California County of Orange - OC Public Works OC Development Services

Shoring may be required where the sides of the excavation cannot be sloped in this report or as required by OSHA for the given soil types. Should be reviewed by this office.

LIMITATIONS

All parties reviewing or utilizing this letter 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.

This letter has not been prepared for use by other parties or projects other than those named or described herein. This letter may not contain sufficient information for other parties or other purposes.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Precise Grading Plans, Dana Point Harbor Parking Structure 24650 Dana Point Harbor Drive, City of Dana Point, California

CLOSURE

Based on our review, the reference (1) precise grading plans, which include the latter work that so the left of the state of the latter work that a solution of the left of the latter work that the parameters and recommendations contained in this correspondence and in our reference (2) report. Therefore, the

subject precise grading plans are considered acceptable from a geotechnical point of view and additional or revised geotechnical recommendations are not considered necessary.

Should you require further assistance, please do not hesitate to call.

Respectfully submitted,



W

Nadim Sunna, M.Sc., QSP, PE 84197 Senior Engineer

David R. Atkinson Project Manager / Senior Engineer

Attachment

Plate 1- Benched Fill over Existing Engineered Fill

(Two (2) wet signature copies and electronic copy)

cc: Tait Engineering Attn: Mr. Jacob Vandervis and Ms. Daniela Malott (electronic copies)

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

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

dra/17-206-02L Precise Grading Plan Review for DP Harbor Parking Structure (9-10-20)

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 leathered attestics the promit tradisions of any County Oranance of state law.





August 31, 2020

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



1/8/2021

Subject: Response to County of Orange Geotechnical Review Comments Pertaining to Building Plan Check, Parking Structure, and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California

References: Listed on Page 3

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 building plans and details for the subject site.

RESPONSES TO GEOTECHNICAL COMMENTS

RESPONSE TO COMMENT 2.001

Acknowledged. GMU has reviewed the reference (2) 3rd submittal foundation plans and finds then in conformance with the recommendations in our reference (3) report. Approved project building foundation plans and applicable details will be signed/stamped by GMU prior to permit issuance.

RESPONSE TO COMMENT 2.015

GMU has reviewed the reference (4) WGI Design Submittal for a Geopier Foundation System and Calculation Package, 3rd Submittal, design submittal plans and finds then in conformance with the recommendations in our reference (3) report. The following is a summary of the changes to the subject plans and pages of the reference (4) WGI submittal package:

- 1. Sheet GP0.1, Detail #4: Added footing details for F8A-3 and F9A-3 to F8A-4 and F9A-4
- 2. Sheet GP0.2: Added Detail #4 to include footing details for F24x32, F10x30, and F5-29.
- 3. All GP Sheets are dated August 31, 2020 in the lower righthand corner for the 3rd submittal.
- 4. All letterhead pages are dated August 31, 2020 for the 3rd submittal.

Please see Appendix B for the reference (4) WGI Geopier 3rd submittal package.

RESPONSE TO COMMENT 20.017

Acknowledged. During construction, <u>it will be confirmed</u> by GMU that the Geopiers will extend down to competent bedrock (i.e., through soft, weathered bedrock).

Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021 Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Building Plan Check. Parking Structure and Boater Services Development Buildings, Dana Point Harbor R City of Dana Point, California RESPONSE TO COMMENT 2.018 This set of plans and specifications must be kept on the job at all lines. It is unlawful to make any changes or

The 120 pcf soil unit weight value used in the WGI calculations has been increased to 125 pcf to match GMU's recommendation in our reference (3) report. Please see the corrected unit weight value of 125 pcf on the WGI Geopier 3rd submittal Sheet GP0.1 and calculation pages in the attached Appendix B.

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

ROFESSION Respectfully submitted, C84197 Nadim Sunna, M.Sc., QSP, PE 84197 Senior Engineer OFESS Gregory P. Silver, M.Sc., PE, GE 2336 GE 2336 President / CEO Principal Geotechnical Engineer OFCALIF

Attachments

Appendix A – County of Orange Building Plan Geotechnical Review Comments Appendix B – Design Resubmittal (Submittal 3) for a Geopier Foundation System by WGI

(Two (2) wet signature copies and 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)

Choate Parking Consultants Attn: Mr. Rick Choate (electronic copy) and Mr. Emerson Flint (electronic copy)

dra/17-206-02L PKG19-1202 3rd submittal D.P. Harbor P. Structure Geotechnical Building Plan Check Response Letter (8-31-20)

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Building Plan Check Parking Structure and Boater Services Development Buildings, Dana Point Harbor Review OC Public Works City of Dana Point, California

REFERENCES

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- County of Orange Geotechnical Comments, PKG19-1202 Dana Point, Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California, Second Submittal, submittal date February 18, 2019, plan check date March 3, 2020, prepared by Ryan Rose of OC Public Works.
- (2) "Dana Point Harbor Parking Building" 3rd Submittal Foundation Plans, 24650 Dana Point Harbor Drive, Dana Point, California 92629," prepared by Culp & Tanner Structural Engineers, dated August 31, 2020.
- (3) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU Project 17-206-02).
- (4) Design Submittal for a Geopier Foundation System and Calculation Package, 3rd Submittal, Dana Point Harbor Parking Structure, Dana Point, California, prepared by Western Ground Improvement, Inc., dated August 31, 2020.
- (5) Our "Response to County of Orange Geotechnical Review Comments Pertaining to Building Plan Check, Parking Structure, and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California," dated February 11, 2020 (GMU Project 17-206-02).

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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 Tabatabase BULDING OFFICIAL

APPENDIX A

County of Orange Geotechnical Report Review Comments



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County



Building Plan Check Comments

OC DEVELOPMENT SERVICES 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 pt on the

of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or be an ns of a State law. Hadi Tabatabaee

It is the responsibility of the applicant to satisfy the requirements and comments listed in the satisfy the requirements and comments listed in the satisfy the requirements and comments listed in the satisfy the requirements and comments are satisfy the requirements are satisfy the requirements and comments are satisfy the requirements and comments are satisfy the requirements are satisfy the requirements are satisfy the requirements and comments are satisfy the requirements are satisfy the document. Corrections shall be made on the original plans. If you make changes to the original plan other than or in addition to what Plan Check has requested, yellow highlight the changes on the resubmitted plans.

Payment of a new plan check deposit may be required for all plans on which no action is taken by the applicant for a period of 180 days. Applications for which no permit is issued within 180 days following the date of submittal shall expire by limitation and shall be discarded.

To view your project status and the latest comments list, please visit: myOCeServices.ocgov.com.

Please note that the OC Development Services Public Counter Hours are open Monday through Friday from 8:00 a.m. to 4:00 p.m. except holidays.

Project Number: Permit Number: PKG19-1202 **Description:** Dana Point Harbor Parking Building Structure and Boater Services Building Code Year: Job Address: **Owner Address:**

Architect of Record:

Engineer of Record:

Project Manager: PeterLiu

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peter.liu@ocpw.ocgov.com

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1/8/2021

Other Reviewers:

Review Name	Review Owner	Status	Due Date	Hadi Tabatabaee
				Date
Building & Safety Review- PKG19-1202	Peter Liu	Corrections Required	03-03-2020	03-03-2020
Geotechnical Review- PKG19-1202	Ryan Rose	Corrections Required	03-03-2020	03-03-2020

GENERAL INFORMATION

- Plans will not be rechecked at the counter, allow a minimum of ten (10) working days for recheck.
- Application for which no permit is issued within 180 days following the date of application shall expire by limitation.
- An extension of 180 days may be granted upon written request showing circumstances beyond the control of the applicant have prevented action being taken. In order to renew action for an application after expiration, the applicant shall resubmit plans and pay a new plan check fee.
- Valid Worker's Compensation Certificate or Owner-Builder Verification is required prior to issuance of building permits.
- Authorized agents for owner-builders must have a notarized statement from the owner authorizing the agent to act on behalf of the owner. A copy of the form may be obtained from <u>http://www.ocgov.com/gov/pw/ds/</u>.
- Obtain all clearances as noted on the MyOCeServices permit portal. Prompt attention is suggested as there can be delays from other departments reviewing the project.
- Upon receiving the inspection report from grading inspection and based on the determination made by the Building Official, a grading permit and rough grading approval may be required.
- Building permit will not be issued until Rough Grading approval is obtained from the grading inspector. Contact the plan checker for additional information.

It is the contractor or owner-builder's responsibility to provide one hard copy set of plans with the County approval stamp in the field for the inspector to view.

HOW TO RESUBMIT ONLINE

- 1. Log into <u>www.myOCeServices.ocgov.com</u>.
- 2. Select the "myOC eServices Account" tile on the homepage or click "Dashboard" at the top of page.
- 3. Use the left-hand menu bar to locate the application in question, either under "Permit Applications" or "Projects and Packages".
- 4. Once on the Permit or Package detail page, select the "Resubmittals" tab.
- 5. Attach* all submittal requirements identified by selecting the "Add Attachment" button. Provide a comment in the "Applicant Comment" field, if applicable.



- 6. Respond to all comments on the "Comments & Responses" tab.
- Once steps 5 and 6 are complete, click "Submit". Please verify that your resubmitted is complete, as all provisions of a 7. incomplete resubmittals will not be accepted for plan check review.
- Note that you can save your work at any time by clicking "Save" at the bottom, to resume at a later time. 8.

* The PDF files submitted must be stamped and signed by the responsible registered professional (e.g. civil engineer, architect, engineering geologist, etc.).

* A 4"X4" space located 1" from the top paper edge and 5" from the right paper edge of all full sized plan sheets, either 24"x36" or 30"x42", shall be left blank to receive the County's electronic approval stamp. Other page sizes shall be scaled accordingly.

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Building&Safety: Ryan Rose

Permits: GRD20-0021

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NPDES Notes

Notes must be shown as worded, on the title sheet of the plan.

- 1. In the case of emergency, call
 - at Work Phone # or Home Phone #
- 2. Sediment from areas disturbed by construction shall be retained on site using structural controls to the maximum extent practicable.
- 3. Stockpiles of soil shall be properly contained to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tacking, or wind.
- 4. Appropriate BMP's for construction-related materials, wastes, spills shall be implemented to minimize transport from the site to streets, drainage facilities, or adjoining properties by wind or runoff.
- 5. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to reduce or remove sediment and other pollutants.
- 6. All construction contractor and subcontractor personnel are to be made aware or the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- 7. At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- 8. Construction sites shall be maintained in such a condition that an anticipated storm does not carry wastes or pollutants off the site. Discharges of material other than stormwater only when necessary for performance and completion of construction practices and where they do not: cause or contribute to a violation of any water quality standard; cause or threaten to cause pollution, contamination, or nuisance; or contain a hazardous substance in a quantity reportable under Federal Regulations 40 CFR Parts 117 and 302.
- 9. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, glues, limes, pesticides, herbicides, wood preservatives and solvents; asbestos fibers, paint flakes or stucco fragments; fuels, oils, lubricants, and hydraulic, radiator or battery fluids; fertilizers, vehicle/equipment wash water and concrete wash water; concrete, detergent or floatable wastes; wastes from any engine/equipment steam cleaning or chemical degreasing and super chlorinated potable water line flushing. During construction, permittee shall dispose of such materials in a specified and controlled temporary area on-site, physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, state and federal requirements.
- 10. Dewatering of contaminated groundwater, or discharging contaminated soils via surface erosion is prohibited. Dewatering of noncontaminated groundwater requires a National Pollutant Discharge Elimination System Permit from the respective State Regional Water Quality Control Board.
- 11. Graded areas on the permitted area perimeter must drain away from the face of slopes at the conclusion of each working day. Drainage is to be directed toward desilting facilities.
- 12. The permittee and contractor shall be responsible and shall take necessary precautions to prevent public trespass onto areas where impounded water creates a hazardous condition.
- 13. The permittee and contractor shall inspect the erosion control work and insure that the work is in accordance with the approved plans.
- 14. The permittee shall notify all general contractors, subcontractors, material suppliers, lessees, and property owners: that dumping of chemicals into the storm drain system or the watershed is prohibited.
- 15. Equipment and workers for emergency work shall be made available at all times during the rainy season. Necessary materials s hall be available on site and stockpiled at convenient locations to facilitate rapid construction of temporary devices when rain is imminent.
- 16. All removable erosion protective devices shall be in place at the end of each working day when the 5-Day Rain Probability Forecast exceeds 40%.
- 17. Sediments from areas disturbed by construction shall be retained on site using an effective combination of erosion and sediment controls to the maximum extent practicable, and stockpiles of soil shall be properly contained to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking, or wind.
- 18. Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented and retained on site to minimize transport from the site to streets, drainage facilities, or adjoining property by wind or runoff.

300 N. Flow er Street, Santa Ana, CA 92703 P.O. Box 4048, Santa Ana, CA 92702-4048 Revised 02/2017



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Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021 **OC DEVELOPMENT SERVICES**



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Applicant Response												
Comment	2nd Submittal bldg plan check review comments	Require stamps and signatures for all plans and clacs i.e. sheet G000 missing signature	2nd Submittal bldg plan check review comments	dwg sheet G000, provide complete list of defferred permit item. i.e. sign, electrical &	mechanical euipment support and equipment restraint & seismic anchors design.	2nd Submittal bldg plan check review comments	Dwg sheet G001, A230, clarify site retaining wall whict detatched from parking	structure req'd separate permit	2nd Submittal bldg plan check review comments	Dwg sheet G001, A230, provide and show calcs of number and location for short	term and long term bike rack	
Category	Non-Residential Plan Check List		Non-Residential Plan Check List			Non-Residential Plan Check List			Non-Residential Plan Check List			
Review	Building & Safety Review-	Peter Liu	Building & Safety	Review- PKG19-1202	Peter Liu	Building & Safety	Review- PKG19-1202	Peter Liu	Building & Safety	Review- PKG19-1202	Peter Liu	
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1/8/2021

Building&Safety: Ryan Rose Approval: Geotechnical Reports

Permits: GRD20-0021

OC DEVELOPMENT SERVICES

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Fils Name	& Page				This set of plan job at all times alterations to the from OC Public of Orange Cou specifications	APPROVED ²⁰ s and specifications must be kept on the It is unlawful to make any changes or ease plans without written permission Works. OC Development Services ny. The stamping of these plan HALL NOT be held to permit or be an
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Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

OC DEVELOPMENT SERVICES

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Status	Not Satisfied	Not Satisfied		Not Satisfied		
Applicant Response						
Comment	2nd Submittal bldg plan check review comments Dwg sheet S5.10 detail J, show rebar clearance against soil side	The approved project building foundation plans and applicable details must be signed/stamped by the geotechnical consultant prior to permit issuance.	*** 2nd Submittal Response is acceptable. Comment will be marked as satisfied upon receipt of the signed and stamped plans.	Footing details for the F8A-3, F9A-3, F10x30 and F24x32 should be provided	on the plans by WGI. *** 2nd Submittal - Response is not acceptable. The WGI plans in the second submittal have the same date as t he plans that were in the first submittal. Details were not added to Sheet GP0.1 for F8A-3, FA9S-3 F10X30	
Category	Non-Residential Plan Check List	Geotechnical/G eology Check List		Geotechnical/G eology Check List		
Review	Building & Safety Review- PKG19-1202 Peter Liu	Geotechnical Review- PKG19-1202 Ryan Rose		Geotechnical Review- PKG19-1202	ryan rose	
#	1.061	2.001		2.015		

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

File Name & Page Status Not Satisfied

Note 1 below the table on Sheet GP0.1 of

Check

eology

List

PKG19-1202

Review-

Ryan Rose

Geotechnical/G

Geotechnical

2.017

the WGI plans states that the Geopier

report states that the Geopier should extend a minimum of 12 inches into

The geotechnical

shall reach bedrock.

bedrock and be verified by the project

geotechnical engineer. The note should

geotechnical

the

per

revised

be

consultant's recommendation.

*** 2nd Submittal - Comment will be marked as satisfied upon confirmation the Geopiers will extend down to competent

bedrock, i.e. through any soft, weathered

bedrock.

Applicant Response

Comment

Category

Review

#

and F24x32.

Building&Safety: Ryan Rose **Approval: Geotechnical Reports** Permits: GRD20-0021

County of Orange - OC

OC Development

ate law Hadi Tabataba BUILDING OFFIC

Not Satisfied

The 120 pcf soil unit weight value used in the WGI calculations should be increased to 125 pcf to match the geotechnical consultant's recommendation.

Check

eology

Review-

List

PKG19-1202

Ryan Rose

Geotechnical/G

Geotechnical

2.018

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be ent Services hese plan permit or be an

OC DEVELOPMENT SERVICES



OC DEVELOPMENT SERVICES

Review	Category	Comment	Applicant Response	Status	File Name & Page
		*** 2nd Submittal: The response is not			
		acceptable. The WGI calculations there			
		were included in the 2nd submittal do not			
		increase the soil unit weight.			

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

County of Orange - OC Public Works **OC Development Services** APPROVED

This set of plans and specifications use 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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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 Tabatabase BULDING OFFICIAL

APPENDIX B

Submittal 3 for a Geopier Foundation System by WGI



WGI GEOPIER® FOUNDATIONS

Wostorn Grou	
western diot	County of Orange - OC Public Works
2372 Morse A	OC Development Services
Suite 504	APPROVED
lrvine, CA 926 www.western	14 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 Specifications StraLL 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

August 31, 2020

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

Re: Design Submittal for a *Geopier[®]* Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The following documents are included herein:

- Geopier Design Drawing GP0.1: Geopier Notes & Details
- Geopier Design Drawing GP0.2: Geopier Schedules
- Geopier Design Drawing GP0.1 GP1.4: Geopier Location Plans

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Sincerely, Western Ground Improvement, Inc.



Ken Hoevelkamp, P.E. Principal Engineer

GEOPIER DESIGN NOTES:

- 1. GEOPIER FOUNDATION SUPPORT IS AS DESIGNED BY WESTERN GROUND IMPROVEMENT, INC., IRVINE, CALIFORNIA (DESIGNER).
- ounty of Orange OC Public Works OC Development Services APPROVED

Building&Safety: Ryan Rose Approval: Geotechnical Repo

- 2. THESE DESIGN DRAWINGS ARE PREPARED BY THE DESIGNER FOR USE IN GEOPIER CONSTRUCTION. THE GEOPIER SYSTEM SHALL BE INSTALLED BY APPROVED INSTALLERS LICENSED BY GEOPIER FOUNDATION COMPANY. UNAUTHORIZED USE OF THESE DRAWINGS IS PROHIBITED.
- 3. THE GEOPIER FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL INFORMATION PROVIDED IN THE SUBSURFACE EXPLORATION BY GMU GEOTECHNICAL, INC. WESTERN GROUND IMPROVEMENT, INC., HAS RELIED ON THIS INFORMATION AND WE HAVE NO REASON TO SUSPECT ANY OF THE INFORMATION IN THE REPORT IS IN ERROR. WESTERN GROUND IMPROVEMENT, INC. IS NOT RESPONSIBLE FOR ERRORS OR OMISSIONS IN THE REPORT THAT MAY AFFECT THE PARAMETER VALUES IN OUR DESIGN. IF THE SUBSURFACE OR SITE CONDITIONS DIFFER FROM THOSE UTILIZED IN THE DESIGN THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY.
- 4. THE ALLOWABLE BEARING PRESSURE FOR FOUNDATIONS SUPPORTED BY GEOPIER ELEMENTS IS AS REFERENCED IN DETAIL 1/GP0.1. THE GEOPIER LAYOUT IS DESIGNED TO PROVIDE SETTLEMENT CONTROL BASED ON SERVICE LOADS PROVIDED BY CULP AND TANNER. IN THE EVENT THE STRUCTURAL LOADS VARY, THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY 5. FOOTING ELEVATIONS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND SHALL BE
- REPORTED IN WRITING TO THE INSTALLER'S QC REPRESENTATIVE PRIOR TO INSTALLING GEOPIER ELEMENTS.

GEOPIER LAYOUT NOTES:

- 1. GEOPIER ELEMENT LAYOUT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. GEOPIER ELEMENTS SHALL BE INSTALLED IN THE FIELD WITHIN 6 INCHES OF LOCATIONS SHOWN ON THESE PLANS.
- 2. GEOPIER ELEMENTS ARE LOCATED RELATIVE TO THE INTERSECTION OF REFERENCE GRID LINES OR AT THE CENTERLINE OF STRIP FOOTINGS, UNLESS DIMENSIONED OTHERWISE. PLEASE REFER TO THE "FOOTING DETAILS" ON THIS SHEET FOR SPECIFIC PIER LOCATIONS AND DIMENSIONS RELATIVE TO THE FOOTING.
- 3. THE "GEOPIER LOCATION PLAN" AND "FOOTING DETAILS" PROVIDE GEOPIER ELEMENT NUMBER, LOCATION, AND LAYOUT ONLY. FOOTING LOCATIONS, SIZES, AND ORIENTATION SHOWN ON THESE PLANS ARE FOR INFORMATION ONLY. PLEASE REFER TO THE STRUCTURAL PLANS FOR SPECIFIC FOUNDATION DIMENSIONS AND LOCATIONS. THE DESIGNER ACCEPTS NO RESPONSIBILITY FOR THE LOCATION OF FOOTINGS SHOWN ON THESE PLANS. THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY IF INFORMATION ON THESE PLANS CONFLICTS WITH STRUCTURAL OR ARCHITECTURAL DRAWINGS.

UTILTIES/OBSTRUCTION NOTES:

- 1. UTILITY LOCATIONS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. THE DESIGNER SHALL BE NOTIFIED OF ANY CONFLICTS WITH GEOPIER LOCATIONS SHOWN ON THE PLANS. NEW TEMPORARY UTILITY EXCAVATIONS SHALL BE LIMITED TO THE ZONE DEPICTED ON DETAIL 2 OF THIS SHEET. IF EXCAVATIONS ARE PLANNED WITHIN THE GEOPIER "NO DIG" ZONE, THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY TO DISCUSS EXCAVATION OPTIONS.
- IF OBSTRUCTIONS ARE ENCOUNTERED DURING GEOPIER INSTALLATION THAT CANNOT BE REMOVED WITH CONVENTIONAL GEOPIER INSTALLATION EQUIPMENT, THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING THE OBSTRUCTIONS. IF THE GENERAL CONTRACTOR DOES NOT DO SO IN A TIMELY MANNER THAT DOES NOT INTERRUPT GEOPIER PRODUCTION. THE INSTALLER MAY REMOVE OBSTRUCTIONS(S) AND SHALL BE REIMBURSED FOR COSTS INCURRED. INCLUDING LABOR, EQUIPMENT, AND MATERIALS. IN THE EVENT OBSTRUCTIONS ARE ENCOUNTERED BELOW THE DESIGNED BOTTOM OF FOOTING ELEVATION THE OBSTRUCTION SHALL BE REMOVED AS OUTLINED ABOVE. THE RESULTING EXCAVATION SHALL THEN BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS FOR STRUCTURAL FILL. THE AREA SHALL BE TESTED BY THE OWNER'S TESTING AGENCY AND THE COMPACTION TEST RESULTS SHALL BE SUBMITTED TO THE INSTALLER AND THE DESIGNER.

GEOPIER TESTING NOTES:

- 1. A QUALIFIED, FULL-TIME QUALITY CONTROL (QC) REPRESENTATIVE PROVIDED BY THE GEOPIER INSTALLER (INSTALLER) SHALL BE RESPONSIBLE FOR INSTALLATION OF THE GEOPIER ELEMENTS IN ACCORDANCE WITH THE DESIGN AND SHALL REPORT ALL GEOPIER FOUNDATION CONSTRUCTION ACTIVITIES TO THE DESIGNER. IF AUTHORIZED BY THE OWNER, THE QC REPRESENTATIVE SHALL COORDINATE QC ACTIVITIES WITH THE TESTING AGENCY HIRED BY THE OWNER. UNDER NO CIRCUMSTANCES SHALL THE TESTING AGENCY DIRECT GEOPIER INSTALLATION PROCEDURES
- GEOPIER ELEMENT DESIGN SHALL BE CONFIRMED BY A MODULUS TEST PERFORMED AT THE SITE. PLEASE REFER TO THE DESIGN SUBMITTAL FOR TEST LOCATION AND SPECIFICATIONS. 3. GEOPIER ELEMENTS SHALL BE BASED ON THE FOLLOWING CRITERIA UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER:
- A. INSTALLATION DEPTHS SHALL BE WITHIN 3 INCHES OR DEEPER THAN THE DEPTHS SHOWN ON THE PLANS.
- B. THE AVERAGE COMPACTED LIFT THICKNESS DURING EACH DAY'S PRODUCTION SHALL BY APPROXIMATELY 12 TO 24 INCHES.
- C. GEOPIER ELEMENT DISPLACEMENT MEASURED DURING BOTTOM STABILIZATION TESTS (BST) SHALL BE WITHIN 150% OF THE BST VALUE ACHIEVED IN THE MODULUS TEST PIER. BSTS SHALL BE PERFORMED IN AT LEAST 10% OF THE DAY'S PRODUCTION PIERS.
- D. GEOPIER ELEMENT AGGREGATE RELATIVE DENSITY SHALL BE RECORDED PERIODICALLY THROUGHOUT THE DAY. THE AVERAGE BLOW COUNTS OBTAINED UTILIZING A DYNAMIC CONE PENETROMETER (DCP) IN ACCORDANCE WITH ASTM STP-399, SHALL BE GREATER THAN 15 BLOWS FOR 1.75 INCHES OF PENETRATION (BPI). NO MORE THAN 10% OF DCP TESTS CONDUCTED ON EACH DAY SHALL BE BELOW 15 BPI. NOTE: USE OF DCP TESTS ARE NOT APPROPRIATE FOR OPEN GRADED AGGREGATE SUCH AS #57 STONE OR SAND
- GEOPIER ELEMENT AGGREGATE SHALL BE APPROVED BY THE DESIGNER AND SHALL BE THE SAME AS USED IN A SUCCESSFUL MODULUS TEST, UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER.
- F. THE AGGREGATE SHALL BE TAMPED IN A MANNER CONSISTENT WITH THE MODULUS TEST PIER BUT FOR NO LESS THAN 10 SECONDS PER LIFT.
- G. IF CAVE-INS OCCUR ON TOP OF A LIFT OF AGGREGATE SUCH THAT THE VOLUME OF CAVED SOIL IS GREATER THAN APPROXIMATELY 10% OF THE VOLUME OF THE AGGREGATE IN THE LIFT, THEN THE AGGREGATE SHALL BE CONSIDERED CONTAMINATED, AND SHALL BE REMOVED AND REPLACED WITH UNCONTAMINATED AGGREGATE.
- 4. GEOPIER ELEMENTS NOT MEETING DESIGN REQUIREMENTS SHALL BE REINSTALLED UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER



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CONSTRUCTION NOTES FOR CONCRETE FOUNDATIONS SUPPORTED BY GEOPIER® ELEMENTS:

1. ALL EXCAVATIONS FOR FOUNDATIONS SUPPORTED BY GEOPIER ELEMENTS SHALL BE PREPARED IN THE FOLLOWING MANNER BY THE GENERAL CONTRACTOR: OVEREXCAVATION BELOW THE BOTTOM OF FOUNDATION SHALL BE LIMITED TO THREE INCHES. THIS INCLUDES LIMITING THE TEETH OF EXCAVATORS FROM OVEREXCAVATION BEYOND THREE INCHES BELOW THE FOUNDATION ELEVATION.

2. FOUNDATION CONCRETE SHALL BE PLACED IMMEDIATELY FOLLOWING FOUNDATION EXCAVATION AND APPROVAL, PREFERABLY THE SAME DAY AS THE EXACAVATION. FOUNDATION CONCRETE SHALL BE PLACED ON THE SAME DAY IF THE FOUNDATION IS BEARING ON MOISTURE-SENSITIVE SOILS. IF SAME DAY PLACEMENT OF FOUNDATION CONCRETE IS NOT POSSIBLE, OPEN EXCAVATIONS SHALL BE PROTECTED FROM SURFACE WATER ACCUMULATION. A LEAN CONCRETE MUD-MAT MAY BE USED TO ACCOMPLISH THIS. OTHER METHODS MUST BE PRE-APPROVED BY THE DESIGNER.

3. PRIOR TO CONCRETE OR MUD MAT PLACEMENT, THE TOP OF THE EXCAVATED SOIL AND GEOPIER ELEMENTS SHALL BE COMPACTED WITH A STANDARD, HAND-OPERATED IMPACT COMPACTOR (I.E. JUMPING JACK COMPACTOR). COMPACTION SHALL BE PERFORMED OVER THE ENTIRE FOUNDATION SUBGRADE TO COMPACT ANY LOOSE SURFACE SOIL AND LOOSE SURFACE GEOPIER AGGREGATE.

4. WATER SHALL NOT BE ALLOWED TO ACCUMULATE IN THE FOUNDATION EXCAVATIONS PRIOR TO CONCRETE PLACEMENT OR ALLOWED TO ACCUMULATE OVER THE POURED FOUNDATION.

5. EXCAVATION AND SURFACE COMPACTION OF ALL FOUNDATION SUBGRADES SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

6. THE TESTING AGENCY SHALL INSPECT EACH FOUNDATION AND APPROVE IT IN WRITING ON THE SAME DAY THAT THE CONCRETE OR MUD MAT IS PLACED IN THE FOUNDATION EXCAVATION. THE APPROVAL SHALL STATE THAT ALL FOUNDATION SUBGRADE, INCLUDING MATRIX SOILS AND GEOPIER TOPS, HAVE NOT BEEN OVEREXCAVATED MORE THAN THREE-INCHES BELOW THE BOTTOM OF THE FOUNDATION, HAVE BEEN KEPT FREE OF WATER ACCUMULATION, AND HAVE BEEN REASONABLY COMPACTED WITH A HAND-HELD MECHANICAL IMPACT COMPACTOR ON THE SAME DAY THAT THE CONCRETE WAS PLACED.

7. IN THE EVENT THAT FOUNDATION BOTTOM PREPARATIONS, AS DESCRIBED ABOVE, ARE NOT PERFORMED OR DOCUMENTED IN ACCORDANCE WITH THIS SECTION, ANY WRITTEN OR IMPLIED WARRANTY WITH RESPECT TO GEOPIER FOUNDATION PERFORMANCE CAN BY CONSIDERED VOID. Design I Allowabl Depth to Total uni Soil frict Geopier Soil stiff

Type / F5-F6-F6 F7-F7 ∕⊉ , F8/ F8 ∑ F9A F9 F9-F10 F1(F11 F14 F10-F10 F24>

NOTES:



ADJACENT TEMPORARY UTILITY EXCAVATION DETAIL 2 ADJACEINI NOT TO SCALE

ADJACENT TEMPORARY UTILITY EXCAVATION NOTES:

- 1. DETAIL 1 DOES NOT APPLY TO MASS EXCAVATION OR SITE GRADING.
- 2. THE PROJECT GEOTECHNICAL ENGINEER'S RECOMMENDATIONS SHALL BE FOLLOWED FOR TEMPORARY OR PERMANANT SLOPES

WHERE PROPOSED EXCAVATIONS EXTEND INTO THE ZONE OF INFLUENCE, DISTURBANCE SHALL BE MINIMIZED AS MUCH AS POSSIBLE. DISTURBED PORTIONS OF GEOPIER ELEMENTS SHALL BE REMOVED AND THE EXCAVATIONS SHALL BE BACKFILLED WITH GRANULAR FILL COMPACTED IN ACCORDANCE WITH THE PROJECT REQUIREMENTS FOR STRUCTURAL FILL. AS AN ALTERNATE, EXCAVATIONS MAY BE BACKFILLED WITH FLOWABLE FILL OR LEAN CONCRETE.





FOOTING DETAILS NOT TO SCALE



		_
Parameter	Value	
e bearing pressure (ksf)	7	
groundwater (ft)	5	
it weight of soil (pcf)	125)/2
ion angle (degrees)	26	
stiffness modulus (pci)	300	
ness modulus (pci)	38	

Mark	Maximum Load, (kips, klf)	Width, (ft)	Length, (ft)	Thickness, (in)	Geopier Diameter, (in)	Number of Geopier Elements per Footing	Minimum Design Shaft Length, (ft) (1)	Anticipated Settlement, (in) (2)	Notes
j - 1	100	5.0	5.0	18	24	1	9.0	1/2	
-3	252	6.0	6.0	24	24	3	9.0	1/2	
5-4	252	6.0	6.0	24	24	4	9.0	1/2	
'-3	315	7.0	7.0	24	24	3	9.0	1/2	
′-4	343	7.0	7.0	24	24	4	9.0	1/2	
A-4 ^	31,5	8.0	8,0	×	24	4	9.0	1/2	
) 4	420	8.0	8.0	24	24	4	9.0)))))))))))))))))))))))))))))))))))))))	
Á-4	315	9.0	9.0	48	24		9.0	<u>,</u> 1/2 ,	
)4	420	9.0	9.0	30	24	4) 9.0)))))))))))))))))))))))))))))))))))))))))))
-5	525	9.0	9.0	30	24	5	9.0	1/2	
0-5	525	10.0	10.0	30	24	5	9.0	1/2	
0-6	630	10.0	10.0	30	24	6	9.0	1/2	
1-6	630	11.0	11.0	36	24	6	9.0	1/2	
4-5	525	14.0	14.0	48	24	5	9.0	1/2	
)-11	315	10.0	11.0	48	24	3	9.0	1/2	
x30	1050	10.0	30.0	36	24	10	9.0	1/2	
x32	2685	24.0	32.0	30	24	30	9.0	3/4	

(1) Geopier elements shall penetrate fill and reach bedrock. (2) Anticipated settlement is estimated to the nearest 1/4 inch.

GEOPIER® DESIGN PARAMETERS AND ESTIMATED SETTLEMENT











1/8/2021

Building&Safety: Ryan Rose

Approval: Geotechnical Reports

GEOPIER[®] Foundation Company

GEOPIER® Fo	oundation Co	mpany						G	EOP	IER®	geopier® f	oundatio
Project Name: Project Location: Project Number:		Dana Point Ha Dana Point, C GLA-113	arbor Parking a	Structure				GEOPIER	R SCHED	ULE	Project Name: Project Location Project Number	n: :
Column Line	Geopier®		Top of Footing Elevation,	Width,	Length,	Thickness,	Geopier Shaft Length, (ft)	Finish Floor Elevation, (ft)	Top of Geopier® Elevation,	Notos	Column Lino	Geopi
A-2	1	F6	-1.00	(it) 6.0	6.0	24	9	0.00	-3.00	Notes	D-1	281 -
۸_3	2 - 3	F6	_1.00	60	6.0	NOT USE	D	0.00	-3.00		D-4	285 -
A-3 A-4	4 - 8 7 - 9	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-5 D-6	289 -
A-5	10 - 12	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-7	295 -
A-7	16 - 18	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-9	301 -
A-8 A-9	19 - 21 22 - 24	F6	-1.00	6.0 6.0	6.0	24	9	0.00	-3.00		D-10	304 -
A-10	25 - 27	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-12	310 -
A-11 A-12	28 - 30 31 - 33	F6 F6	-1.00 -1.00	6.0 6.0	6.0 6.0	24 24	9 9	0.00	-3.00		D-13	313
4.40	34			0.0		NOT USE	D	0.00			D-14	315 -
A-13	35 - 37	FO	-1.00	0.0	6.0	NOT USE	D	0.00	-3.00		D-15	319 -
A-14 A-15	39 - 42 43 - 45	F8A F7	-1.00 -1.00	8.0 7.0	8.0 7.0	36 24	9 9	0.00	-4.00		D-16	322 -
	46		1.00	7.0	1 7.0	NOT USE	D	0.00			D-18	328 -
A-16	<u>47 - 49</u> 50	F7	-1.00	7.0	7.0	24 NOT USE	9 D	0.00	-3.00		D-19 D-20	<u> </u>
A-17	51 - 53	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D-21	337 -
A-18	55 - 57	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D-22 D-23	340 -
Δ-19	58 59 - 61	F7	-1.00	7.0	7.0	NOT USE	D 9	0.00	-3.00		D-24	346 -
	62		1.00	7.0	1.0	NOT USE	D	0.00	0.00			354 -
A-20	63 - 65 66	F7	-1.00	7.0	7.0	24 NOT USE	9 D	0.00	-3.00		D.1-1 D.6-1	356 - 359 -
A-21	67 - 69	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D.7-27	362 -
A-22	70 71 - 73	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-1 E-2	365 -
A 23	74	E7	1.00	7.0	7.0	NOT USE	D	0.00	3.00		E-3	371 -
A-23	78 - 80	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00		E-4 E-6	379 -
A-25	81 - 83 84	F8	-1.00	8.0	8.0	24	9	0.00	-3.00			384
A-20.3	85 - 87	F9A	-1.00	9.0	9.0	48	9	0.00	-5.00		E-8	389 -
A.4-1.5	88 89 - 91	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		E-9	393 -
A.4-1 A.4-2	92 - 94	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-11	401 -
A.3-27	95 - 97 98 - 100	F6 F6	-1.00	6.0	6.0 6.0	24	9	0.00	-3.00		E-12 E-14	405 -
A.5-5	101	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		E-15	415 -
A.7-27 A 8-1	102 - 104 105 - 107	F6	-1.00	6.0 6.0	6.0 6.0	24	9	0.00	-3.00		E-16 F-17	419 -
A.9-7	108 - 110	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-18	427 -
B-2 B-4	111 - 115 116 - 120	F9 F9	-1.00 -1.00	9.0 9.0	9.0 9.0	30 30	9 9	0.00	-3.50		E-19 E-20	431 -
B-5	121 - 124	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E-21	439 -
B-6 B-7	125 - 127 128 - 130	F7 F7	-1.00 -1.00	7.0	7.0	24	9 9	0.00	-3.00		E-22 E-23	443 -
B-8	131 - 133	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-24	451 -
<u>В-9</u> В-10	134 - 136 137 - 139	F7 F8	-1.00 -1.00	7.0 8.0	7.0 8.0	24	9	0.00	-3.00		E-26	456
B-11	140 - 143	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.1-27	462 -
B-12 B-14	144 - 148 149 - 153	F9 F9	-1.00	9.0	9.0	30	9	0.00	-3.50		E.8-3	468 -
B-15 B-16	154 - 157 158 - 161	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-4	471 -
B-10 B-17	162 - 165	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-24	477 -
B-18 B-19	166 - 169 170 - 173	F8 F8	-1.00	8.0 8.0	8.0 8.0	24	9	0.00	-3.00		E.8-25 E 8-26	480 -
B-20	174 - 177	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-27	486 -
B-21 B-22	178 - 181 182 - 185	F8 F8	-1.00 -1.00	8.0 8.0	8.0 8.0	24	9 9	0.00	-3.00		F-4 F-24	49
B-23	186 - 189	F8	-1.00	8.0	8.0	24	9	0.00	-3.00			493 -
<u>В-24</u> В-26	<u> 190 - 195</u> 196 - 201	F10 F10	-1.00 -1.00	10.0 10.0	10.0	30 30	9	0.00	-3.50 -3.50		F-1/	534 -
B.2-1	202 - 204	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-18	538 -
B.3-27 B.5-1	205 - 207 208 - 210	F8A F6	-1.00 -1.00	8.0 6.0	8.0 6.0	36 24	9	0.00	-4.00 -3.00		F-19	542 -
B.8-1	211 - 213	F6	-1.00	6.0	6.0	24	9	0.00	-3.00			545
C-2 C-4	214 - 216 217 - 219	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		F-20 F-21	546 -
C-5	220 - 222	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-22	553 -
C-0 C-7	226 - 228	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-23 F-24	556 -
C-8	229 - 231	F6	-1.00	6.0	6.0 6.0	24	9 9	0.00	-3.00		B.7-25.6	560 -
C-10	235 - 237	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		A-24	590 - 600
C-11 C-12	238 - 240 241 - 243	F6 F7	-1.00 -1.00	6.0 7.0	6.0 7.0	24 24	9 9	0.00	-3.00		A-25	60
0.42	244		1.00	E O	5.0	NOT USE	D	0.00	2.50		B-10	603
C-13 C-14	245 246 - 248	F5 F7	-1.00	5.0 7.0	5.0 7.0	24	9	0.00	-2.50 -3.00		B.3-27	604
C-15	249 250 - 252	F6	-1 00	6.0	6.0	NOT USE	D Q	0.00	-3.00		F-4/F-16	606 -
C-16	253 - 255	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		NOTES:	(1) Geopie
C-17 C-18	256 - 258 259 - 261	F6	-1.00	6.0 6.0	6.0 6.0	24 24	9 9	0.00	-3.00			(2) Structu
C-19	262 - 264	F6	-1.00	6.0	6.0	24	9	0.00	-3.00			
C-20 C-21	265 - 267 268 - 270	F6 F6	-1.00	6.0 6.0	6.0 6.0	24 24	9 9	0.00	-3.00			
C-22	271 - 273	F6	-1.00	6.0	6.0	24	9	0.00	-3.00			
C-23 C-24	277 - 280	F8	-1.00	0.0 8.0	0.0 8.0	24 24	9	0.00	-3.00			







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GEOPIER[®]

Dana Point Harbor Parking Structure Dana Point, Ca

GEOPIER® SCHEDULE

	GLA-113	1				0			
		Ten of				Geopler	Tinink Theory	Tanaf	
		Top of Easting				Shaft	Finish Floor	Top of Goopier®	
Goopior®		Fooling	Width	Longth	Thicknoss	Lengin, (ft)	Elevation,	Geoplet®	
Number(s)	Type / Mark		(ft)	(ft)	(in)	(1)	(1)		Notes
		(11)	(11)	(11)	(11)	(1)	(2)	0.00	Notes
281 - 284	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
285 - 288	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
289 - 291	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
292 - 294	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
295 - 297	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
298 - 300	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
301 - 303	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
304 - 306	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
307 - 309	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
310 - 312	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
313					NOT USE	2			
314	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
315 - 317	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
318					NOT USED)			
319 - 321	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
322 - 324	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
325 - 327	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
328 - 330	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
331 - 333	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
334 - 336	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
337 - 339	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
340 - 342	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
343 - 345	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
346 - 349	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
350 - 353	F5x29	-1.00	5.0	29.0	18	9	0.00	-2.50	
354 - 355			0.0	_0.0	NOT USE)	0.00	2.00	
356 - 358	F6	-1.00	60	60	24	9	0.00	-3.00	
359 - 361	F6	-1.00	6 0	6.0	24	9	0.00	-3.00	
362 - 364	FRA	-1.00	8.0	8.0	36	q	0.00	-4.00	
365 - 367	F10v11	-1.00	10.0	10.0	<u>1</u> 8	a	0.00	-5.00	
368 370	E6	1.00	6.0	6.0	24	9	0.00	3.00	
271 272	F7	1.00	7.0	7.0	24		0.00	-5.00	
371-373		-1.00	7.0	7.0	24	9	0.00	-3.00	
374 - 370	F9 F0	-1.00	9.0	9.0	30	9	0.00	-3.50	
379 - 383	F9	-1.00	9.0	9.0		9	0.00	-3.50	
295 299	EQ	1.00	8.0	8.0	24	0	0.00	3.00	
380 302	F8	1.00	8.0	8.0	24	9	0.00	3.00	
393 - 396	F8	-1.00	8.0	8.0	24	g	0.00	-3.00	
397 - 400	F8	-1.00	8.0	8.0	24	g	0.00	-3.00	
401 - 404	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
401 - 404	F9	-1.00	9.0	9.0	30	g	0.00	-3.50	
403 - 403	F0	1.00	0.0	0.0	30	0 0	0.00	-5.50	
415 - 414	F8	-1.00	8.0	8.0	24	g	0.00	-3.00	
410 422	F0	-1.00	0.0	0.0	24	0	0.00	-5.00	
419-422		-1.00	0.0	0.0	24	9	0.00	-3.00	
423 - 420		-1.00	0.0	0.0	24	9	0.00	-3.00	
421 - 430		-1.00	0.0	0.0	24	9	0.00	-3.00	
431 - 434		-1.00	0.0	0.0	24	9	0.00	-3.00	
430 430		-1.00	0.0	0.0	24	9	0.00	-3.00	
439 - 442		-1.00	0.0	0.0	24	9	0.00	-3.00	
443 - 446	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
447 - 450	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
451 - 455	F9	-1.00	9.0	9.0		9	0.00	-3.50	
456	50	4.00	0.0	0.0	NOTUSEL	,	0.00	0.50	
457 - 461	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
402 - 464	F0	-1.00	6.0	6.0	24	9	0.00	-3.00	
400 - 467	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
468 - 4/0	<u> </u>	-1.00	6.0	6.0	24	9	0.00	-3.00	
4/1 - 4/3	F6	-1.00	0.0	0.0	24	9	0.00	-3.00	
4/4 - 4/6	F6	-1.00	6.U	b.U	24	9	0.00	-3.00	
4// - 4/9	<u> </u>	-1.00	6.0	6.0	24	9	0.00	-3.00	
480 - 482	<u>⊢6</u>	-1.00	6.0	6.0	24	9	0.00	-3.00	
483 - 485	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
486 - 490	F14	-1.00	14.0	14.0	48	9	0.00	-5.00	
491	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
492	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
493 - 533			0		NOT USE	J			
534 - 536	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
537					NOT USE	נ			
538 - 540	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
541					NOT USE	נ			
542 - 544	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
545					NOT USE	J			
546 - 549	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
550 - 552	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
<u>553 - 555</u>	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
556 - 558	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
559	F5	-1.00	5. <mark>0</mark>	5.0	18	9	0.00	-2.50	
560 - 589	F24x32	-1.00	24.0	32.0	30	9	0.00	-3.50	
590 - 599	F10x30	-1.00	10.0	30.0	36	9	0.00	-4.00	
600	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
601	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
602	F9A	-1.00	9.0	9.0	48	9	0.00	-5.00	
603	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
604	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
605	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
606 - 655	CONT	-1.00	VARIES	223.5	24	9	0.00	-3.00	

) Geopier elements shall completely penetrate the fill and reach bedrock.) Structure FFE=0.00 ft is equivalent to Site Civil Elevation XX.XX ft.

<u>/2\</u> (26) (560) (561) (562) (567) (566) (568) ┌───5'-10''───ſ (572) (573) (574) (578) (579) (580) <u>←3'-1"</u> 1'-3"(585) (584) (586) F24-32

UPLIFT GEOPIER ELEMENTS.

2

GEOPIER[®] Foundation Company

Project Name: Dana Point Harbor Parking Structure Geopier[®] Modulus Test Schedule Dana Point, Ca Project Location: Project Number: GLA-113

Maximum Geo Geopie

Ram Load Load No. (kips) 3.46 1 11.53 2 23.05 3 34.57 4 46.10 5 57.62 6 69.15 7 80.65 8 92.19 9 103.72 10 69.15 11 45.64 12 22.82 13 3.46

Notes:

Geopier Design Calculations. top of Geopier deflections during the modulus load test. accordance with manufacturers specifications.

6 - A representative of the owner's geotechnical consultant should be present to witness the load test.



GEOPIER® MODULUS TEST SETUP

NOT TO SCALE

GEOPIER[®]

opier Des	sign Stress:	22,010	psf	Modulus Test Location:	Near Boring DH-35					
r Elemer	nt Diameter:	24	in.	Test Geopier Element Shaft Length: 9 ft						
Desig	n Modulus:	300	рсі	Concrete Cap Thickness:	2 ft					
				Total Drill Depth	11 ft					
Geopier Element Stress, (psf)	Percent of Design Stress	Minimum Duration	Maximum Duration	Remarks						
1,101	5.0%	N/A	N/A	seating load						
3,669	16.7%	15 min	60 min							
7,336	33.3%	15 min	60 min							
11,005	50.0%	15 min	60 min							
14,674	66.7%	15 min	60 min							
18,341	83.3%	15 min	60 min							
22,010	100.0%	15 min	60 min							
25,672	116.6%	60 min	240 min							
29,346	133.3%	15 min	60 min							
33,015	150.0%	15 min	60 min							
22,010	100.0%	N/A	N/A	rebound, unload						
14,527	66.0%	N/A	N/A	rebound, unload						
7,263	33.0%	N/A	N/A	rebound, unload						
1,101	5.0%	N/A	N/A	rebound, unload						

1 - The Geopier element to be used in the modulus load testing should be installed in a manner similar to production, at least 4 days prior to testing, so that pore-pressures have adequate time to dissipate. 2 - The modulus load test shall be performed to a stress not less than 150% of the design maximum top-of-pier stress indicated in the

3 - The modulus load test Geopier element shall be installed to a depth of 11 feet below the ground surface with a 2-foot thick unreinforced concrete leveling pad. The modulus load test Geopier shall penetrate fill. 4 - A telltale shall be installed in the bottom one-third of the tested Geopier element. Telltale deflections shall be monitored concurrent with

5 - The modulus load test setup shall be as shown on Geopier Construction Drawing GP0.1. Helical anchors should be installed in

3 GEOPIER® MODULUS TEST SCHEDULE





FOOTING DETAILS







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 $(1) \frac{\text{OVERALL GEOPIER} \text{ LOCATION PLAN}}{1/16" = 1'-0"}$

GEOPIER® LOCATION PLAN NOTES

 FOOTING CONCRETE SHALL BE PLACED DIRECTLY ON TOP OF EXPOSED GEOPIER ELEMENTS.
 ALL EXISTING AND PROPOSED LITUITIES WITHIN AND ADJACENT TO THE PROPOSEI

2. ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSED BUILDING FOOTPRINT SHALL BE FIELD VERIFIED BY THE GENERAL CONTRACTOR AND COORDINATED WITH THE GEOPIER INSTALLER BEFORE GEOPIER ELEMENT INSTALLATION SHALL PROCEED.

3. THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION.

 GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.

LEGEND

Typ. 24" GEOPIER ELEMENT Typ. GEOPIER ELEMENT NUMBER







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STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION.

(1)

TYP. GEOPIER

ELEMENT

NUMBER

4. GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.







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GEOPIER® LOCATION PLAN



GEOPIER[®] LOCATION PLAN NOTES

LEGEND

(1)

TYP. 24"

GEOPIER ELEMENT

TYP. GEOPIER

ELEMENT

NUMBER

 FOOTING CONCRETE SHALL BE PLACED DIRECTLY ON TOP OF EXPOSED GEOPIER ELEMENTS.
 ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSEI

- ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSED BUILDING FOOTPRINT SHALL BE FIELD VERIFIED BY THE GENERAL CONTRACTOR AND COORDINATED WITH THE GEOPIER INSTALLER BEFORE GEOPIER ELEMENT INSTALLATION SHALL PROCEED.
 THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE
- . THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION
- ORIENTATION. 4. GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.



OPIER DPOSED TOR NT DATED AND DNED



Building&Safety: Ryan Rose





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GEOPIER® LOCATION PLAN 1/16" = 1'-0"

<u>GEOPIER@ LOCATION PLAN NOTES</u>

ELEMENTS.

1. FOOTING CONCRETE SHALL BE PLACED DIRECTLY ON TOP OF EXPOSED GEOPIER 2. ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSED BUILDING FOOTPRINT SHALL BE FIELD VERIFIED BY THE GENERAL CONTRACTOR AND COORDINATED WITH THE GEOPIER INSTALLER BEFORE GEOPIER ELEMENT INSTALLATION SHALL PROCEED. 3. THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION. 4. GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED

FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.

LEGEND









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Geopier® is the property of Geopier Foundation Company, Inc. and is protected under U.S. Patent No. 6,425,713; 6,688,815; 6,988,855, 5,249,892; 7,226,246; 6,354,766; 7,004,684; 6,354,768; 7,326,004 and other patents pending.

1 GEOPIER® LOCATION PLAN

<u>GEOPIER</u> LOCATION PLAN NOTES

1. FOOTING CONCRETE SHALL BE PLACED DIRECTLY ON TOP OF EXPOSED GEOPIER ELEMENTS.

2. ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSED BUILDING FOOTPRINT SHALL BE FIELD VERIFIED BY THE GENERAL CONTRACTOR AND COORDINATED WITH THE GEOPIER INSTALLER BEFORE GEOPIER ELEMENT INSTALLATION SHALL PROCEED.

3. THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION

ORIENTATION. 4. GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.

LEGEND





WGI GEOPIER® FOUNDATIONS

Western Grou	ind Improvement. Inc.
2372 Morse A	County of Orange - OC Public Works
Suite 504	OC Development Services
Irvine, CA 926	14 APPROVED
www.western	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 of the planter works of the perment services of the planter the standard 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

August 31, 2020

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

> Re: Calculations Package for a *Geopier[®]* Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The design is based on geotechnical information provided by «GE» in the report dated «GEreportdateTEXT». Structural design loads are as provided by «SE». The following documents are included herein:

- Geopier settlement calculations for square footings
- Geopier settlement calculations for rectangular footings

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Sincerely, Western Ground Improvement, Inc.



Ken Hoevelkamp, P.E. Principal Engineer

Permits: GRD20-0021 ER®

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9.0

12

3.0

9.0

12

GEOPIER[®] Foundation Company

Project:
No.:
Engnr:
Date:

Parameter RAP diameter (in)

Depth to groundwater (ft) Total unit weight of soil (pcf)

Soil frict. angle (degr)

From Table 4.2: RAP cell cap. (kips) Footing bearing press. (ksf)

Max. hor. pressure (psf)

RAP stiffn. modulus (pci)

Soil stiffness modulus (pci)

Dana Point Harbor Parking Structure GLA-113

Engnr:	AMB
Date:	12/11/2019
INPUT PARAMETER VALUE	S:

d

dgw

g f

pmax

Qcell

qall

km 38

Qeb

 $E_1 / c_{\epsilon 1}$

 $\mathsf{E_2}\,/\,\mathsf{c}_{\epsilon 2}$

 $\mathsf{E}_3 \, / \, \mathsf{C}_{\! \epsilon 3}$

 $\mathsf{E}_4 \, / \, \mathsf{c}_{\epsilon 4}$

 $E_5 / c_{\epsilon 5}$

Х 2

Symb Val.

24

125

2

2500

105

300 kg

					Cour	ity of OC D	2 LA R 6 8 8 8 10	6 FOOT 3m6ft19	INGS 567012	c Works es
TOP OF PIER STRESS - SQUARE	FOOTIN	IGS					APP	ROVE		
Parameter	Symb	Equation	F5-1	F6-3	F6-4	F7-3	F7-4	F8A-4	F8-4	
Max Column load (kips)	Р		100	252	252	set of 313	s and 345	cifica315	mus420	kept on the
Required footing width (ft)	Br	sqrt(P/qall)	3.78	6.00	6,00	tions6171	ese 7199	witt 6.71	ritten 65	mission
Selected footing width (ft)	В		5	6	fron6	OC Public	Works,70	DC Develo	pment 8	ervices
Footing bearing pressure	q	P/(B*B)	4.00	7.00	7.00	ange6.43	ity 7.00	stamgig2	of th 6.56	lan
Required No. RAP elems	Nr	P/Qcell	1.0	2.4	2.4	val of 3h	violation	of any 300	vision4.9	any County
Selected No. RAP elems	N		1	3	Ordin	ance or 3	tate law4	4	4	any county
Area replacement ratio	Ra	N*Ag/(B*B)	0.126	0.262	0.349	0.192	0.256	0,196	0.196	
Stiffness ratio	Rs	kg/km	7.9	7.9	7.9	7.9	BUIL 7.9	G OFFIS	7.9	
Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	16.92	19.70	16.22	21.82	19.96	16.51	22.01	
Load at top of GP (kips)	Qg	qg*Ag	53.2	61.9	51.0	68.5	62.7	51.9	69.1	

3.0

9.0

12

3.0

9.0

12

9.0 12

SHAFT LENGTH REQUIREMENTS Depth of Embedment

Trial shaft length (ft)

Drill depth (ft)

Df

Hs

Hdrill

Df+Hs

INPUT PARAMETER VALUES:

INPUT PARAMETER VALUES:

Allowable end-bearing (kips)

E or c_ε for LZ sublyr 1

E or c_{ϵ} for LZ sublyr 2

E or c_{ϵ} for LZ sublyr 3

E or c_{ϵ} for LZ sublyr 4

E or c_{ϵ} for LZ sublyr 5

Calc. settlement to X*B

Parameter

Upper Zone Elastic Parameters						
Parameter	Sym	Val				
Pier Modulus Layer 1 (ksf)	Eg1					
Pier Modulus Layer 2 (ksf)	Eg2					
Pier Modulus Layer 3 (ksf)	Eg3					
Pier Modulus Layer 4 (ksf)	Eg4					
Pier Modulus Layer 5 (ksf)	Eg5					
Soil Modulus Layer 1 (ksf)	Em1					
Soil Modulus Layer 2 (ksf)	Em2					
Soil Modulus Layer 3 (ksf)	Em3					
Soil Modulus Layer 4 (ksf)	Em4					
Soil Modulus Layer 5 (ksf)	Em5					

UPPER ZONE SETTLEMENT - SQ	UARE	FOOTINGS							
Parameter	Symb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	1
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H _{uz2}								
Thickness of UZ sublayer 3 (ft)	H _{uz3}								
Thickness of UZ sublayer 4 (ft)	H_{uz4}								
Thickness of UZ sublayer 5 (ft)	H _{uz5}								
Total UZ Thickness OK?		Huz = Hs + d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E_{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E _{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E_{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E _{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	S _{uz1}	qg/kg or q*l <i>a</i> -vag*H/Ecomp	0.39	0.46	0.38	0.51	0.46	0.38	0.51
Sett. of UZ sublayer 2 (in)	S _{uz2}	q*I <i>J</i> -2*H _{uz2} /E _{comp2}	N/A						
Sett. of UZ sublayer 3 (in)	S _{uz3}	q*I <i>T</i> -3*H _{uz3} /E _{comp3}	N/A						
Sett. of UZ sublayer 4 (in)	S _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A						
Sett. of UZ sublayer 5 (in)	S _{uz5}	q*I <i>T</i> -5*H _{uz5} /E _{comp5}	N/A						
Total Upper Zone Settlement (in)	S _{uz}	S _{uz1} +S _{uz2} +S _{uz3} +S _{uz4} +S _{uz5}	0.39	0.46	0.38	0.51	0.46	0.38	0.51

LOWER ZONE SETTLEMENTS - SQUARE FOOTINGS Symb Val.

		LOWER ZONE OF THE MENTO									
Val.		Parameter	Symb	Equation	F5-1	F6-3	F6-4	F7-3	F7-4	F8A-4	F8-4
0.0		Dpth to bottm of LZ from ftg (ft)	X*B	X*B	10	12	12	14	14	16	16
800		Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00	11.00	11.00	11.00	11.00
2000)	Lower zone thickness (ft)	H _{lz}	H2b-HIz	-1	1	1	3	3	5	5
2000)	Thickness of LZ sublayer 1(ft)	H _{lz1}		0	1	1	3	3	5	5
2000)	Thickness of LZ sublayer 2 (ft)	H _{lz2}								
2000)	Thickness of LZ sublayer 3 (ft)	H _{Iz3}								
2		Thickness of LZ sublayer 4 (ft)	H _{lz4}								
		Thickness of LZ sublayer 5 (ft)	H _{lz5}								
		Total LZ thickness ok?			No LZ	ok	ok	ok	ok	ok	ok
		E or c _ε for LZ sublyr 1	E ₁ / c _{ε1}	E (ksf) or c _ε	800	800	800	800	800	800	800
		E or c_{ϵ} for LZ sublyr 2	E ₂ / c _{ε2}	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		E or c _ε for LZ sublyr 3	E ₃ / c _{ε3}	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		Initial stress for sublyr 1 (ksf)	P' ₀₁		1.188	1.220	1.220	1.282	1.282	1.345	1.345
		Initial stress for sublyr 2 (ksf)	P'02		1.188	1.251	1.251	1.376	1.376	1.501	1.501
		Initial stress for sublyr 3 (ksf)	P'03		1.188	1.251	1.251	1.376	1.376	1.501	1.501
		Initial stress for sublyr 4 (ksf)	P'04		1.188	1.251	1.251	1.376	1.376	1.501	1.501
		Initial stress for sublyr 5 (ksf)	P'05		1.188	1.251	1.251	1.376	1.376	1.501	1.501
		Ftg stress on sublyr 1 (ksf)	ΔP1	q*l	0.36	0.82	0.82	0.85	0.93	0.72	0.96
		Ftg stress on sublyr 2 (ksf)	$\Delta P2$	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
		Ftg stress on sublyr 3 (ksf)	ΔP3	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
		Ftg stress on sublyr 4 (ksf)	ΔP4	a*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
		Ftg stress on sublyr 5 (ksf)	ΔP5	a*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
		Sett. of LZ sublayer 1 (in)	S _{Iz1}	DP1*Hiz1/E1	0.00	0.01	0.01	0.04	0.04	0.05	0.07
		Sett. of LZ sublayer 2 (in)	S _{Iz2}	DP2*Hiz2/E2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sett. of LZ sublayer 3 (in)	S _{Iz3}	DP3*HIz3/E3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sett. of LZ sublayer 4 (in)	S _{Iz4}	DP4*HIz4/E4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sett. of LZ sublayer 5 (in)	S _{Iz5}	DP5*HIz5/E5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total lower zone sett. (in)	S _{Iz}	$s_{lz1}+s_{lz2}+s_{lz3}+s_{lz4}+s_{lz5}$	0.0	0.0	0.0	0.0	0.0	0.1	0.1
		Total LIZ + LZ settlement (in)	e e		0.4	0.5	0.4	0.5	0.5	0.4	0.6

Page 1 of 3

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Permits: GRD20-0021 ER®

G

County of QLARE FOOTINGSic Works

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GEOPIER[®] Foundation Company

Project:	
No.:	
Engnr:	
Date:	

Parameter RAP diameter (in)

Dana Point Harbor Parking Structure GLA-113

Engnr: AMB								
Date:	e: 12/11/2019							
INPUT PARAMETER VAL	UES:							
Parameter	Symb	Val.						

d

105

300 kg

dgv

g

pmax

Qcell

qall

km 38

 $E_1 / c_{\epsilon 1}$

 $\mathsf{E_2}\,/\,\mathsf{c}_{\epsilon 2}$

 $E_3 / c_{\epsilon 3}$

 E_4 / $c_{\epsilon 4}$

 $E_5 / c_{\epsilon 5}$

9								Jevelo	pmenty	Servic	es		
	TOP OF PIER STRESS - SQUARE FOOTINGS							APPROVED					
Val.	Parameter	Symb	Equation	F9A-4	F9-4	F9-5	F10-5	F10-6	F11-6	F14-5			
24	Max Column load (kips)	Р		315	420	525	set of 525	1s an 630	CIIIC 630	s mu 525	kept on the		
্ৰ	Required footing width (ft)	Br	sqrt(P/qall)	6.71	7.75	8,66	tions8166	iese 9149	s with 9,49	vritte8.66	mission		
125	Selected footing width (ft)	В		9	9	fron9	OC Public	Works,0	OC Develo	pment13e	rvices		
-26	Footing bearing pressure	q	P/(B*B)	3.89	5.19	6.48	ange5.25	nty 6.30	stame 29	of the 568	lan		
2500	Required No. RAP elems	Nr	P/Qcell	3.0	4.0	5.0	val of the	violat	of any 60	vision 5.8	any County		
	Selected No. RAP elems	N		4	4	Order	ance or 5	tate law6	6	5	,		
105	Area replacement ratio	Ra	N*Ag/(B*B)	0.155	0.155	0.194	0.157	0,188	aba 9156	0.080			
7	Stiffness ratio	Rs	kg/km	7.9	7.9	7.9	7.9	BUIL DIR	G OFFIC	7.9			
300	Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	14.83	19.78	21.89	19.90	21.63	19.82	13.62			
38	Load at top of GP (kips)	Qg	qg*Ag	46.6	62.1	68.8	62.5	67.9	62.3	42.8			

SHAFT LENGTH REQUIREMENTS

Depth of Embedment Df 3.0 3.0 3.0 3.0 Trial shaft length (ft) Hs 9.0 9.0 9.0 9.0 9.0 Df+Hs 12 Drill depth (ft) Hdrill 12 12 12 12

INPUT PARAMETER VALUES:

INPUT PARAMETER VALUES:

Allowable end-bearing (kips)

E or c_ε for LZ sublyr 1

E or c_{ϵ} for LZ sublyr 2

E or c_{ϵ} for LZ sublyr 3

E or c_{ϵ} for LZ sublyr 4

E or c_{ϵ} for LZ sublyr 5

Calc. settlement to X*B

Parameter

Depth to groundwater (ft) Total unit weight of soil (pcf),

RAP cell cap. (kips) Footing bearing press. (ksf) RAP stiffn. modulus (pci)

Soil stiffness modulus (pci)

Soil frict. angle (degr) Max. hor. pressure (psf)

From Table 4.2:

Upper Zone Elastic Parameters						
Parameter	Sym	Val				
Pier Modulus Layer 1 (ksf)	Eg1					
Pier Modulus Layer 2 (ksf)	Eg2					
Pier Modulus Layer 3 (ksf)	Eg3					
Pier Modulus Layer 4 (ksf)	Eg4					
Pier Modulus Layer 5 (ksf)	Eg5					
Soil Modulus Layer 1 (ksf)	Em1					
Soil Modulus Layer 2 (ksf)	Em2					
Soil Modulus Layer 3 (ksf)	Em3					
Soil Modulus Layer 4 (ksf)	Em4					
Soil Modulus Layer 5 (ksf)	Em5					

JPPER ZONE SETTLEMENT - SQUARE FOOTINGS									
Parameter	Symb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	1
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H_{uz2}								
Thickness of UZ sublayer 3 (ft)	H _{uz3}								
Thickness of UZ sublayer 4 (ft)	H _{uz4}								
Thickness of UZ sublayer 5 (ft)	H _{uz5}								
Total UZ Thickness OK?		Huz = Hs + d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E _{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E _{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E_{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E _{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	S _{uz1}	qg/kg or q*l∂-vag*H/Ecomp	0.34	0.46	0.51	0.46	0.50	0.46	0.32
Sett. of UZ sublayer 2 (in)	S _{uz2}	q*I <i>u</i> -2*H _{uz2} /E _{comp2}	N/A						
Sett. of UZ sublayer 3 (in)	S _{uz3}	q*I <i>T</i> -3*H _{uz3} /E _{comp3}	N/A						
Sett. of UZ sublayer 4 (in)	S _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A						
Sett. of UZ sublayer 5 (in)	S _{uz5}	q*I0-5*H _{uz5} /E _{comp5}	N/A						
Total Upper Zone Settlement (in)	S _{uz}	S _{uz1} +S _{uz2} +S _{uz3} +S _{uz4} +S _{uz5}	0.34	0.46	0.51	0.46	0.50	0.46	0.32

LOWER ZONE SETTLEMENTS - SQUARE FOOTINGS

		EGMER EGNE GETTEEMENTO	o a o Airi								
Symb	Val.	Parameter	Symb	Equation	F9A-4	F9-4	F9-5	F10-5	F10-6	F11-6	F14-5
Qeb	0.0	Dpth to bottm of LZ from ftg (ft)	X*B	X*B	18	18	18	20	20	22	28
E ₁ / c _{ε1}	800	Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00	11.00	11.00	11.00	11.00
E ₂ / c _{ε2}	2000	Lower zone thickness (ft)	H _{lz}	H2b-HIz	7	7	7	9	9	11	17
E ₃ / c _{ε3}	2000	Thickness of LZ sublayer 1(ft)	H _{lz1}		5	5	5	5	5	5	5
$E_4 / c_{\epsilon 4}$	2000	Thickness of LZ sublayer 2 (ft)	H _{lz2}		2	2	2	4	4	5	5
E ₅ / c _{ε5}	2000	Thickness of LZ sublayer 3 (ft)	H _{Iz3}							1	5
Х	2	Thickness of LZ sublayer 4 (ft)	H_{lz4}								2
		Thickness of LZ sublayer 5 (ft)	H _{lz5}								
		Total LZ thickness ok?			ok						
		E or c _ε for LZ sublyr 1	E ₁ / c _{ε1}	E (ksf) or c _ε	800	800	800	800	800	800	800
		E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		E or c _c for LZ sublyr 3	E ₃ / c _{ε3}	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c _e	2000	2000	2000	2000	2000	2000	2000
		E or c_{ϵ} for LZ sublyr 5	E ₅ / c _{ε5}	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
		Initial stress for sublyr 1 (ksf)	P' ₀₁		1.345	1.345	1.345	1.345	1.345	1.345	1.345
		Initial stress for sublyr 2 (ksf)	P'02		1.564	1.564	1.564	1.627	1.627	1.658	1.658
		Initial stress for sublyr 3 (ksf)	P'03		1.627	1.627	1.627	1.752	1.752	1.846	1.971
		Initial stress for sublyr 4 (ksf)	P'04		1.627	1.627	1.627	1.752	1.752	1.877	2.190
		Initial stress for sublyr 5 (ksf)	P'05		1.627	1.627	1.627	1.752	1.752	1.877	2.253
		Ftg stress on sublyr 1 (ksf)	ΔP1	q*l	0.70	0.93	1.16	1.12	1.34	1.29	0.95
		Ftg stress on sublyr 2 (ksf)	$\Delta P2$	q*l	0.47	0.62	0.78	0.69	0.82	0.77	0.59
		Ftg stress on sublyr 3 (ksf)	ΔP3	q*l	0.42	0.56	0.70	0.57	0.68	0.59	0.40
		Ftg stress on sublyr 4 (ksf)	$\Delta P4$	q*l	0.42	0.56	0.70	0.57	0.68	0.56	0.31
		Ftg stress on sublyr 5 (ksf)	$\Delta P5$	q*l	0.42	0.56	0.70	0.57	0.68	0.56	0.29
		Sett. of LZ sublayer 1 (in)	S _{Iz1}	DP1*HIz1/E1	0.05	0.07	0.09	0.08	0.10	0.10	0.07
		Sett. of LZ sublayer 2 (in)	S _{Iz2}	DP2*HIz2/E2	0.01	0.01	0.01	0.02	0.02	0.02	0.02
		Sett. of LZ sublayer 3 (in)	S _{IZ3}	DP3*HIz3/E3	0.00	0.00	0.00	0.00	0.00	0.00	0.01
		Sett. of LZ sublayer 4 (in)	S _{Iz4}	DP4*HIz4/E4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sett. of LZ sublayer 5 (in)	S _{IZ5}	DP5*HIz5/E5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Total lower zone sett. (in)	SIZ	S _{IZ1} +S _{IZ2} +S _{IZ3} +S _{IZ4} +S _{IZ5}	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Total UZ + LZ settlement (in)	S		0.4	0.5	0.6	0.6	0.6	0.6	0.4

GEOPIER[®]

CoREGTANGELIAR FOOTINGSic Works

GEOPIER[®] Foundation Company

Project:	
No.:	
Engnr:	
Date:	

Dana Point Harbor Parking Structure GLA-113

AMB 12/11/2019

INPUT PARAMETER VALUES:								
Parameter	Symb	Val.						
RAP diameter (in)	d	24						
Depth to groundwater (ft)	dgw	~5						
Total unit weight of soil (pcf)	g	125						
Soil frict. angle (degr)		26						
Max. hor. pressure (psf)	pmax	2500						
From Table 4.2:								
RAP cell cap. (kips)	Qcell	105						
Footing bearing press. (ksf)	qall	7						
RAP stiffn. modulus (pci)	kg	300						
Soil stiffness modulus (pci)	km	38						

							Never	3mente	servic	es
TOP OF PIER STRESS - RECTAN	IGULAR	FOOTINGS					APP	ROVE	D	
Parameter	Symb	Equation	F10x11	F10x30	F24x32					
Max Column load (kips)	Р		315	1050	2685	set of plai	is and sp	ecification	is must be	kept on the
Selected footing width (ft)	В		10.00	10.00	24,00	tions to t	nese plan	s without	written pe	mission
Required footing length (ft)	Lr		4.50	15.00	15:98	OC Publi	Works, (DC Devel	opment Se	ervices
Selected footing length (ft)	L		11.00	30.00	32.00	ange Cou	nty. The	stamping	of these p	lan Lor be an
Footing bearing pressure	q	P/(B*L)	2.86	3.50	3,50	oval of the	violation	of any pr	visions o	any County
Required No. RAP elems	Nr	P/Qcell	3.0	10.0	25.6	ance or S	tate law.	in 15		,,
Selected No. RAP elems	N		3	10	30		Hadi T	abatabae		
Area replacement ratio	Ra	N*Ag/(B*L)	0.086	0.105	0.123			G OFFIC		
Stiffness ratio	Rs	kg/km	7.9	7.9	7.9		DOILDIN			
Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	14.21	16.05	14.95					
Load at top of GP (kips)	Qg	qg*Ag	44.6	50.4	47.0					

SHAFT LENGTH REQUIREMENTS

Depth of Embedment Df 3.0 3.0 3.0 Trial shaft length (ft) Hs 9.0 9.0 9.0 9.0 Drill depth (ft) Hdrill Df+Hs 12 12 12 12

INPUT PARAMETER VALUES:

Upper Zone Elastic Parameter Parameter	s Sym	Va
Pier Modulus Layer 1 (ksf)	Eg1	
Pier Modulus Layer 2 (ksf)	Eg2	
Pier Modulus Layer 3 (ksf)	Eg3	
Pier Modulus Layer 4 (ksf)	Eg4	
Pier Modulus Layer 5 (ksf) Soil Modulus Layer 1 (ksf)	Eg5 Em1	
Soil Modulus Layer 2 (ksf)	Em2	
Soil Modulus Layer 3 (ksf)	Em3	
Soil Modulus Layer 4 (ksf)	Em4	
Soil Modulus Layer 5 (ksf)	Em5	

UPPER ZONE SETTLEMENT - RE	CIANG	ULAR FOOTINGS							
Parameter	Symb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H_{uz2}								
Thickness of UZ sublayer 3 (ft)	H _{uz3}								
Thickness of UZ sublayer 4 (ft)	H_{uz4}								
Thickness of UZ sublayer 5 (ft)	H_{uz5}								
Total UZ Thickness OK?		Huz = Hs +d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E_{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E _{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E_{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E_{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	S _{uz1}	qg/kg or q*I σ -vag*H/Ecomp	0.33	0.37	0.35				
Sett. of UZ sublayer 2 (in)	S _{uz2}	q*I <i>o</i> -2*H _{uz2} /E _{comp2}	N/A	N/A	N/A				
Sett. of UZ sublayer 3 (in)	S _{uz3}	q*I <i>T</i> -3*H _{uz3} /E _{comp3}	N/A	N/A	N/A				
Sett. of UZ sublayer 4 (in)	S _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A	N/A	N/A				
Sett. of UZ sublayer 5 (in)	S _{uz5}	q*I σ -5*H _{uz5} /E _{comp5}	N/A	N/A	N/A				
Total Upper Zone Settlement (in)	S _{uz}	S _{uz1} +S _{uz2} +S _{uz3} +S _{uz4} +S _{uz5}	0.33	0.37	0.35				

INPUT PARAMETER VALUES:

Parameter	Symb	Val.
Allowable end-bearing (kips)	Qeb	0.0
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	2000
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	2000
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	2000
Calc. settlement to X*B	Х	2

LOWER ZONE SETTLEMENTS							
Parameter	Symb	Equation	F10x11	F10x30	F24x32		
Dpth to bottm of LZ from ftg (ft)	X*B	X*Beq	21.0	34.6	55.4		
Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00		
Lower zone thickness (ft)	H _{lz}	H2b-Hlz	10	23.7	44.5		
Thickness of LZ sublayer 1(ft)	H _{lz1}		5	5	5		
Thickness of LZ sublayer 2 (ft)	H _{lz2}		5	5	20		
Thickness of LZ sublayer 3 (ft)	H _{Iz3}			5	19.5		
Thickness of LZ sublayer 4 (ft)	H _{lz4}			5			
Thickness of LZ sublayer 5 (ft)	H _{lz5}			3.7			
Total thickness ok?			ok	ok	ok		
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	E (ksf) or c _ε	800	800	800		
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	E (ksf) or c_{ϵ}	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	E (ksf) or c_{ϵ}	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c_{ϵ}	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	E (ksf) or c_{ϵ}	2000	2000	2000		
Initial stress for sublyr 1 (ksf)	P' ₀₁		1.345	1.345	1.345		
Initial stress for sublyr 2 (ksf)	P' ₀₂		1.658	1.658	2.127		
Initial stress for sublyr 3 (ksf)	P' ₀₃		1.814	1.971	3.364		
Initial stress for sublyr 4 (ksf)	P' ₀₄		1.814	2.284	3.974		
Initial stress for sublyr 5 (ksf)	P'05		1.814	2.556	3.974		
Ftg stress on sublyr 1 (ksf)	ΔP1	q*l	0.66	1.63	2.50		
Ftg stress on sublyr 2 (ksf)	ΔP2	q*l	0.39	1.08	1.29		
Ftg stress on sublyr 3 (ksf)	ΔP3	q*l	0.31	0.74	0.53		
Ftg stress on sublyr 4 (ksf)		q^l	0.31	0.53	0.38		
Sett of LZ sublever 1 (in)	ΔP5	q I	0.31	0.42	0.38		
Sett. of LZ sublayer 1 (iii)	Sizi	DP1*HIZ1/E1	0.05	0.12	0.19		
Sett. of LZ sublayer 2 (in)	S _{lz2}	DP2*HIZ2/E2	0.01	0.03	0.15		
Sett. of LZ Sublayer 3 (III)	S _{IZ3}	DP3"HIZ3/E3	0.00	0.02	0.00		
Sett. of LZ sublayer 4 (In)	S _{IZ4}	DP4*HIz4/E4	0.00	0.02	0.00		
Sett. of LZ sublayer 5 (in)	S _{lz5}	DP5*HIz5/E5	0.00	0.01	0.00		
I otal lower zone sett. (in)	S _{lz}	s _{lz1} +s _{lz2} +s _{lz3} +s _{lz4} +s _{lz5}	0.1	0.2	0.4		
Total UZ + LZ settlement (in)	S		0.4	0.6	0.8		

1/8/2021

WGI GEOPIER® FOUNDATIONS

August 31, 2020

Western Grou	County of Orange - OC Public Works no Improvement Inc. OC Development Services
2372 MOISE A	APPROVED
Suite 504	This set of plans and specifications must be kept on the
Irvine, CA 926	[4] 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
www.western	groundimproventert.comovisions of any County Ordinance or State law.
	Hadi Tabatabaee BUILDING OFFICIAL

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

> Re: Quality Control Package for a *Geopier®* Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The following documents are included herein:

• Geopier Quality Control Package

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Sincerely, Western Ground Improvement, Inc.



Ken Hoevelkamp, P.E. Principal Engineer

WGI GEOPIER® FOUNDATIONS

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

County of Orange - OC Public Works **OC Development Services** APPROVED

1/8/2021

County

t on the QUALITY CONTROL PACKAGE FOR GEOPIER FOUNDATIONS (Copy to be provided to Owner's QA Representative) stamping of these plan T be held to permit or be an

Project:	<u>Dana Point Harbor Parking Structure</u> <u>Dana Point, California</u>	Hadi Tabatabaee BUILDING OFFICIAL
Project Number:	<u>GLA-113</u>	
Geopier Designer: Mobile: E-Mail:	<u>Ken Hoevelkamp, P.E.</u> 949.677.6553 <u>ken@westerngroundimprovement.com</u>	
Geotechnical Engineer: Contact: Phone:	<u>GMU Geotechnical, Inc.</u> Dave Atkinson 949.546.0085	
Structural Engineer: Contact: Phone: Referenced Drawings: Date of Drawings:	<u>Culp and Tanner</u> <u>Rory Rottshalk</u> <u>530.895.3518</u> <u>S2.01</u> 12/03/19	

Anticipated Geotechnical Conditions:

The subsurface conditions generally consist of soft to very stiff lean clay fill and medium dense to very dense silty sand fill underlain by medium stiff to very stiff lean clay and medium dense to very dense sand overlying sandstone and siltstone (Capistrano Formation). Groundwater was encountered 12 to 17 feet below existing grade.

Potential Anomalies:

None.

Materials to be Encountered at Bottom of Shaft:

Medium stiff to very stiff clay and/or medium dense to very dense sand.

Other Items:

Piers should completely penetrate the fill and reach bedrock

ATTACHMENTS -

GEOTECHNICAL INFORMATION GEOPIER TEST SCHEDULES

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 Tabatabase BUILDING OFFICIAL

GEOTECHNICAL INFORMATION

The attached boring logs have been prepared by others and are included solely for reference purposes. The boring logs should be used for information only and are not intended to represent geotechnical recommendations for this project. The project geotechnical report should be reviewed in its entirety for more information.


Building&Safety: Ryan Rose

1/8/2021

Pro	ject iect	: D	ana Point Harbor, Commercia	l Component		Log	Approval: Ge	eotec D20-0		B DF	s 1-2	9	
Pro	ject	Nu	mber: 17-206-02				County	of O	of 2 rang	e)+O	C Pi	ıblic	Works
Date Drille Drillir	(s) d	9/1	3/2018	Logged WD By Drilling 2R Drill	ling		Checked By Total Dept	plans files.	APR and sp t is unly	ecificatio	ED ns mu nake a	st be ka	s ept on the inges or
Meth Drill F	od Rig	CM	IE 75	Contractor Diameter(s)	ing		of a Drill Ho from OC P Approxide	eo the ublic \ Infact	se plan Vorks, 9. The ALL N	s without OC Deve stamping	g of the	in perm int Servicese pla	ission rices n r be an
Grou [Elev	ndwa ation]	ter D , feel	epth 16.0 [-2.7]	Sampling Method(s) Cal-mod	d sampler SPT, and I	with 6-inch bulk	Driving Me	or Sta Na	te law tive a Hadi T	of any p nd Qui abataba	rovisio ickre	ons of a ote	ny County
Rema	arks		1		1		and Drop	_	AL		imer		
ELEVATION, feet	DEPTH, feet	SRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION A DESCRIPTION	ND	SAMPLE	NUMBER DF BLOWS	DRIVING VEIGHT, Ibs	AOISTURE	NEIGHT, pcf	ADDITIONAL TESTS
		==			Asphalt C	concrete (approximate	ely 3	0	20		20		
10 -	-		ARTIFICIAL FILL (Qaf) Subrounded gravel up to 4"		Aggregate SILTY SA brown, sli medium g	e Base (approximatel ND (SM), brown gray ghtly moist, medium o rained, some gravel	y 3 inches) , yellowish Jense,	1 [1] ¹ 1 [5 10 12	140			
	-5		Subrounded gravel 1 to 6"		SANDY C hard, fine gravel	CLAY (CL), dark brow to medium grained, s	n, moist, some	-	50/0.5'	' 140	6	108	
5-	-		Rounded to subrounded gravel and cob up to 7"	bles	brownish	gray, moist, stiff		, 111111111111111111111111111111111111	3 4 5	140			
	- 10		Minor fine grained sand						4 6 7	140	29	92	
0-	-		Scattered gravel		gray and fine grain	orange brown, moist, ed sand	firm to stiff,	1	3 4 4	140			
	- 15 -		MARINE DEPOSITS (Qm) Rounded to subrounded gravel up to 3"		SANDY C medium g	LAY (CL); gray, mois rained sand	t, firm, — — ⊊	-	2 3 4	140	23	100	
-5 -	-		CAPISTRANO FORMATION (Tc)		SILTSTO overlying brown and dense, fin	NE (ML), gray, moist SANDSTONE (SP), (d dark orange brown, e to medium grained	, hard brange wet, very	-					



Drill Hole DH-29

Project Dama Point Harbor, Commercial Component Project Number: 17:26-02 Dog Of Differ Harbor Data ¹⁰							Building&Sat	fety:	Ryan	Rose			1/8/202
Perjoct Number: 17-286-02 Image: State one is thinly bedded with while moties. CLASSIFICATION ADD DESCRIPTION ORIENTATION DATA Image: State one is thinly bedded with while moties. EAADSTYCE [SP and approximate on countered at 19 feet 0001 140 21 108 Image: State one is thinly bedded with while moties. EAADSTYCE [SP and approximate on countered at 19 feet 100 140 21 108	Project Project	: D	ana Point Harbor, Commercial Co ation: Dana Point Harbor Drive	omponent		Log	of Diffi	2 1 -	101 6	B DF	s 1-2	9	
Bit C.C. Comparing Systems Bit CLASSIFICATION AND DESCRIPTION ORIENTATION DATA The set of	Project	Nur	nber: 17-206-02				County	of C	of 2 Drang	e)+O	C Pi	ıblic	Works
and big big big big big big big big big big							0			pmen ROM	t Sei	rvice	S DATA
10 Internedded SIT STONE and Sold" 140 21 100 16 SkNDSTONE (GP and ML), pale brown, der granned Sold" 140 21 100 30 Sittstone is thinly bedded with white mottles. Sittstone (GP and ML), pale brown, der granned 16 140 30 Sittstone is thinly bedded with white mottles. Sittstone (GP and ML), pale brown, der granned 16 140 16 Total Depth art Strice (GP and ML), pale brown, der granned 16 140 100 16 Total Depth art Strice (GP and ML), pale brown, der granned 16 140 16 Total Depth art Strice (GP and ML), pale brown, der granned 16 140 16 Total Depth art Strice (GP and ML), pale brown, der granned 16 140 16 Total Depth art Strice (GP and ML), pale brown, der granned 16 140 16 Total Depth art Strice (GP and ML), pale brown, depth ar	ELEVATION, feel DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CI	ENGINEERING ASSIFICATION DESCRIPTION	This set of job at all tim Netterations of Orange (specificatio approval of Ordinance	plan nes. to the state of the s	s and sp It is unl dese par Wars hyll the histor at 210 Hagi 1	ecificatio awful (or s witteu SooDeve stamin o Doone oranw p o abput to a	NOIS THE PARTY IN THE PARTY INTERPARTY IN THE PARTY INTERPARTY INTERP	st person and a second	ept on the anges or hissen vices or backson hydrogenty V
10 15 15 SubJSTONE (SP and ML), pale brown, dark gray, most, very demee, fine grained, overy most, very demee. The grained, overy most, very demee, the grained, over most, very demee, the								11111	50/5"	IG OFFI	CIAL		—
-18- -30 Sitistone is thinly bedded with white mottles. SANDSTONE (SP), gray, wel, dense, fine 16 140 -20 Sitistone is thinly bedded with white mottles. SANDSTONE (SP), gray, wel, dense, fine 16 140 -21 Fride overlying Sit ISTONE (ML), dark 16 140 17 -21 Fride overlying Sit ISTONE (ML), dark 16 140 17 -21 Fride overlying Sit ISTONE (ML), dark 16 140 17 -21 Fride overlying Sit ISTONE (ML), dark 16 140 17 -22 Fride overlying Sit ISTONE (ML), dark 16 16 16 17 -22 Fride overlying Sit ISTONE (ML), dark Fride overlying Sit ISTONE (ML), dark 16 16 16 -23 Fride overlying Sit ISTONE (ML), dark Fride overlying Sit ISTONE (ML), dark 16 16 16 16 -24 Fride overlying Sit ISTONE (ML), dark Fride overlying Sit ISTONE (ML), dark 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16<	-10 - - - 25 -				Interbedd SANDST dark gray dense/ha	ed SILTSTONE and ONE (SP and ML), p ish brown and gray, rd, fine grained			50/4"	140	21	106	
30 Sitistone is thinly bedded with white mottles. SANDSTORE (SP) name, wet, dense, fine, life,	-15 - -							-					
Total Depth = 31.5 feet Groundwater encountered at 16 feet Image: Comparison of the sector of th	- 30		Siltstone is thinly bedded with white mottles,		SANDST grained, o brownish	ONE (SP), gray, wet overlying SILTSTON black, moist, very s	, dense, fine E (ML), dark tiff	11111111111111111111111111111111111111	16 16 21	140			
GMU					Total Dep Groundwa	oth = 31.5 feet ater encountered at	16 feet)ri				1-2	9
CONTRACTOR AL INC.		GN)ri	нн	ole		1-2	9

DH_REV3 17-206-02 (UPDATED ELEV.); GPJ GMULAB.GPJ 4/4/19

Building&Safety: Ryan Rose

1/8/2021

Pro	ject	Loc Nur	ation: Dana Point Harbor Dr nber: 17-206-02	IVe				County	of O	of 2 rang	e - O pmen	C Pi t Sei	Iblic	Works
Date Drille	(s) ed	9/14	4/2018	Logged By	WD			Checked By	$\overline{\mathcal{A}}$	APR	Reve	ED.	×2	
Drillir Meth	ng Iod	Hol	low Stem Auger	Drilling Contractor	2R Drill	ing		TotalaDepti ofaDrilleoi	plans fles. to the	and sp It is un- se plan Norks	6.0 fee	make a writte	any cha n perm	spt on the nges or ission
Drill I Type	Rig	СМ	E 75	Diameter(s) of Hole, inch	nes 8			Approxisu Elevation	n fac ft M	ALL N	stampin OT be he of any p	g of th ald to p rovisio	ese pla bermit o	n ir be an inv County
Grou [Elev Rem	indwa vation arks	iter Do], feet	^{epth} 18.0 [-6.7]	Sampling Method(s)	Cal-moo sleeve,	d sampler SPT, and b	with 6-inch oulk	Driving Me	or Sta Na	te law tive a Hadi 1 IUILDIN AL	nd Qu abataba IG OFFIC		ete	
									SA	MPLE	DATA	Т	EST D	ΑΤΑ
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIEN D.	ITATION ATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	AND	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
		==	-			Asphalt C inches)	oncrete (approximat	ely 4.5						
10 -	-		ARTIFICIAL FILL (Qaf)			Aggregate SILTY SA moist, me	Base (approximate ND with GRAVEL (S dium dense, fine gra	ly 4 incheş∕ M), brown, ined	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 6 6	140			
5-	- 5					SANDY C very stiff	LAY (CL), grayish bi	rown, moist,	-	20 26 12	140	19		
	-		Scattered gravel up to 4"			brown, mo	bist, fine to medium (grained		3 8 9	140			
- 0 -	-		MARINE DEPOSITS (Qm) orange brown staining			SANDY C stiff to ver	LAY (CL); gray, sligl y stiff, medium grain	ntly moist, ed sand	-	8 11 14	140	13		
ED ELEV.).GPJ GMUL	-					moist, ver	y stiff, fine grained s	and		6 8 10	140			
DH_KEV3 17-206-02 (UPDATE 5	- 15		CAPISTRANO FORMATION (Tc) Scattered subrounded gravel up to 4"			SANDST(dense, me	DNE (SP), gray, wet, edium to fine grained	medium I	-	3 6 8	140			
								C	Dri	ΠН	ole	Dŀ	1-34	4

GEOTECHNICAL, INC.

roi	act		ana Point Harbor, Commorcial Co	mnonent			Approval: Ge	otec	chnical	Report	s		
roje	ect	Loc	ana Form narbor, commercial Co ation: Dana Point Harbor Drive	mponent		Log	orbrit	20-	Юlе) DF	1-3	4	
roi	ect	Nun	nber: 17-206-02				County	t _f 2	$\frac{0}{100}$	e - 00	2 Pi	blic	Wor
, oj		ITUI					Otanty		evelo	pmen	t Sei	vice	s
		0						SA	MPP	BOW	Dт	EST	DATA
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	DEP'	GRA		DAIN		DECONT HON	approval of Ordinance	S AT N		o ∑obe⊇he o Mantu p	NON NON		any
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-	-25		Sand is fine grained						30	140	23	101	
			Ĵ						50/4"				
					Total Dep Groundwa	th = 26 feet	18 feet						
					ciounant								
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S													-

Building&Safety: Ryan Rose

1/8/2021

Proj Proj	ect: ect	Dana Locatio	Point Harbor, Commercia on: Dana Point Harbor Dr	l Co ive	omponent		Log	of Diff		61e	DF	1-3	5	
Proj	ect	Numbe	r: 17-206-02					County o	of O C D	rang evelo	e - OC pmen	C Pu t Ser	iblic vice:	Work s
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GEOTECHNICAL, INC.

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GEOTECHNICAL, INC.

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.

GEOPIER TEST SCHEDULES

GEOPIE	R [®] Four	ndation C	ompany			Building&Safety: Ryan Rose 1/8/202 Approval: Geotechnical Reports Permits: GRD20-0021 County of Orange - OC Public Works OC Development Services
Project Na	ame:	Dana Poin	t Harbor Park	ing Structure		A This set of plans and specifications, must be kept on the
Project Lo	ocation:	Dana Poin	t, Ca			Geopier Modulus Test Schedule, changes or alterations to these place without writing permission
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Ι	Maximum G	eopier Des	sign Stress:	22,010	psf	Modulus Test Location, Har Near Boring DH-35
	Geop	oier Elemer	nt Diameter:	24	in.	Test Geopier Element Shaft Length: 9 ft
		Desig	n Modulus:	300	рсі	Concrete Cap Thickness: 2 ft
Load No.	Ram Load, (kips)	Geopier Element Stress, (psf)	Percent of Design Stress	Minimum Duration	Maximum Duration	Remarks
	3.46	1,101	5.0%	N/A	N/A	seating load
1	11.53	3,669	16.7%	15 min	60 min	
2	23.05	7,336	33.3%	15 min	60 min	
3	34.57	11,005	50.0%	15 min	60 min	
4	46.10	14,674	66.7%	15 min	60 min	
5	57.62	18,341	83.3%	15 min	60 min	
6	69.15	22,010	100.0%	15 min	60 min	
7	80.65	25,672	116.6%	60 min	240 min	
8	92.19	29,346	133.3%	15 min	60 min	
9	103.72	33,015	150.0%	15 min	60 min	
10	69.15	22,010	100.0%	N/A	N/A	rebound, unload
11	45.64	14,527	66.0%	N/A	N/A	rebound, unload
12	22.82	7,263	33.0%	N/A	N/A	rebound, unload
13	3.46	1,101	5.0%	N/A	N/A	rebound, unload

Notes:

1 - The Geopier element to be used in the modulus load testing should be installed in a manner similar to production, at least 4 days prior to testing, so that pore-pressures have adequate time to dissipate.

2 - The modulus load test shall be performed to a stress not less than 150% of the design maximum top-of-pier stress indicated in the Geopier Design Calculations.

3 - The modulus load test Geopier element shall be installed to a depth of 11 feet below the ground surface with a 2-foot thick unreinforced concrete leveling pad. The modulus load test Geopier shall penetrate fill.

4 - A telltale shall be installed in the bottom one-third of the tested Geopier element. Telltale deflections shall be monitored concurrent with top of Geopier deflections during the modulus load test.

5 - The modulus load test setup shall be as shown on Geopier Construction Drawing GP0.1. Helical anchors should be installed in accordance with manufacturers specifications.

6 - A representative of the owner's geotechnical consultant should be present to witness the load test.

1/8/2021



GMU

February 14, 2020

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 Precise Grading Plans, Dana Point Harbor Parking
	Structure, 24650 Dana Point Harbor Drive, City of Dana Point, California

References:

- (1) Dana Point Harbor Parking Structure Precise Grading Plans, prepared by Tait Engineers, dated February 14, 2020.
- (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU 17-206-02).

Dear Mr. Ward:

INTRODUCTION

The purpose of this correspondence is to confirm in writing that that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) precise grading plans for the subject site. The precise grading is to support site grading and design and construction of the proposed parking structure, the adjacent boater services building, and other site improvements (i.e. roadways, parking lots, site walls, exterior concrete flatwork, etc.). The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south. It is our understanding that the proposed development will consist of a 3-story on-grade cast-in-place concrete parking structure and an adjacent 1-story boater services building at its southeast corner with surface parking at the east and south ends of the site, located south of existing of Dana Point Harbor Drive and east of existing Golden Lantern. We also understand that 2H:1V fill slopes are planned to be placed against the northerly and western sides of the parking structure and supporting site retaining wall on the north side.

Our review of the Tait Engineering precise grading plans (reference (1)) presented herein provides recommendations specific to the precise grading shown on these plans only for final construction. To support the precise grading plans, GMU previously performed a geotechnical foundation investigation and compiled our detailed site recommendations in our reference (2) report. The subject supporting geotechnical foundation investigation report contains:

- Geotechnical Map and Cross Sections
- Drill Hole and CPT logs
- Laboratory testing
- Infiltration test results
- Geotechnical engineering analyses, and
- Project recommendations

REVIEW OF PRECISE GRADING PLANS

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

The precise grading reflected on the reference (1) plans consist mainly of minor cuts and fills of so any courupt to 1-foot on the parking structure pad and the boater services building pad, along with adjacent site work. The planned precise grading also reflects fills into the 2:1 descending slope below both Dana Point Harbor Drive on the north and Golden Lantern on the west. We have attached a grading exhibit, Plate 1 – Benched Fill Over Existing Engineered Fill, to illustrate our recommended keyway and benching requirements for those slopes. This exhibit is also shown on sheet 8 of the reference (1) precise grading plans.

SLOPE STABILITY

It is our opinion that the permanent 2:1 slopes shown on sections A-A and F-F below Dana Point Harbor Drive on the north side and Golden Lantern on the west side, respectively, will be grossly and surficially stable during the construction of the parking structure and should be periodically monitored by GMU personnel during construction and the owner after completion of construction.

TEMPORARY EXCAVATIONS

Temporary excavations for during construction are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 4 feet high will generally be stable; however, all temporary excavations should be observed by a representative of GMU to evaluate their stability. Our recommendations for temporary excavations are as follows:

- Temporary, unsurcharged excavation sides within artificial fill material over 4 feet in height should be sloped no steeper than 1.5H:1V (horizontal: vertical).
- Temporary, unsurcharged excavation sides within bedrock material over 4 feet in height should be sloped no steeper than 1H:1V (horizontal: vertical).
- 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.

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 and temporary slope construction, maintenance, and safety are the responsibility of the contractor.

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 performed by others should be reviewed by this office.

1/8/2021

LIMITATIONS



All parties reviewing or utilizing this letter should recognize that the findings conclusions, and the 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 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.

This letter has not been prepared for use by other parties or projects other than those named or described herein. This letter may not contain sufficient information for other parties or other purposes.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Precise Grading Plans, Dana Point Harbor Parking Structure 24650 Dana Point Harbor Drive, City of Dana Point, California

CLOSURE

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

Based on our review, the reference (1) precise grading plans have been precise and in our accordance with the parameters and recommendations contained in this correspondence and in our reference (2) report. Therefore, the subject precise grading plans are considered acceptable from a geotechnical point of view and additional or revised geotechnical recommendations are not considered necessary.

Should you require further assistance, please do not hesitate to call.



Respectfully submitted,

Nadim Sunna, M.Sc., QSP, PE 84197 Senior Engineer

David R. Atkinson Project Manager / Senior Engineer

Attachment

Plate 1- Benched Fill over Existing Engineered Fill

(Two (2) wet signature copies and electronic copy)

cc: Tait Engineering Attn: Mr. Jacob Vandervis and Ms. Daniela Malott (electronic copies)

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

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

dra/17-206-02L Precise Grading Plan Review for DP Harbor Parking Structure (2-14-20)



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 ons of a n of a State law. Hadi Tabatabaee BUILDING OFFICIAL

GMU Project 17-206-02

- Subject: Geotechnical Review of Geopier Submittal No. 2, Dana Point Harbor Revitalization: Parking Structure – Commercial Component, City of Dana Point, California
- References: (1) Design Submittal for a Geopier Foundation System, Submittal No. 2, Dana Point Harbor Parking Structure, Dana Point, California, prepared by Western Ground Improvement, Inc., dated February 11, 2020.
 - (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU 17-206-02).

Dear Mr. Ward:

Mr. Bryon Ward, President

Newport Beach, CA 92660

DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES 1100 Newport Center Drive, Suite 200

The purpose of this correspondence is to confirm in writing that that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) Geopier submittal No. 2 for the subject project. This Geopier submittal No. 2 is to support the foundation design of the proposed parking structure. The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south.

As is standard of practice, Quality Control (QC) for Geopier installations will performed by both the Geopier designer/contractor (WGI) and the Geotechnical engineer of Record (GMU). The QC requirements to be completed by WGI are contained on Sheet GP0.1 of the Reference (1) Geopier plans under "Geopier Testing Notes". Note 1 also refers to supplemental testing by a "testing agency hired by the owner". This testing is the supplemental Geopier testing GMU will be performing. The supplemental testing will be performed by one of GMU's Senior Engineering Technicians reporting directly to the Geotechnical Engineer-of-Record (GE) on a full-time basis.

GMU's QC testing will include:

- Observation, documentation and verification of geotechnical conditions
- Determination/verification that bedrock has been reached/tagged at each Geopier location.
- Depth and diameter of each Geopier
- Verification of installation per design.
- Observation and documentation of load testing.

1/8/2021



February 11, 2020

Building&Safety: Ryan Rose 1/8/2021 Approval: Geotechnical Reports Permits: GRD20-0021 Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Geopier Submittal No. 2, Dana Point Harbor Revitalization: Parking Structure – Commercial Component, County of Orange - OC Public Works **OC Development Services** City of Dana Point, California APPROVED This set of plan 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 reference (1) Geopier design submittal No. 2 has been prepared descented accordance with the parameters and recommendations of our reference (2) report. All the recommendations included herein and in our reference (2) report remain applicable to the site Therefore, the Geopier design submittal is considered acceptable from a improvements. geotechnical point of view. Should you require further assistance, please do not hesitate to call. Respectfully submitted, wid R. attinson David R. Atkinson Project Manager / Senior Engineer GE 2336 Gregory P. Silver, M.Sc., PE, GE 2336 President / CEO Principal Geotechnical Engineer (Two (2) wet signature copies and electronic copy) **SMS** Architects cc: Attn: Mr. Brandon Dedmon (electronic copy) **Choate Parking Design** Attn: Mr. Rick Choate and Mr. Emerson Flint Schmieder (electronic copies) Culp & Tanner Structural Engineers Attn: Mr. Rory Rottschalk and Mr. Calvin Jackson (electronic copies) **Tindall Consulting** Attn: Mr. John Tindall (electronic copy) dra/17-206-02L Geotechnical Review of Geopier Submittal No. 2 for DPHP, LLC P.S. and Boater Services Building (2-11-20)



February 11, 2020

Building&Safety: Ryan Rose
Approval: Geotechnical Reports
Permits: GRD20-0021

1/8/2021

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

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. PKG19-1202

- Subject: Response to County of Orange Geotechnical Review Comments Pertaining to Building Plan Check, Parking Structure, and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California
- References: Listed on Page 7

Dear Mr. Ward:

This correspondence presents our response to the reference (1) County of Orange Review Comments pertaining to the submittal of the rough grading plans and details for the subject site. A copy of County's Building Plan Check Comments is included in this response as Appendix A for ease of reference.

RESPONSES TO GEOTECHNICAL COMMENTS

RESPONSE TO COMMENT 2.001

Acknowledged. The approved project building foundation plans and applicable details will be signed/stamped by GMU prior to permit issuance.

RESPONSE TO COMMENT 2.002

Acknowledged. GMU is coordinating with the project team to ensure that the geotechnical ground improvement recommendations/details for the Geopiers are included on the project precise grading plans and on the 2nd submittal Geopier plans with the 2nd submittal building/structural plans.

RESPONSE TO COMMENT 2.003

Acknowledged. The previously issued review comments for GRD19-0177 that are related to the proposed Geopier construction are addressed as part of our following responses for this submittal.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response -Parking Structure and Boater Services Development Buildings, Dana Point Harbor Control of Control of

RESPONSE TO COMMENT 2.004

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Acknowledged. GMU is coordinating with the project team to ensure that the geotechnical ground improvement recommendations/details for the Geopiers are included on the project precise grading plans and on the 2nd submittal Geopier plans with the 2nd submittal building/structural plans.

RESPONSE TO COMMENT 2.005

The Capistrano Formation has properties that act more as a stiff soil rather than a bedrock material. Due to these properties, it was determined that using a "soil density/consistency" descriptor was more accurate than using the "bedrock hardness" descriptor. The drilling conditions can be inferred from the material descriptions, boring logs, groundwater discussion, and geotechnical cross sections. All of these have been reviewed and discussed with WGI, and they have been incorporated into the Geopier design.

It should also be noted that after consultation with the Geopier designer (WGI), the Geopier will only extend to, and not into, the bedrock (see Response to Comment 2.017). Once the bedrock is tagged, which will be confirmed and documented by a GMU representative, the Geopier will be deemed complete and drilling operations will cease.

Additionally, it is noted that although not anticipated on a widespread basis, there may be a single local Geopier in which caving may occur. In this case, WGI will provide casing such that the casing will be filled with rock and then withdrawn as the rock is placed.

RESPONSE TO COMMENT 2.006

The imported rock material to be utilized by Geopier, including in the top of the Geopiers, will consist of CMB/CalTrans Class II base (1-inch minus) with no "oversize" material present (i.e., GMU does not consider 1-inch minus to be oversize). Consequently, the waste CMB materials from the footings will be easily blended in with other precise fills. If, for some reason, it becomes difficult to utilize the waste CMB materials onsite, they will be exported off site or stockpiled for future use. Whichever the case, this will be observed and documented by a GMU field representative.

RESPONSE TO COMMENT 2.007

Given that the potential for lateral spreading to affect this site is low, as determined in our reference (2) report, and that the calculated seismic settlements are small, Geopiers are only needed for vertical support to minimize the potential effects of the existing fill variability relative to the proposed foundation loads (i.e., heavier than for a standard commercial structure). Hence there is <u>no need for Geopiers outside the footprint of the future parking structure</u>. Consequently,

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response -Parking Structure and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California City of Dana Point, California APPROVED t on the recommendations for the lateral extent of Geopier improvements beyond the perimeter of the or be an Parking Structure footprint are not required. Hadi Tabatabaee BUILDING OFFICIAL **RESPONSE TO COMMENT 2.008**

7 ksf is appropriate for the existing soil consistency and amount of ground improvement planned, based on empirical design charts and result in tolerable settlements. 7 ksf bearing capacity for the Parking Structure footings was determined by Western Ground Improvement, Inc/Geopier Foundation (WGI). The value considers the effect of the Geopiers as well as settlement of the foundations. Calculations are contained in the reference (5) Geopier 2nd submittal and are included as Appendix C of this response. These calculations have been reviewed by GMU and deemed acceptable. Load testing will also be performed to confirm the bearing vs. settlement design assumptions.

RESPONSE TO COMMENT 2.009

For a "calculation and diagram" based explanation of how the seismic earth pressure was derived, please see the attached calculations contained in Appendix B.

RESPONSE TO COMMENT 2.01

In the submitted reference (2) report, Item 8 on Page 13 contains a typographical error. The final statement "will need to be founded on Geopiers, the Boater services Building" should be eliminated. The Geopiers will be constructed directly beneath the Parking Structure foundations only, not under the structurally separate Boater Services Building. The Boater Services Building will be founded on engineered fill per the recommendation shown on Pages 15, 21, and 22 of our reference (2) report. There is a separation of 5-feet minimum between the Parking Structure and the Boater Services Building. No additional recommendations are necessary.

RESPONSE TO COMMENT 2.011

GMU confirms that our complete geotechnical recommendations for design and construction of the proposed ground improvement/Geopier system at the subject site are contained in our reference (2) report. Based upon our review of the currently submitted reference (5) 2nd submittal Geopier project plans, included as Appendix C of this response, our recommendations have been incorporated into the design. The designer of the ground improvement/Geopier system is Western Ground Improvement (WGI).

We have included an updated Geotechnical Map Plate 2, as Appendix D of this response, to indicate the location of the proposed Geopiers beneath the footings of the parking structure building pad. No additional recommendations are necessary.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response -Parking Structure and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California

RESPONSE TO COMMENT 2.012

This set of plans and specifications must be kept on the ob at all times. It is unlawful to make any changes or alterations to these plans without written permission for 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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The Geotechnical Sections shown on Plate 3 from our reference (2) report have been updated to include the recommended Geopiers by both location and estimated depth of installation based on our review of the currently submitted reference (5) 2^{nd} submittal Geopier plans. Please see Appendix D for the updated Geotechnical Sections. No additional recommendations are necessary.

RESPONSE TO COMMENT 2.013

As is standard of practice, QC for Geopier installations will be performed by both the Geopier designer/contractor (WGI) and the Geotechnical engineer of Record (GMU). The QC requirements to be completed by WGI are contained on Sheet GP0.1 of the Reference (5) Geopier plans under "Geopier Testing Notes" (see Appendix C). Note 1 also refers to supplemental testing by a "testing agency hired by the owner". This testing is the supplemental Geopier testing GMU will be performing by one of GMU's Senior Engineering Technician reporting directly to the GE of record on a full-time basis. Post-construction CPT verification is not required per the rationale provided in response to Item 2.007.

GMU's QC testing will include:

- Observation, documentation, and verification of geotechnical conditions
- Determination and verification that bedrock has been reached/tagged at each Geopier location.
- Depth and diameter of each Geopier
- Verification of installation per design.
- Observation and documentation of load testing.

It is further noted that all of 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.

RESPONSE TO COMMENT 2.014

Acknowledged. GMU has reviewed the reference (3) 2nd submittal structural foundation plans and calculations by Culp & Tanner and has confirmed that the geotechnical recommendations contained in our reference (2) report have been adequately incorporated into the foundation and building/retaining wall designs.

RESPONSE TO COMMENT 2.015

We confirm that the footing details for the F8A-3, F9A-3, F10x30 and F24x32 have been provided on the reference (5) resubmittal plans by WGI. See Appendix C for the WGI Geopier resubmittal.

RESPONSE TO COMMENT 2.016

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Given that the potential for lateral spreading to affect this site is low as determined in our reference (2) report, and that the calculated seismic settlements are small, Geopiers are only needed for vertical support to minimize the potential effects of the existing fill variability relative to the proposed foundation loads (i.e., heavier than for a standard commercial structure). We do not anticipate any significant bearing loss due to settlement occurring adjacent the Geopier-supported foundations. Consequently, adding additional Geopiers is not required. GMU's opinion in this regard has been discussed with WGI and they are in complete concurrence.

RESPONSE TO COMMENT 2.017

Our recommendations with regard to Geopier bedrock requirements have been modified. After consultation with the Geopier designer (WGI), *all Geopiers will only extend "to" and not into the bedrock*. Once the bedrock is tagged, which will be confirmed and documented by a GMU representative, the Geopier will be deemed complete and drilling operations will cease.

RESPONSE TO COMMENT 2.018

The 120 pcf soil unit weight value used in the WGI calculations has been increased to 125 pcf to match GMU's recommendation in our reference (2) report. Please see the WGI Geopier 2nd submittal, Appendix C.

RESPONSE TO COMMENT 2.019

Page 20 of GMU's reference (2) geotechnical report states that the "Final bearing value to be provided by Geopier". 7 ksf is appropriate for the existing soil consistency and amount of ground improvement planned, based on empirical design charts and result in tolerable settlements. The 7 ksf bearing capacity for the Parking Structure footings was determined by Western Ground Improvement, Inc/Geopier Foundation (WGI). The value considers the effect of the Geopiers as well as settlement of the foundations. Calculations are contained in the reference (5) Geopier 2nd submittal and are included as Appendix C of this response.

There is no need to confirm the design bearing value based on precise grading. The only geotechnical engineering issue that could affect the design bearing value would be if extreme anomalous geotechnical conditions are encountered during rough grading that can't be appropriately mitigated via corrective grading. However, given the amount of data and our overall familiarity with the site, this occurrence is deemed extremely low. We feel that the bearing value determined from WGI is based on sufficient subsurface data and laboratory testing. If extreme geotechnical conditions are noted during rough grading that would change the assumptions made by WGI in their calculations, this would be discussed in our rough grading report, and new recommendations for design would be developed. This, however, is highly unlikely.

RESPONSE TO COMMENT 2.02

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Acknowledged. GMU will confirm the bearing capacity for the Boater Services Building mithe as-graded report that will be prepared at the completion of precise grading. The as-graded report will be submitted to the County for review and approval prior to building permit issuance.

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

Respectfully submitted,

Project Manager / Senior Engineer



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

Attachments:

Appendix A – County of Orange Building Plan Geotechnical Review Comments Appendix B – Earth Pressure Distribution Seismic Loads – Plate 1 Appendix C - Submittal 2 for a Geopier Foundation System by WGI Appendix D – Updated GMU Geotechnical Map – Plate 2 Appendix E – Updated GMU Geotechnical Sections – Plate 3

(Two (2) wet signature copies and 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)

Choate Parking Consultants Attn: Mr. Rick Choate (electronic copy) and Mr. Emerson Flint (electronic copy)

REFERENCES

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Hadi Tabatabaee
BUILDING OFFICIAL

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- (1) County of Orange Geotechnical Comments, PKG19-1202 Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California, First Submittal, submittal date December 17, 2019, plan check date January 23, 2020, prepared by Ryan Rose of OC Public Works.
- (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU Project 17-206-02).
- (3) "Dana Point Harbor Parking Building" 2nd Submittal Foundation Plans and Volume 4 2nd Submittal Structural Calculations Package, 24650 Dana Point Harbor Drive, Dana Point, California 92629," prepared by Culp & Tanner Structural Engineers, dated February 11, 2020.
- (4) Our "Geotechnical Review of Geopier Submittal, Dana Point Harbor Revitalization: Parking Structure – Commercial Component, City of Dana Point, California," dated December 11, 2019 (GMU 17-206-02).
- (5) Design Submittal for a Geopier Foundation System, and Calculation Package, 2nd Submittal, Dana Point Harbor Parking Structure, Dana Point, California, prepared by Western Ground Improvement, Inc., dated February 11, 2019.

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APPENDIX A

County of Orange Geotechnical Report Review Comments





Building Plan Check Comments

Building&Safety: Ryan Rose Approval: Geotechnical Reports

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It is the responsibility of the applicant to satisfy the requirements and comments listed in this a rabatabaee document. Corrections shall be made on the original plans. If you make changes to the original plan other than or in addition to what Plan Check has requested, yellow highlight the changes on the resubmitted plans.

Payment of a new plan check deposit may be required for all plans on which no action is taken by the applicant for a period of 180 days. Applications for which no permit is issued within 180 days following the date of submittal shall expire by limitation and shall be discarded.

To view your project status and the latest comments list, please visit: myOCeServices.ocgov.com.

Please note that the OC Development Services Public Counter Hours are open Monday through Friday from 8:00 a.m. to 4:00 p.m. except holidays.

 Project Number:

 Permit Number:
 PKG19-1202

 Description:
 Dana Point Harbor Parking Building Structure and Boater Services Building

 Code Year:
 Job Address:

 Owner Address:
 Owner Address:

Architect of Record:

Engineer of Record:

Project Manager: Dev Admin2 300 North Flower, Suite 800 Santa Ana ,CA ,92703

priya.subbaraj@ocit.ocgov.com



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County of Orange - OC Public Works

1/8/2021

Other Reviewers:

Review Name	Review Owner	Status	approval of the violation of any provisions of any Co
	Neview Owner	Status	Hadi Tabatabaee Build Roefficial
Building & Safety Review- PKG19-1202	Peter Liu	Corrections Required	01-09-2020 01-09-2020
Geotechnical Review- PKG19-1202	Ryan Rose	Corrections Required	01-09-2020 01-22-2020
Planning Review-PKG19- 1202	llene Lundfelt	Not Required	01-09-2020 12-17-2019

GENERAL INFORMATION

- Plans will not be rechecked at the counter, allow a minimum of ten (10) working days for recheck.
- Application for which no permit is issued within 180 days following the date of application shall expire by limitation.
- An extension of 180 days may be granted upon written request showing circumstances beyond the control of the applicant have prevented action being taken. In order to renew action for an application after expiration, the applicant shall resubmit plans and pay a new plan check fee.
- Valid Worker's Compensation Certificate or Owner-Builder Verification is required prior to issuance of building permits.
- Authorized agents for owner-builders must have a **notarized** statement from the owner authorizing the agent to act on behalf of the owner. A copy of the form may be obtained from http://www.ocgov.com/gov/pw/ds/.
- Obtain all clearances as noted on the MyOCeServices permit portal. Prompt attention is suggested as there can be delays from other departments reviewing the project.
- Upon receiving the inspection report from grading inspection and based on the determination made by the Building Official, a grading permit and rough grading approval may be required.
- Building permit will not be issued until Rough Grading approval is obtained from the grading inspector. Contact the plan checker for additional information.

It is the contractor or owner-builder's responsibility to provide one hard copy set of plans with the County approval stamp in the field for the inspector to view.

HOW TO RESUBMIT ONLINE

- 1. Log into <u>www.myOCeServices.ocgov.com</u>.
- 2. Select the "myOC eServices Account" tile on the homepage or click "Dashboard" at the top of page.



Building&Safety: Ryan Rose **Approval: Geotechnical Reports**

OCDEVELOPMENT SERVICES

1/8/2021



- 3. Use the left-hand menu bar to locate the application in question, either under "Projects and Packages".
- 4. Once on the Permit or Package detail page, select the "Resubmittals" tab.
- 5. Attach* all submittal requirements identified by selecting the "Add Attachment" comment in the "Applicant Comment" field, if applicable.
- 6. Respond to all comments on the "Comments & Responses" tab.
- 7. Once steps 5 and 6 are complete, click "Submit". Please verify that your resubmittal is complete, as all incomplete resubmittals will not be accepted for plan check review.
- 8. Note that you can save your work at any time by clicking "Save" at the bottom, to resume at a later time.

* The PDF files submitted must be stamped and signed by the responsible registered professional (e.g. civil engineer, architect, engineering geologist, etc.).

* A 4"X4" space located 1" from the top paper edge and 5" from the right paper edge of all full sized plan sheets, either 24"x36" or 30"x42", shall be left blank to receive the County's electronic approval stamp. Other page sizes shall be scaled accordingly.



CPublicWorks

NPDES Notes

Notes must be shown as worded, on the title sheet of the plan.

1.

at Work Phone # or Home Phone

- 2. Sediment from areas disturbed by construction shall be retained on site using structural controls to the maximum extent practicable.
- 3. Stockpiles of soil shall be properly contained to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tacking, or wind.
- 4. Appropriate BMP's for construction-related materials, wastes, spills shall be implemented to minimize transport from the site to streets, drainage facilities, or adjoining properties by wind or runoff.
- 5. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to reduce or remove sediment and other pollutants.
- 6. All construction contractor and subcontractor personnel are to be made aware or the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- 7. At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- 8. Construction sites shall be maintained in such a condition that an anticipated storm does not carry wastes or pollutants off the site. Discharges of material other than stormwater only when necessary for performance and completion of construction practices and where they do not: cause or contribute to a violation of any water quality standard; cause or threaten to cause pollution, contamination, or nuisance; or contain a hazardous substance in a quantity reportable under Federal Regulations 40 CFR Parts 117 and 302.
- 9. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, glues, limes, pesticides, herbicides, wood preservatives and solvents; asbestos fibers, paint flakes or stucco fragments; fuels, oils, lubricants, and hydraulic, radiator or battery fluids; fertilizers, vehicle/equipment wash water and concrete wash water; concrete, detergent or floatable wastes; wastes from any engine/equipment steam cleaning or chemical degreasing and super chlorinated potable water line flushing. During construction, permittee shall dispose of such materials in a specified and controlled temporary area on-site, physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, state and federal requirements.
- 10. Dewatering of contaminated groundwater, or discharging contaminated soils via surface erosion is prohibited. Dewatering of noncontaminated groundwater requires a National Pollutant Discharge Elimination SystemPermit from the respective State Regional Water Quality Control Board.
- 11. Graded areas on the permitted area perimeter must drain away from the face of slopes at the conclusion of each working day. Drainage is to be directed toward desilting facilities.
- 12. The permittee and contractor shall be responsible and shall take necessary precautions to prevent public tres pass onto areas where impounded water creates a hazardous condition.
- 13. The permittee and contractor shall inspect the erosion control work and insure that the work is in accordance with the approved plans.
- 14. The permittee shall notify all general contractors, subcontractors, material suppliers, lessees, and property owners: that dumping of chemicals into the stormdrain system or the watershed is prohibited.
- 15. Equipment and workers for emergency work shall be made available at all times during the rainy season. Necessary materials shall be available on site and stockpiled at convenient locations to facilitate rapid construction of temporary devices when rain is imminent.
- 16. All removable erosion protective devices shall be in place at the end of each working day when the 5-Day Rain Probability Forecast exceeds 40%.
- 17. Sediments from areas disturbed by construction shall be retained on site using an effective combination of erosion and sediment controls to the maximum extent practicable, and stockpiles of soil shall be properly contained to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking, or wind.
- 18. Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented and retained on site to minimize transport from the site to streets, drainage facilities, or adjoining property by wind or runoff.



In the case of emergency, call



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PLAN CHECK COMMENTS	job at all times. It is unlawful to make any c alterations to these plans without written per from OC Public Works. OC Development Se of Orange County. The stamping of these p specifications SHALL NOT be held to permi approval of the violation of any provisions of Ordinance or State law.	
Permit Application No.	PKG19-1202	BUILDING OFFICIAL
Plan Check No.	First Submittal-PKG19-1202	
Plan Check Date	01-23-2020	
Applicant	Junior Mazariegos	
Submittal Date	12-17-2019	

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
1.001	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements .Required to submit signed pdf of dwg & calcs for re-submittal thru OC portal "myOCeServices.ocgov.com"		Required	
1.002	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements A 4"X4" blank space shall be provide on the upper right corner of all sheets of plans. Space shall be 1" below the top and 5" from the right edge of all sheets. This space is intended for County of Orange electronic approval stamp.		Required	



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		JDI1C rity, Accountab	WOTKS oility, Service, Trust	County of Orange - OC Public Work OC Development Services APPROVED This set of plans and specifications must be kept on th 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 Orance County. The stamong of these plan	OC DEVELOP	MENT SERVICE
#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any Coun Ordin Applicant Response Hadi Tabatabase Build Disc OFFICIAL	Status	File Name & Page
1.003	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements File naming convention examples: File naming convention examples: PKG19- xxxx, BLD19-xxxx- Plans.pdf; PKG19-xxxx, BLD19-xxxx- Structural Calcs.pdf; PKG19-xxxx, BLD19-xxxx-Soil Report.pdf		Required	
1.004	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements It is the responsibility of the Owner, Owner/Contractor to make available a copy of the County approved plans for inspector's review		Required	
1.005	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements . Req'd submit written response to 1st submittal correction list, without written response at re-submittal review may delay plan check process and increase numbers of submittal, County will charge additional plan check fee based on time & material basis starting 4th submittal.		Required	



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U	PUDIIC W ORKS Integrity, Accountability, Service, Trust			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	OC DEVELOPI	MENT SERVICE
#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordin Applicant Response Hadi Tabatabase Bull Ding OFFICIAL	Status	File Name & Page
1.006	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Do not use delta 123 at resubmittal plans & calcs, you may use cloud with delta ABC to identify difference per submittal. County considers delta 123 is used only for field revision after permit is issued.		Required	
1.007	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Exterior wall and site freestanding signs req'd separate permit.		Required	
1.008	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Site freestanding or wall mount signs req'd separate permit		Required	
1.009	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Required OCFA, zoning and grading and soil report review approval, prior to issuance of building permit.		Required	



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	Integr	rity, Accountal	bility, Service, Trust	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		
#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any County Ordin Applicant Response Hadi Tabatabaee Bulu DING OFFICIAL	Status	File Name & Page
1.01	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Req'd stamp and signature on all plans and structural calcs		Required	
1.011	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal bldg general requirements Required soil engineer review stamps and signatures on foundation plans, retaining wall and shoring plans and detail sheets with date		Required	
1.012	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Gwg sheet G001 deferred permit items, add sign as deferred permit items.		Required	
1.013	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet A120, provide ADA site plan to indicate complete accessibility path starting from street right of way, to accessible parking, to accessible rest room and office		Required	

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#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any Cour Ordin Applicant Response Hadi Tabatabae Build Date October	^{ty} Status	File Name & Page
1.014	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet A410 detail 1 & 2, show or provide cross reference of elevator manufacturer model number, power phase, signage and elevator accessibility compliance including communication DAS device, ADA signs and evacuate path map sign		Required	
1.015	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet A460 detail 2, clarify grove is used and all stair tread surface shall provide strip 11B-504.4 and contracting stripe shall comply with 11B-504.4.1		Required	
1.016	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet A512, provide enlarged plan to show accessible shower, male and female bath room and diaper changing station and drinking fountain including regular & accessible		Required	
1.017	Building & Safety Review- PKG19-1202	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S1.01 notes 20.2, clarify parking load, use 50 psf with moving load		Required	



County of Orange - OC Public Works OC Development Services

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1/8/2021

				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	ne -	
#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any Cour Ordin Applicant Response Hadi Tabatabase Buy Dive Octoor	^{ty} Status	File Name & Page
	Peter Liu		in lieu of static 40 psf			
1.018	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S1.01 notes 20.3, clarify wind load formula, it shall use open structure formula in lieu of closed structure		Required	
1.019	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S1.05, provide OC standard special inspection form with owner 's signature and req'd inspection items i.e. concrete, filed weld, CMU, moment frame, high strength bolting etc.		Required	
1.02	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S1.05, povide OC standard structural observation form with engineer's signature and req'd observed items.		Required	


County of Orenano, OC Dublic Works

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	Integr	rity, Accountab	oility, Service, Trust	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 Orance County. The stamping of these plan	5	
#	Review	Category	Comment	specifications SHALL NOT be held to permit or be an approval of the violation of any provisions of any Count Ordin Applicant Response Hadi Tabatabaee Built DIMG OFFICIAL	Status	File Name & Page
1.021	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S2.01 thru S2.03, show room names on plans i.e. electrical room, mechanical room, elevator etc.		Required	
1.022	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S2.01 thru S2.03, clarify requirements of pour joints and expansion joints		Required	
1.023	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S3.09 section B, clarify and show girder tie bars required hook at ends as shown as detail G & F on sheet S3.85,		Required	
1.024	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S3.10 detail C, S3.15 detail H, show column & beam tie special requirement at frame column & beam joint and rigid zone		Required	
1.025	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S4.02 detail D, show metail deck shear stud size and spacing at connecting supporting angle		Required	



		IDIIC rity, Accountat	WORKS pility, Service, Trust	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	OC DEVELOPMENT SERVIC
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1.026	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet A4.21 &A4.51 detail 1 & 2, clarify stair height and mid landing may be required and clarify and show horizontal rail extend dimension.		Required
1.027	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.01 detail H, clarify and show footing double layer(top & bot) in lieu of one layer of rebars		Required
1.028	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.02 detail J, clarify and show diagonal rebars at (4) corners		Required
1.029	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.03 detail F, show seismic top wall restraint detail		Required
1.03	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.03 detail F & J, show rebar edge clearance		Required



	PUDIIC WORKS Integrity, Accountability, Service, Trust			County of Orange - OC Public Work OC Development Services APPROVED This set of plans and specifications must be kept on th 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 Oceans County. The attractions of these activities	OC DEVELOP	OC DEVELOPMENT SERVIC		
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1.031	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.03 detail M, clarify and show rebar edge clearnce and located at mid layer		Required			
1.032	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet S5.10 & S5.11, show all rebar locations and edge clearance for all CMU wall details		Required			
1.033	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet M003 equipment schedule, show equipment platform wt and show isolator structural calcs for vertical & horizontal loads		Required			
1.034	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet M003 T-24, show signature of design responsible person		Required			
1.035	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet M500 detail 5 & 11, provide structural calcs of roof and ground mount mechanical equipment support and		Required			



PUDILC W OKKS Integrity, Accountability, Service, Trust				County of Orange - OC Public Work OC Development Services APPROVED This set of plans and specifications must be kept on th 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	OC DEVELOF	OC DEVELOPMENT SERVI	
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			isolator seismic restraint & base anchor design.				
1.036	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet M500, show seismic anchor design for suspended mechanical equipment and suspended duct.		Required		
1.037	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E001, add note to indicate all electrical design based on year of electrical codes		Required		
.038	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E230P, clarify electrical room fire rate requirements and clearly show door and transformer and main panel working clearance and sign requirements		Required		
1.039	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E260, provide elevator model number and specifications, power phase and clarify is it tie to any emergency		Required		



County of Orange - OC Public Works

1/8/2021

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			generator?			
1.04	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E401, provide will serve electricity letter from utility company.		Required	
1.041	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E602, show seismic anchor design for suspended electrical conduit or cable tray		Required	
1.042	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet E701 detail 2, provide sign structural details and structural calculations for light pole and foundation design,		Required	
1.043	Building & Safety Review- PKG19-1202 Peter Liu	Non-Residential Plan Check List	1st Submittal drawing plan check review comments Dwg sheet P001, show max. water flow rate per green bldg code.		Required	



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OC DEVELOPMENT SERVICES

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consultant prior to permit issuance.



Integrity, Accountability, Service, Trust

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

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 plan specifications SHALL NOT be held to permit or be an	,	
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2.002	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	During review of the 1st submittal for the project rough grading permit GRD19-0177, it was not-ed that the proposed Geopier construction was to be reviewed and included on the rough grading plans. Subsequent to that, it was determined that the proposed Geopier construction will be reviewed and approved as part of the project precise grading and building submittals. Please coordinate w/project team to ensure the geotechnical ground improvement recom-mendations/details are included on the project precise grading and building/structural plans.		Required	
2.003	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	There are outstanding geotechnical review comments on the project rough grading submittal, GRD19-0177. Approval of this submittal is contingent upon review and approval of the rough grading package. For your convenience, the previously issued review comments for GRD19-0177 that are related to the proposed Geopier construction have been repeated herein and should be addressed as part of your response for this submittal.		Required	



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2.004	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	During the 1st submittal review of the project rough grading permit, GRD19- 0177, it was noted that the proposed Geopier construction was to be included on the rough grading plans. Sub-sequent to that, it was determined that the proposed Geopier construction will be reviewed and approved as part of the project precise grading and building submittals. Please coordinate w/project team to ensure the geotechnical ground improvement recommendations/details are included on the project precise grading and building/structural plans.		Required		
2.005	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The consultant should describe the anticipated drilling conditions that will be encountered dur-ing construction of the Geopiers. Geotechnical considerations should be provided for the Ge-opier construction including drilling difficulty based on bedrock described as hard to very hard, mitigating caving, handling groundwater, casing withdrawal (if used) during ramming, etc.		Required		



U		IDIIC rity, Accountak	WORKS pility, Service, Trust	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	OC DEVELOPMENT SERVICES	
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2.006	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The consultant recommends that the top of the Geopiers extend about 6 inches above the Parking Structure spread footing bottom elevations. The consultant also recommends that the subject spread footings be supported on the Geopiers. That means that during the foundation subgrade preparation, considerable amount of coarse aggregates including unknown quanti-ties of oversize rocks will be generated while removing the tops of the Geopiers across the Parking Structure pad. The consultant must address how such oversize materials should be handled during construction - whether these should be blended into the excavated soil or discarded offsite based on their size.		Required	
2.007	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The consultant should recommend the lateral extent of Geopier improvements beyond the perimeter of the Parking Structure footprint.		Required	



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2.008	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The consultant should justify the use of a preliminary bearing capacity of 7 ksf for the Parking Structure footings. What is this preliminary value based on? The consultant should provide jus-tifications for this value.		Required	
2.009	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The consultant recommends a seismic earth pressure of 17 pcf for the site retaining walls. The consultant should explain how they arrived at this earth pressure magnitude.		Required	
2.01	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The submitted report dated 12/4/19 (Page 13) states "Based on Conclusions 3-6 above, the fol-lowing remediation will be required: 1) corrective grading beneath the entire site, 2) Geopier ground improvement below the parking structure foundations and 3) use of a WRI foundation system for the Boater Services Building, will need to be founded on Geopiers, the Boater Services Building". Please provide additional comment/discussion to confirm if the Boater Ser-vices Building is to be founded		Required	



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Integrity, Accountability, Service, Trust				County of Orange - OC Public Work OC Development Services APPROVED This set of plans and specifications must be kept on th 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	S	
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			on Geopiers or not. If so, please provide comment/discussion to confirm the lateral extent of Geopiers beyond the outside edge(s) of the proposed Boater Services Building. Please also provide additional comment/discussion to on the differential settlement potential between Parking Structure and Boaters Service Building for proposed construction method (i.e. with or without Geopiers). Provide additional recommendations as necessary.			
2.011	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	Provide additional comment/discussion to confirm your complete geotechnical recommenda-tions for design and construction of the proposed ground improvement/Geopier system at the subject site based on your review of the currently submitted project plans. Specifically, please address who will be the designer of the ground improvement/Geopier system (i.e. your firm or a specialty contractor). Include updated plot plan/map to indicate the location of the proposed Geopiers (i.e. entire building pad w/lateral extension		Required	



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I UUIIC VV UIKS Integrity, Accountability, Service, Trust				County of Orange - OC Public Work OC Development Services APPROVED This set of plans and specifications must be kept on th 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	s	
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			foundation elements only). Provide additional recommendations as necessary.			
2.012	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The Geotechnical Sections in your submitted report(s) should be updated to include the rec-ommended Geopiers (location and depth of installation). Additional Geotechnical Section(s) should also be provided as necessary based on your review of the currently submitted project plans. Provide additional recommendations as necessary.		Required	
2.013	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	Provide additional comment/discussion to confirm your geotechnical QA/QC recommenda-tions for the proposed Geopier construction based on your review of the currently submitted (and forthcoming) project plans. Include confirmation of your recommendations for QA/QC during construction (e.g. full-time observation/testing, material quality/spec. confirmation testing, etc.) and post- construction (e.g. CPT soundings, field		Required	



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			testing, etc.) prior to pad release for building construction. Provide additional recommendations as necessary.			
2.014	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The geotechnical consultant shall review the structural foundation plans and calculations by Culp & Tanner to confirm that their geotechnical recommendations were adequately incorpo-rated into the foundation and retaining wall designs.		Required	
2.015	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	Footing details for the F8A-3, F9A-3, F10x30 and F24x32 should be provided on the plans by WGI.		Required	
2.016	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The proposed Geopier layout for each footing consists of Geopiers that are to be placed only within the footprint area of the footing. Placement of Geopiers has not been proposed out-side the footing. Liquefiable soils occurring outside the limits of the Geopiers and along the pe- rimeter of the footing will not be densified adequately, and will lose shear strength following the liquefaction event. This will		Required	



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			lead to loss of bearing capacity of the improved foundation zone underneath the footing and cause additional settlement. WGI should evaluate the im-pact of not placing Geopiers outside the footing and modify their Geopier placement plan, as needed.			
2.017	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	Note 1 below the table on Sheet GP0.1 of the WGI plans states that the Geopier shall reach bedrock. The geotechnical report states that the Geopier should extend a minimum of 12 inches into bedrock and be verified by the project geotechnical engineer. The note should be revised per the geotechnical consultant's recommendation.		Required	
2.018	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The 120 pcf soil unit weight value used in the WGI calculations should be increased to 125 pcf to match the geotechnical consultant's recommendation.		Required	
2.019	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	Page 20 of the geotechnical report states that the "Final bearing value to be provided by the Geopier". On Sheet		Required	



Integrity, Accountability, Service, Trust

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

County of Orange - OC Public Works OC Development Services

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			GP0.1, WGI lists an allowable bearing pressure of 7 ksf. WGI does not, however, state how they arrived at that value. There is no indication on Sheet GP0.1 how this value will be verified. It's worth noting that an allowable bearing pressure of 6 ksf was used in the structural calculations by Culp & Tanner. Note – "Final bearing value" for garage structure must be confirmed by geotechnical consultant and Geopier in their report(s) that will be pre-pared at the completion of precise grading/Geopier construction. The as-graded report(s) must be submitted to the County for review and approval prior to building permit issuance.			
2.02	Geotechnical Review- PKG19-1202 Ryan Rose	Geotechnical/G eology Check List	The geotechnical consultant shall confirm the bearing capacity for the Boater Services Building in their report that will be prepared at the completion of precise grading. The as-graded report should be submitted to the County for review and approval prior to building permit issuance.		Required	

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APPENDIX B

Earth Pressure Distribution Seismic Loads





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APPENDIX C

Submittal 2 for a Geopier Foundation System by WGI



WGI GEOPIER® FOUNDATIONS

Western Grou	ndolundyové mentgac. OC Public Works
2372 Morse A	ve OC Development Services
Suite 504	APPROVED
Irvine, CA 926	14 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 encodences ENd to NOT be bold to experie or be an
www.western	Brothnormover and the point of permit of be an approval of the violation of any provisions of any County Ordinance or State law. Hadi Tabatabase BUILDING OFFICIAL

February 11, 2020

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

Re: Design Submittal for a *Geopier[®]* Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The following documents are included herein:

- Geopier Design Drawing GP0.1: Geopier Notes & Details
- Geopier Design Drawing GP0.2: Geopier Schedules
- Geopier Design Drawing GP0.1 GP1.4: Geopier Location Plans

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Sincerely, Western Ground Improvement, Inc.



Ken Hoevelkamp, P.E. Principal Engineer

GEOPIER DESIGN NOTES:

- 1. GEOPIER FOUNDATION SUPPORT IS AS DESIGNED BY WESTERN GROUND IMPROVEMENT, INC., IRVINE, CALIFORNIA (DESIGNER).
- ounty of Orange OC Public Works OC Development Services APPROVED

Building&Safety: Ryan Rose pproval: Geotechnical Repo

- 2. THESE DESIGN DRAWINGS ARE PREPARED BY THE DESIGNER FOR USE IN GEOPIER CONSTRUCTION. THE GEOPIER SYSTEM SHALL BE INSTALLED BY APPROVED INSTALLERS LICENSED BY GEOPIER FOUNDATION COMPANY. UNAUTHORIZED USE OF THESE DRAWINGS IS PROHIBITED.
- 3. THE GEOPIER FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL INFORMATION PROVIDED IN THE SUBSURFACE EXPLORATION BY GMU GEOTECHNICAL, INC. WESTERN GROUND IMPROVEMENT, INC., HAS RELIED ON THIS INFORMATION AND WE HAVE NO REASON TO SUSPECT ANY OF THE INFORMATION IN THE REPORT IS IN ERROR. WESTERN GROUND IMPROVEMENT, INC. IS NOT RESPONSIBLE FOR ERRORS OR OMISSIONS IN THE REPORT THAT MAY AFFECT THE PARAMETER VALUES IN OUR DESIGN. IF THE SUBSURFACE OR SITE CONDITIONS DIFFER FROM THOSE UTILIZED IN THE DESIGN THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY.
- 4. THE ALLOWABLE BEARING PRESSURE FOR FOUNDATIONS SUPPORTED BY GEOPIER ELEMENTS IS AS REFERENCED IN DETAIL 1/GP0.1. THE GEOPIER LAYOUT IS DESIGNED TO PROVIDE SETTLEMENT CONTROL BASED ON SERVICE LOADS PROVIDED BY CULP AND TANNER. IN THE EVENT THE STRUCTURAL LOADS VARY, THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY 5. FOOTING ELEVATIONS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND SHALL BE
- REPORTED IN WRITING TO THE INSTALLER'S QC REPRESENTATIVE PRIOR TO INSTALLING GEOPIER ELEMENTS.

GEOPIER LAYOUT NOTES:

- 1. GEOPIER ELEMENT LAYOUT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. GEOPIER ELEMENTS SHALL BE INSTALLED IN THE FIELD WITHIN 6 INCHES OF LOCATIONS SHOWN ON THESE PLANS.
- 2. GEOPIER ELEMENTS ARE LOCATED RELATIVE TO THE INTERSECTION OF REFERENCE GRID LINES OR AT THE CENTERLINE OF STRIP FOOTINGS, UNLESS DIMENSIONED OTHERWISE. PLEASE REFER TO THE "FOOTING DETAILS" ON THIS SHEET FOR SPECIFIC PIER LOCATIONS AND DIMENSIONS RELATIVE TO THE FOOTING.
- 3. THE "GEOPIER LOCATION PLAN" AND "FOOTING DETAILS" PROVIDE GEOPIER ELEMENT NUMBER, LOCATION, AND LAYOUT ONLY. FOOTING LOCATIONS, SIZES, AND ORIENTATION SHOWN ON THESE PLANS ARE FOR INFORMATION ONLY. PLEASE REFER TO THE STRUCTURAL PLANS FOR SPECIFIC FOUNDATION DIMENSIONS AND LOCATIONS. THE DESIGNER ACCEPTS NO RESPONSIBILITY FOR THE LOCATION OF FOOTINGS SHOWN ON THESE PLANS. THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY IF INFORMATION ON THESE PLANS CONFLICTS WITH STRUCTURAL OR ARCHITECTURAL DRAWINGS.

UTILTIES/OBSTRUCTION NOTES:

- 1. UTILITY LOCATIONS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. THE DESIGNER SHALL BE NOTIFIED OF ANY CONFLICTS WITH GEOPIER LOCATIONS SHOWN ON THE PLANS. NEW TEMPORARY UTILITY EXCAVATIONS SHALL BE LIMITED TO THE ZONE DEPICTED ON DETAIL 2 OF THIS SHEET. IF EXCAVATIONS ARE PLANNED WITHIN THE GEOPIER "NO DIG" ZONE, THE DESIGNER SHALL BE NOTIFIED IMMEDIATELY TO DISCUSS EXCAVATION OPTIONS.
- IF OBSTRUCTIONS ARE ENCOUNTERED DURING GEOPIER INSTALLATION THAT CANNOT BE REMOVED WITH CONVENTIONAL GEOPIER INSTALLATION EQUIPMENT, THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING THE OBSTRUCTIONS. IF THE GENERAL CONTRACTOR DOES NOT DO SO IN A TIMELY MANNER THAT DOES NOT INTERRUPT GEOPIER PRODUCTION. THE INSTALLER MAY REMOVE OBSTRUCTIONS(S) AND SHALL BE REIMBURSED FOR COSTS INCURRED. INCLUDING LABOR, EQUIPMENT, AND MATERIALS. IN THE EVENT OBSTRUCTIONS ARE ENCOUNTERED BELOW THE DESIGNED BOTTOM OF FOOTING ELEVATION THE OBSTRUCTION SHALL BE REMOVED AS OUTLINED ABOVE. THE RESULTING EXCAVATION SHALL THEN BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS FOR STRUCTURAL FILL. THE AREA SHALL BE TESTED BY THE OWNER'S TESTING AGENCY AND THE COMPACTION TEST RESULTS SHALL BE SUBMITTED TO THE INSTALLER AND THE DESIGNER.

GEOPIER TESTING NOTES:

- 1. A QUALIFIED, FULL-TIME QUALITY CONTROL (QC) REPRESENTATIVE PROVIDED BY THE GEOPIER INSTALLER (INSTALLER) SHALL BE RESPONSIBLE FOR INSTALLATION OF THE GEOPIER ELEMENTS IN ACCORDANCE WITH THE DESIGN AND SHALL REPORT ALL GEOPIER FOUNDATION CONSTRUCTION ACTIVITIES TO THE DESIGNER. IF AUTHORIZED BY THE OWNER, THE QC REPRESENTATIVE SHALL COORDINATE QC ACTIVITIES WITH THE TESTING AGENCY HIRED BY THE OWNER. UNDER NO CIRCUMSTANCES SHALL THE TESTING AGENCY DIRECT GEOPIER INSTALLATION PROCEDURES
- GEOPIER ELEMENT DESIGN SHALL BE CONFIRMED BY A MODULUS TEST PERFORMED AT THE SITE. PLEASE REFER TO THE DESIGN SUBMITTAL FOR TEST LOCATION AND SPECIFICATIONS. 3. GEOPIER ELEMENTS SHALL BE BASED ON THE FOLLOWING CRITERIA UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER:
- A. INSTALLATION DEPTHS SHALL BE WITHIN 3 INCHES OR DEEPER THAN THE DEPTHS SHOWN ON THE PLANS.
- B. THE AVERAGE COMPACTED LIFT THICKNESS DURING EACH DAY'S PRODUCTION SHALL BY APPROXIMATELY 12 TO 24 INCHES.
- C. GEOPIER ELEMENT DISPLACEMENT MEASURED DURING BOTTOM STABILIZATION TESTS (BST) SHALL BE WITHIN 150% OF THE BST VALUE ACHIEVED IN THE MODULUS TEST PIER. BSTS SHALL BE PERFORMED IN AT LEAST 10% OF THE DAY'S PRODUCTION PIERS.
- D. GEOPIER ELEMENT AGGREGATE RELATIVE DENSITY SHALL BE RECORDED PERIODICALLY THROUGHOUT THE DAY. THE AVERAGE BLOW COUNTS OBTAINED UTILIZING A DYNAMIC CONE PENETROMETER (DCP) IN ACCORDANCE WITH ASTM STP-399, SHALL BE GREATER THAN 15 BLOWS FOR 1.75 INCHES OF PENETRATION (BPI). NO MORE THAN 10% OF DCP TESTS CONDUCTED ON EACH DAY SHALL BE BELOW 15 BPI. NOTE: USE OF DCP TESTS ARE NOT APPROPRIATE FOR OPEN GRADED AGGREGATE SUCH AS #57 STONE OR SAND
- GEOPIER ELEMENT AGGREGATE SHALL BE APPROVED BY THE DESIGNER AND SHALL BE THE SAME AS USED IN A SUCCESSFUL MODULUS TEST, UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER.
- F. THE AGGREGATE SHALL BE TAMPED IN A MANNER CONSISTENT WITH THE MODULUS TEST PIER BUT FOR NO LESS THAN 10 SECONDS PER LIFT.
- G. IF CAVE-INS OCCUR ON TOP OF A LIFT OF AGGREGATE SUCH THAT THE VOLUME OF CAVED SOIL IS GREATER THAN APPROXIMATELY 10% OF THE VOLUME OF THE AGGREGATE IN THE LIFT, THEN THE AGGREGATE SHALL BE CONSIDERED CONTAMINATED, AND SHALL BE REMOVED AND REPLACED WITH UNCONTAMINATED AGGREGATE.
- 4. GEOPIER ELEMENTS NOT MEETING DESIGN REQUIREMENTS SHALL BE REINSTALLED UNLESS OTHERWISE APPROVED IN WRITING BY THE DESIGNER



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CONSTRUCTION NOTES FOR CONCRETE FOUNDATIONS SUPPORTED BY GEOPIER® ELEMENTS:

1. ALL EXCAVATIONS FOR FOUNDATIONS SUPPORTED BY GEOPIER ELEMENTS SHALL BE PREPARED IN THE FOLLOWING MANNER BY THE GENERAL CONTRACTOR: OVEREXCAVATION BELOW THE BOTTOM OF FOUNDATION SHALL BE LIMITED TO THREE INCHES. THIS INCLUDES LIMITING THE TEETH OF EXCAVATORS FROM OVEREXCAVATION BEYOND THREE INCHES BELOW THE FOUNDATION ELEVATION.

2. FOUNDATION CONCRETE SHALL BE PLACED IMMEDIATELY FOLLOWING FOUNDATION EXCAVATION AND APPROVAL, PREFERABLY THE SAME DAY AS THE EXACAVATION. FOUNDATION CONCRETE SHALL BE PLACED ON THE SAME DAY IF THE FOUNDATION IS BEARING ON MOISTURE-SENSITIVE SOILS. IF SAME DAY PLACEMENT OF FOUNDATION CONCRETE IS NOT POSSIBLE, OPEN EXCAVATIONS SHALL BE PROTECTED FROM SURFACE WATER ACCUMULATION. A LEAN CONCRETE MUD-MAT MAY BE USED TO ACCOMPLISH THIS. OTHER METHODS MUST BE PRE-APPROVED BY THE DESIGNER.

3. PRIOR TO CONCRETE OR MUD MAT PLACEMENT, THE TOP OF THE EXCAVATED SOIL AND GEOPIER ELEMENTS SHALL BE COMPACTED WITH A STANDARD, HAND-OPERATED IMPACT COMPACTOR (I.E. JUMPING JACK COMPACTOR). COMPACTION SHALL BE PERFORMED OVER THE ENTIRE FOUNDATION SUBGRADE TO COMPACT ANY LOOSE SURFACE SOIL AND LOOSE SURFACE GEOPIER AGGREGATE.

4. WATER SHALL NOT BE ALLOWED TO ACCUMULATE IN THE FOUNDATION EXCAVATIONS PRIOR TO CONCRETE PLACEMENT OR ALLOWED TO ACCUMULATE OVER THE POURED FOUNDATION.

5. EXCAVATION AND SURFACE COMPACTION OF ALL FOUNDATION SUBGRADES SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

6. THE TESTING AGENCY SHALL INSPECT EACH FOUNDATION AND APPROVE IT IN WRITING ON THE SAME DAY THAT THE CONCRETE OR MUD MAT IS PLACED IN THE FOUNDATION EXCAVATION. THE APPROVAL SHALL STATE THAT ALL FOUNDATION SUBGRADE, INCLUDING MATRIX SOILS AND GEOPIER TOPS, HAVE NOT BEEN OVEREXCAVATED MORE THAN THREE-INCHES BELOW THE BOTTOM OF THE FOUNDATION, HAVE BEEN KEPT FREE OF WATER ACCUMULATION, AND HAVE BEEN REASONABLY COMPACTED WITH A HAND-HELD MECHANICAL IMPACT COMPACTOR ON THE SAME DAY THAT THE CONCRETE WAS PLACED.

7. IN THE EVENT THAT FOUNDATION BOTTOM PREPARATIONS, AS DESCRIBED ABOVE, ARE NOT PERFORMED OR DOCUMENTED IN ACCORDANCE WITH THIS SECTION, ANY WRITTEN OR IMPLIED WARRANTY WITH RESPECT TO GEOPIER FOUNDATION PERFORMANCE CAN BY CONSIDERED VOID. Design F Allowable Depth to Total unit Soil friction Geopier Soil stiff

Туре / F5 F6 F6 F7 F7 F8 F۵ F9 FS FC F1(F1(F1 F14 F10 F10 F24

NOTES:



ADJACENT TEMPORARY UTILITY EXCAVATION DETAIL 2 ADJACEN

ADJACENT TEMPORARY UTILITY EXCAVATION NOTES:

- 1. DETAIL 1 DOES NOT APPLY TO MASS EXCAVATION OR SITE GRADING.
- 2. THE PROJECT GEOTECHNICAL ENGINEER'S RECOMMENDATIONS SHALL BE FOLLOWED FOR TEMPORARY OR PERMANANT SLOPES

WHERE PROPOSED EXCAVATIONS EXTEND INTO THE ZONE OF INFLUENCE, DISTURBANCE SHALL BE MINIMIZED AS MUCH AS POSSIBLE. DISTURBED PORTIONS OF GEOPIER ELEMENTS SHALL BE REMOVED AND THE EXCAVATIONS SHALL BE BACKFILLED WITH GRANULAR FILL COMPACTED IN ACCORDANCE WITH THE PROJECT REQUIREMENTS FOR STRUCTURAL FILL. AS AN ALTERNATE, EXCAVATIONS MAY BE BACKFILLED WITH FLOWABLE FILL OR LEAN CONCRETE.





FOOTING DETAILS NOT TO SCALE

Parameter	Value
e bearing pressure (ksf)	7
groundwater (ft)	5
weight of soil (pcf)	120
on angle (degrees)	26
stiffness modulus (pci)	300
ness modulus (pci)	38

′ Mark	Maximum Load, (kips, klf)	Width, (ft)	Length, (ft)	Thickness, (in)	Geopier Diameter, (in)	Number of Geopier Elements per Footing	Minimum Design Shaft Length, (ft) (1)	Anticipated Settlement, (in) (2)	Notes
5-1	100	5.0	5.0	18	24	1	9.0	1/2	
6-3	252	6.0	6.0	24	24	3	9.0	1/2	
<u> </u>	252	6.0	6.0	24	24	4	9.0	1/2	
'- 3	315	7.0	7.0	24	24	3	9.0	1/2	
'-4	343	7.0	7.0	24	24	4	9.0	1/2	
۹-3	315	8.0	8.0	36	24	3	9.0	1/2	
8-4	420	8.0	8.0	24	24	4	9.0	1/2	
۹-3	315	9.0	9.0	48	24	3	9.0	1/2	
)-4	420	9.0	9.0	30	24	4	9.0	1/2	
)-5	525	9.0	9.0	30	24	5	9.0	1/2	
0-5	525	10.0	10.0	30	24	5	9.0	1/2	
0-6	630	10.0	10.0	30	24	6	9.0	1/2	
1-6	630	11.0	11.0	36	24	6	9.0	1/2	
4-5	525	14.0	14.0	48	24	5	9.0	1/2	
)-11	315	10.0	11.0	48	24	3	9.0	1/2	
)x30	1050	10.0	30.0	36	24	10	9.0	1/2	
x32	2685	24.0	32.0	30	24	30	9.0	3/4	

(1) Geopier elements shall penetrate fill and reach bedrock. (2) Anticipated settlement is estimated to the nearest 1/4 inch.

GEOPIER® DESIGN PARAMETERS AND ESTIMATED SETTLEMENT



TYPICAL GEOPIER® ELEMENT (3) NOT TO SCALE





1/8/2021

Building&Safety: Ryan Rose

GEOPIER[®] Foundation Company

ct Number:		Dana Point, C GLA-113	a			-					Project Ni
			Top of Footing				Geopier Shaft Length,	Finish Floor Elevation,	Top of Geopier®		
umn Line	Geopier® Number(s)	Type / Mark	Elevation, (ft)	Width, (ft)	Length, (ft)	Thickness, (in)	(ft) (1)	(ft) (2)	Elevation, (ft)	Notes	Column
A-2	1	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-1
	2 - 3					NOT USE	C				D-4
A-3	4 - 6	F6	-1.00	6.0 6.0	6.0	24	9	0.00	-3.00		D-6
A-4 A-5	10 - 12	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-7
A-6	13 - 15	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-8
A-7	16 - 18	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-9
A-8	19 - 21	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-10
A-9	22 - 24	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-1
A-10	25 - 27	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-1.
A-11	28 - 30	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D-1
A-12	31 - 33	го	-1.00	0.0	0.0		<u>ש</u> ר	0.00	-3.00		D-1
A-13	35 - 37	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
	38					NOT USEI	D				D-1
A-14	39 - 42	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00		D-1
A-15	43 - 45	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D-1
	46		1		1	NOT USE	כ	1	1		D-1
A-16	47 - 49	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D-1
A 47	50	F 7	1.00	7.0	7.0			0.00			D-2
A-17	51 - 53	F/	-1.00	7.0	7.0		9	0.00	-3.00		D-2
A-18	55 - 57	F7	-1.00	7.0	7.0	24	٩	0.00	-3.00		D-2
	58		1.00	,	1 7.0		 >	1 0.00	1 0.00		D-2-
A-19	59 - 61	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D-25.6/
	62					NOT USE	C				
A-20	63 - 65	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		D.1-
	66		1		1	NOT USE	כ	1	· · · · ·		D.6-
A-21	67 - 69	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		
Δ_22	/U 71 72	E7	_1 00	7.0	7.0		ر ہ	0.00	_3 00		F-2
/ \- <u>-</u> LL	74		1-1.00	1.0	1.0		 D	1 0.00	0.00		E-3
A-23	75 - 77	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-4
A-24	78 - 80	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00		E-6
A-25	81 - 83	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		
-26.5	84	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		E-7
A-27	85 - 87	F9A	-1.00	9.0	9.0	48	9	0.00	-5.00		E-8
4-1.5	88	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		E-*
A.4-1	89 - 91	F10X11	-1.00	10.0	10.0	48	9	0.00	-5.00		E-1
A.4-2	92 - 94	F0 F6	-1.00	6.0 6.0	6.0	24	9	0.00	-3.00		E-1
A.5-1	98 - 100	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-1
A.5-5	101	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		E-1
<i>\</i> .7 - 27	102 - 104	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-1
A.8-1	105 - 107	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-1
A.9-7	108 - 110	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		E-1
B-2	111 - 115	F9	-1.00	9.0	9.0	30	9	0.00	-3.50		E-1
B-4 B-5	121 - 124	F9 F8	-1.00	9.0	9.0	30	9	0.00	-3.50		E-2
B-6	125 - 127	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-2
B-7	128 - 130	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-2
B-8	131 - 133	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		E-2
B-9	134 - 136	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		
B-10	137 - 139	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E-2
B-11	140 - 143	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.1-2
B-12	144 - 148	F9 F0	-1.00	9.0	9.0	30	9	0.00	-3.50		E.3-,
B-14 B-15	154 - 157	F8	-1.00	9.0 8.0	8.0	24	9	0.00	-3.00		E.8
B-16	158 - 161	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-
B-17	162 - 165	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-
B-18	166 - 169	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-2
B-19	170 - 173	 F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-2
B-20	174 - 177	F8	-1.00	8.0	8.0	24	9	0.00	-3.00		E.8-2
B-22	1/8 - 181		-1.00	8.0	8.0	24	9	0.00	-3.00		
B-22	102 - 185 186 - 189	F8	-1.00	0.U 8.0	0.0 8.0	24	9 0		-3.00		r-2
<u> </u>	190 - 195	F10	-1.00	10.0	10.0	30	9	0.00	-3.50		F-1
B-26	196 - 201	F10	-1.00	10.0	10.0	30	9	0.00	-3.50		
B.2-1	202 - 204	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-1
3.3-27	205 - 207	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00		
B.5-1	208 - 210	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-1
B.8-1	211 - 213	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
C-2	214 - 216	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		F-2
C-5	217 - 219 220 - 222		-1.00	7.U 6.0	1.0	24	9 0		-3.00		F-2
C-6	223 - 225	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-2
C-7	226 - 228	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		F-2
C-8	229 - 231	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		B.7-2
C-9	232 - 234	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		D.2-2
C-10	235 - 237	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		A-2
C-11	238 - 240	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		A-2
C-12	241 - 242	F7	-1.00	7.0	7.0	24	9	0.00	-3.00		A-2
0.40	243 - 244		1.00	F ~				0.00	0.50		B-1
C-13	245	F5	-1.00	5.0	5.0	18	9	0.00	-2.50		B.3-
∪-14	246 - 248		-1.00	7.0	1.0		<u>ש</u> ר	U.UU	-3.00		
C-15	249 250 - 252	F6	-1 00	60	6.0	24	ر <u>۹</u>	0.00	-3 00		□ -4/ Γ
C-16	253 - 255	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		NOTES:
C-17	256 - 258	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
C-18	259 - 261	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
C-19	262 - 264	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
C-20	265 - 267	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
		1	1			1	•	0.00			
C-21	268 - 270	F6	-1.00	6.0	6.0	24	9	0.00	-3.00		
C-21 C-22	268 - 270 271 - 273	F6 F6	-1.00 -1.00	6.0 6.0	6.0 6.0	24 24	9	0.00	-3.00 -3.00		

(1) GEOPIER® SCHEDULE



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GEOPIER[®]

GEOPIER[®] Foundation Company

GEOPIER[®]

ı:		Dana Point Ha Dana Point, Ca	<u>rbor Parkin</u> a a	g Structure				GEOPIER	® SCHEL	DULE
:		GLA-113								
	- eonier®		Top of Footing Elevation	Width	l enath	Thickness	Geopier Shaft Length, (ft)	Finish Floor Elevation,	Top of Geopier® Elevation	
N	lumber(s)	Type / Mark	(ft)	(ft)	(ft)	(in)	(1)	(1)	(ft)	Notes
2	281 - 284	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
2	285 - 288	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
2	289 - 291	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
2	92 - 294	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
2	95 - 297	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
2	98 - 300	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	801 - 303	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	804 - 306	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	807 - 309	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	310 - 312	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
	313					NOT USE	D			
	314	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
3	815 - 317	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
	318					NOT USE	D	1	r	
3	319 - 321	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	322 - 324	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	825 - 327	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	328 - 330	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	31 - 333	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	34 - 336	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	37 - 339	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	40 - 342	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	43 - 345	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	46 - 349	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
3	50 - 353	F5x29	-1.00	5.0	29.0	18	9	0.00	-2.50	
3	354 - 355					NOT USE	D	1		
3	356 - 358	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	859 - 361	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	62 - 364	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
3	65 - 367	F10x11	-1.00	10.0	10.0	48	9	0.00	-5.00	
3	68 - 370	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
3	371 - 373	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
3	374 - 378	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
3	379 - 383	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
	384					NOT USE	D			
3	85 - 388	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
3	89 - 392	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
3	93 - 396	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
3	97 - 400	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	01 - 404	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	05 - 409	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
4	10 - 414	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
4	15 - 418	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	19 - 422	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	23 - 426	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	27 - 430	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	31 - 434	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	35 - 438	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	39 - 442	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	43 - 446	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	47 - 450	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
4	51 - 455	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
	456					NOT USE	D			
4	57 - 461	F9	-1.00	9.0	9.0	30	9	0.00	-3.50	
4	62 - 464	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	65 - 467	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	68 - 470	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	71 - 473	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	74 - 476	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	77 - 479	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	80 - 482	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	83 - 485	F6	-1.00	6.0	6.0	24	9	0.00	-3.00	
4	86 - 490	F14	-1.00	14.0	14.0	48	9	0.00	-5.00	
	491	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
	492	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
4	93 - 533					NOT USE	D	1		
5	534 - 536	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
	537					NOT USE	D			
5	538 - 540 541	F7	-1.00	7.0	7.0	24 NOT USE	9 D	0.00	-3.00	
5	642 - 544	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
	545				_	NOT USE	D	_	I	
5	46 - 549	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
5	50 - 552	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
5	53 - 555	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
5	56 - 558	F7	-1.00	7.0	7.0	24	9	0.00	-3.00	
	559	F5	-1.00	5.0	5.0	18	9	0.00	-2.50	
5	60 - 589	F24x32	-1.00	24.0	32.0	30	9	0.00	-3.50	
5	90 - 599	F10x30	-1.00	10.0	30.0	36	9	0.00	-4.00	
	600	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
	601	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
	602	F9A	-1.00	9.0	9.0	48	9	0.00	-5.00	
	603	F8	-1.00	8.0	8.0	24	9	0.00	-3.00	
	604	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
	605	F8A	-1.00	8.0	8.0	36	9	0.00	-4.00	
6	606 - 655	CONT	-1.00	VARIES	223.5	24	9	0.00	-3.00	

(1) Geopier elements shall completely penetrate the fill and reach bedrock. (2) Structure FFE=0.00 ft is equivalent to Site Civil Elevation XX.XX ft.

Project Name: Project Location:

Project Number:

Load No.	Ram Load, (kips)	C E
	3.46	
1	11.53	
2	23.05	
3	34.57	
4	46.10	
5	57.62	
6	69.15	
7	80.65	
8	92.19	
9	103.72	
10	69.15	
11	45.64	
12	22.82	
13	3.46	

Notes:

Geopier Design Calculations. accordance with manufacturers specifications.



GEOPIER® MODULUS TEST SETUP 2

NOT TO SCALE

GEOPIER[®] Foundation Company



Geopier[®] Modulus Test Schedule

Dana Point Harbor Parking Structure Dana Point, Ca

GLA-113

Maximum Geopier Design Stress: 22,010 psf Modulus Test Location: Near Boring DH-35 Test Geopier Element Shaft Length: 9 ft Geopier Element Diameter: 24 in. Concrete Cap Thickness: 2 ft Design Modulus: 300 pci Total Drill Depth 11 ft Geopier Element | Percent of | Design Minimum Maximum Stress Duration Duration Stress, (psf) Remarks 1,101 5.0% N/A N/A seating load 3,669 16.7% 15 min 60 min 7,336 33.3% 15 min 60 min 11,005 50.0% 15 min 60 min 14,674 66.7% 15 min 60 min 18,341 83.3% 15 min 60 min 22,010 100.0% 15 min 60 min 25,672 116.6% 60 min 240 min 29,346 133.3% 15 min 60 min 33,015 150.0% 15 min 60 min 22,010 100.0% N/A rebound, unload N/A

> 14,527 66.0% N/A N/A rebound, unload 7,263 33.0% N/A N/A rebound, unload <u>1,101 5.0% N/A</u> N/A rebound, unload

1 - The Geopier element to be used in the modulus load testing should be installed in a manner similar to production, at least 4 days prior to testing, so that pore-pressures have adequate time to dissipate. 2 - The modulus load test shall be performed to a stress not less than 150% of the design maximum top-of-pier stress indicated in the

3 - The modulus load test Geopier element shall be installed to a depth of 11 feet below the ground surface with a 2-foot thick unreinforced

concrete leveling pad. The modulus load test Geopier shall penetrate fill. 4 - A telltale shall be installed in the bottom one-third of the tested Geopier element. Telltale deflections shall be monitored concurrent with

top of Geopier deflections during the modulus load test.

5 - The modulus load test setup shall be as shown on Geopier Construction Drawing GP0.1. Helical anchors should be installed in

6 - A representative of the owner's geotechnical consultant should be present to witness the load test.

2 GEOPIER® MODULUS TEST SCHEDULE







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<u>GEOPIER® LOCATION PLAN NOTES</u>

ELEMENTS.

1. FOOTING CONCRETE SHALL BE PLACED DIRECTLY ON TOP OF EXPOSED GEOPIER 2. ALL EXISTING AND PROPOSED UTILITIES WITHIN AND ADJACENT TO THE PROPOSED BUILDING FOOTPRINT SHALL BE FIELD VERIFIED BY THE GENERAL CONTRACTOR AND COORDINATED WITH THE GEOPIER INSTALLER BEFORE GEOPIER ELEMENT INSTALLATION SHALL PROCEED. 3. THESE DRAWINGS ARE FOR GEOPIER LOCATION ONLY, AND ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED

12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION.

4. GEOPIER ELEMENTS SHALL BE LOCATED IN THE FIELD AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS.

LEGEND

TYP. 24" GEOPIER ELEMENT $\left(\begin{array}{c}1\end{array}\right)$ TYP. GEOPIER ELEMENT NUMBER





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STRUCTURAL DRAWINGS PROVIDED BY CULP AND TANNER ON SHEET S2.01 DATED 12/03/19. REFER TO CULP AND TANNER DRAWINGS FOR FOOTING LAYOUT AND ORIENTATION.

(1)

TYP. GEOPIER

ELEMENT

NUMBER

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GEOPIER® LOCATION PLAN (**1**) <u>1/16" = 1'-0"</u>

GEOPIER[®] LOCATION PLAN NOTES

LEGEND

TYP. 24"

GEOPIER

ELEMENT

TYP. GEOPIER

ELEMENT

NUMBER

(1)

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Building&Safety: Ryan Rose

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<u>GEOPIER@ LOCATION PLAN NOTES</u>

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LEGEND

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GEOPIER® LOCATION PLAN (**1**) <u>1/16" = 1'-0"</u>

NORTH

<u>GEOPIER@ LOCATION PLAN NOTES</u>

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LEGEND

1/8/2021

Western Grou	nd Improvement, Inc. oc. Dublic Works
2372 Morse A	Ve OC Development Services
Juile Ju4	APPROVED
Irvine, CA 926 www.western	14 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 Organe County. The stamping of these plan grouped of the violation of any provisions of any County Ordinance or State law.
	Hadi Tabatabaee BUILDING OFFICIAL

February 11, 2020

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

> Re: Calculations Package for a *Geopier*[®] Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The design is based on geotechnical information provided by «GE» in the report dated «GEreportdateTEXT». Structural design loads are as provided by «SE». The following documents are included herein:

- Geopier settlement calculations for square footings
- Geopier settlement calculations for rectangular footings

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Sincerely, Western Ground Improvement, Inc.

Ken Hoevelkamp, P.E. Principal Engineer

Building&Safety: Ryan Rose Approval: Geotechnical Reports

Permits: GRD20-0021

GEOPIER[®] Foundation Company

Project: No.:	
Engnr:	
Date:	

RAP diameter (in) Depth to groundwater (ft) Total unit weight of soil (pcf) Soil frict. angle (degr) Max. hor. pressure (psf) From Table 4.2: RAP cell cap. (kips) Footing bearing press. (ksf) RAP stiffn. modulus (pci) Soil stiffness modulus (pci)

Parameter

Dana Point Harbor	Parking	Structure
GLA-113		

Α INPUT PARAMETER VALUES:

GLA-113		0										
AMB							Coun	ty of C	RUAR	E.FOOT	PNAR	Works
12/6/2019	9							OC D	eversion	306 Aug	ust 2013	s
S:		TOP OF PIER STRESS - SQUARE	FOOTI	NGS					APPE	OVED		
Symb	Val.	Parameter	Symb	Equation	F5-1	F6-3	F6-4	F7-3	F7-4	F8A-3	F8-4	
d	24	Max Column load (kips)	Р		100	252	252	et of 1345	and sas	cilications	must 420	lept on the
dgw	5	Required footing width (ft)	Br	sqrt(P/qall)	3.78	6.00	afegg	ions forth	ese plang	without 1	itten7p75	hission
g	120	Selected footing width (ft)	В		5	6	from6	C Publiz	Works, Ø	C Devel8	ment S8	vices
f	26	Footing bearing pressure	q	P/(B*B)	4.00	7.00	5pect	cations S	HALL NO	T be held	to permit	or be an
pmax	2500	Required No. RAP elems	Nr	P/Qcell	1.0	2.4	ap p ro	val of the	violation 3	f any prov	isions 40	any County
		Selected No. RAP elems	N		1	3	Ordina	ince or Si	ate law.4	3	4	
Qcell	105	Area replacement ratio	Ra	N*Ag/(B*B)	0.126	0.262	0.349	0.192	Hafu256	bataba46	0.196	
qall	7	Stiffness ratio	Rs	kg/km	7.9	7.9	7.9	7.9	BUILD7N	OFFIC	L 7.9	
kg	300	Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	16.92	19.70	16.22	21.82	19.96	19.28	22.01	
km	38	Load at top of GP (kips)	Qg	qg*Ag	53.2	61.9	51.0	68.5	62.7	60.6	69.1	
		SHAFT LENGTH REQUIREMENTS	5									
		Depth of Embedment	Df		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
		Trial shaft length (ft)	Hs		9.0	9.0	9.0	9.0	9.0	9.0	9.0	
		Drill depth (ft)	Hdrill	Df+Hs	12	12	12	12	12	12	12	
•				0071000								
5:	1	UPPER ZONE SETTLEMENT - SC	UAREI	OUTINGS			r					4
'S		Parameter	Symb	Equation								
Sym	Val	UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	1	

INPUT PARAMETER VALUES:

Upper Zone Elastic Parameter	s	
Parameter	Sym	Va
Pier Modulus Layer 1 (ksf)	Eg1	
Pier Modulus Layer 2 (ksf)	Eg2	
Pier Modulus Layer 3 (ksf)	Eg3	
Pier Modulus Layer 4 (ksf)	Eg4	
Pier Modulus Layer 5 (ksf)	Eg5	
Soil Modulus Layer 1 (ksf)	Em1	
Soil Modulus Layer 2 (ksf)	Em2	
Soil Modulus Layer 3 (ksf)	Em3	
Soil Modulus Layer 4 (ksf)	Em4	
Soil Modulus Layer 5 (ksf)	Em5	

UPPER ZONE SETTLEMENT - SC	UARE F	OOTINGS							
Parameter	Symb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	1
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H_{uz2}								
Thickness of UZ sublayer 3 (ft)	H_{uz3}								
Thickness of UZ sublayer 4 (ft)	H_{uz4}								
Thickness of UZ sublayer 5 (ft)	H_{uz5}								
Total UZ Thickness OK?		Huz = Hs + d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E _{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E _{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E _{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E_{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	S _{uz1}	qg/kg or q*l σ -vag*H/Ecomp	0.39	0.46	0.38	0.51	0.46	0.45	0.51
Sett. of UZ sublayer 2 (in)	S _{uz2}	q*I <i>σ</i> -2*H _{uz2} /E _{comp2}	N/A						
Sett. of UZ sublayer 3 (in)	s _{uz3}	q*I <i>σ</i> -3*H _{uz3} /E _{comp3}	N/A						
Sett. of UZ sublayer 4 (in)	s _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A						
Sett. of UZ sublayer 5 (in)	S _{uz5}	q*I <i>σ</i> -5*H _{uz5} /E _{comp5}	N/A						
Total Upper Zone Settlement (in)	S _{uz}	s _{uz1} +s _{uz2} +s _{uz3} +s _{uz4} +s _{uz5}	0.39	0.46	0.38	0.51	0.46	0.45	0.51

INPUT PARAMETER VALUES:

Parameter	Symb	Val.
Allowable end-bearing (kips)	Qeb	0.0
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	2000
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	2000
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	2000
Calc. settlement to X*B	Х	2

Parameter	Symb	Equation	F5-1	F6-3	F6-4	F7-3	F7-4	F8A-3	F8-4
Dpth to bottm of LZ from ftg (ft)	X*B	X*B	10	12	12	14	14	16	16
Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Lower zone thickness (ft)	H _{lz}	H2b-HIz	-1	1	1	3	3	5	5
Thickness of LZ sublayer 1(ft)	H _{lz1}		0	1	1	3	3	5	5
Thickness of LZ sublayer 2 (ft)	H _{lz2}								
Thickness of LZ sublayer 3 (ft)	H _{Iz3}								
Thickness of LZ sublayer 4 (ft)	H _{Iz4}								
Thickness of LZ sublayer 5 (ft)	H _{Iz5}								
Total LZ thickness ok?			No LZ	ok	ok	ok	ok	ok	ok
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	E (ksf) or c _ε	800	800	800	800	800	800	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
E or c _ε for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
Initial stress for sublyr 1 (ksf)	P' ₀₁		1.118	1.147	1.147	1.205	1.205	1.262	1.262
Initial stress for sublyr 2 (ksf)	P' ₀₂		1.118	1.176	1.176	1.291	1.291	1.406	1.406
Initial stress for sublyr 3 (ksf)	P' ₀₃		1.118	1.176	1.176	1.291	1.291	1.406	1.406
Initial stress for sublyr 4 (ksf)	P' ₀₄		1.118	1.176	1.176	1.291	1.291	1.406	1.406
Initial stress for sublyr 5 (ksf)	P'05		1.118	1.176	1.176	1.291	1.291	1.406	1.406
Ftg stress on sublyr 1 (ksf)	ΔP1	q*l	0.36	0.82	0.82	0.85	0.93	0.72	0.96
Ftg stress on sublyr 2 (ksf)	$\Delta P2$	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
Ftg stress on sublyr 3 (ksf)	ΔP3	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
Ftg stress on sublyr 4 (ksf)	$\Delta P4$	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
Ftg stress on sublyr 5 (ksf)	$\Delta P5$	q*l	0.36	0.76	0.76	0.69	0.76	0.53	0.71
Sett. of LZ sublayer 1 (in)	S _{IZ1}	DP1*HIz1/E1	0.00	0.01	0.01	0.04	0.04	0.05	0.07
Sett. of LZ sublayer 2 (in)	S _{IZ2}	DP2*HIz2/E2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sett. of LZ sublayer 3 (in)	s _{iz3}	DP3*HIz3/E3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sett. of LZ sublayer 4 (in)	S _{IZ4}	DP4*HIz4/E4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sett. of LZ sublayer 5 (in)	s _{iz5}	DP5*HIz5/E5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total lower zone sett. (in)	S _{IZ}	s _{lz1} +s _{lz2} +s _{lz3} +s _{lz4} +s _{lz5}	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total UZ + LZ settlement (in)	S		0.4	0.5	0.4	0.5	0.5	0.5	0.6

LOWER ZONE SETTLEMENTS - SQUARE FOOTINGS

Building&Safety: Ryan Rose Approval: Geotechnical Reports

Permits: GRD20-0021

1/8/2021

GEOPIER[®] Foundation Company

Project: No.:	
Engnr:	
Date:	

Parameter

INPUT PARAMETER VALUES:

RAP diameter (in) Depth to groundwater (ft) Total unit weight of soil (pcf)

Soil frict. angle (degr) Max. hor. pressure (psf)

From Table 4.2:

RAP cell cap. (kips) Footing bearing press. (ksf) RAP stiffn. modulus (pci) Soil stiffness modulus (pci)

Dana Point Harbor	Parking	Structure
GLA-113		

AMB 12/6/

MB 2/6/2019)						Coun	ty of OC D	QUAR	E.FOO	PNGE Vet 2023es	Works
	TOP OF PIER STRESS - SQUARE FOOTINGS								APPR			
Symb	Val.	Parameter	Symb	Equation	F9A-3	F9-4	F9-5	F10-5	F10-6	F11-6	F14-5	
d	24	Max Column load (kips)	Р		315	420	525	et of 1525	s and 690	cilical 630	must 525	ept on the
dgw	5	Required footing width (ft)	Br	sqrt(P/qall)	6.71	7.75	8,66	ions 8,66	ese p949	with 9.49	ntten 866h	ission
g	120	Selected footing width (ft)	В		9	9	from90	C Public	Works10	C Develo	ment 34rv	ices
f	26	Footing bearing pressure	q	P/(B*B)	3.89	5.19	6.48	nge <u>625</u>	ty 6,30	amping p	f these and	r he an
pmax	2500	Required No. RAP elems	Nr	P/Qcell	3.0	4.0	apero	val of the	violation	f any 60	risions50	ny County
		Selected No. RAP elems	N		3	4	Ordifi	ance or S	ate law.6	6	5	,,
Qcell	105	Area replacement ratio	Ra	N*Ag/(B*B)	0.116	0.155	0.194	0.157	Hafu198	batab156	0.080	
qall	7	Stiffness ratio	Rs	kg/km	7.9	7.9	7.9	7.9	BUILDIN	OFFIC	7.9	
kg	300	Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	17.04	19.78	21.89	19.90	21.63	19.82	13.62	
km	38	Load at top of GP (kips)	Qg	qg*Ag	53.5	62.1	68.8	62.5	67.9	62.3	42.8	

SHAFT LENGTH REQUIREMENTS

Depth of Embedment	Df		3.0	3.0	3.0	3.0	3.0	3.0	3.0
Trial shaft length (ft)	Hs		9.0	9.0	9.0	9.0	9.0	9.0	9.0
Drill depth (ft)	Hdrill	Df+Hs	12	12	12	12	12	12	12

INPUT PARAMETER VALUES:

Upper Zone Elastic Parameter	s	
Parameter	Sym	Va
Pier Modulus Layer 1 (ksf)	Eg1	
Pier Modulus Layer 2 (ksf)	Eg2	
Pier Modulus Layer 3 (ksf)	Eg3	
Pier Modulus Layer 4 (ksf)	Eg4	
Pier Modulus Layer 5 (ksf)	Eg5	
Soil Modulus Layer 1 (ksf)	Em1	
Soil Modulus Layer 2 (ksf)	Em2	
Soil Modulus Layer 3 (ksf)	Em3	
Soil Modulus Layer 4 (ksf)	Em4	
Soil Modulus Layer 5 (ksf)	Em5	

Parameter	Svmb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	1
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H _{uz2}								
Thickness of UZ sublayer 3 (ft)	H _{uz3}								
Thickness of UZ sublayer 4 (ft)	H _{uz4}								
Thickness of UZ sublayer 5 (ft)	H _{uz5}								
Total UZ Thickness OK?		Huz = Hs + d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E _{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E _{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E_{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E_{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	s _{uz1}	qg/kg or q*I∂-vag*H/Ecomp	0.39	0.46	0.51	0.46	0.50	0.46	0.32
Sett. of UZ sublayer 2 (in)	S _{uz2}	q*I <i>σ</i> -2*H _{uz2} /E _{comp2}	N/A						
Sett. of UZ sublayer 3 (in)	s _{uz3}	q*I <i>o</i> -3*H _{uz3} /E _{comp3}	N/A						
Sett. of UZ sublayer 4 (in)	s _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A						
Sett. of UZ sublayer 5 (in)	s _{uz5}	q*I <i>σ</i> -5*H _{uz5} /ヒ _{comp5}	N/A						
Total Upper Zone Settlement (in)	S _{uz}	$s_{uz1}+s_{uz2}+s_{uz3}+s_{uz4}+s_{uz5}$	0.39	0.46	0.51	0.46	0.50	0.46	0.32

INPUT PARAMETER VALUES:

Parameter	Symb	Val.
Allowable end-bearing (kips)	Qeb	0.0
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	2000
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	2000
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	2000
Calc. settlement to X*B	Х	2

LOWER ZONE SETTLEMENTS - S	QUARE	FOOTINGS							
Parameter	Symb	Equation	F9A-3	F9-4	F9-5	F10-5	F10-6	F11-6	F14-5
Dpth to bottm of LZ from ftg (ft)	X*B	X*B	18	18	18	20	20	22	28
Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Lower zone thickness (ft)	H _{lz}	H2b-Hlz	7	7	7	9	9	11	17
Thickness of LZ sublayer 1(ft)	H _{Iz1}		5	5	5	5	5	5	5
Thickness of LZ sublayer 2 (ft)	H _{lz2}		2	2	2	4	4	5	5
Thickness of LZ sublayer 3 (ft)	H _{Iz3}							1	5
Thickness of LZ sublayer 4 (ft)	H _{lz4}								2
Thickness of LZ sublayer 5 (ft)	H _{Iz5}								
Total LZ thickness ok?			ok						
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	E (ksf) or c _ε	800	800	800	800	800	800	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	E (ksf) or c_{ϵ}	2000	2000	2000	2000	2000	2000	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	E (ksf) or c _ε	2000	2000	2000	2000	2000	2000	2000
Initial stress for sublyr 1 (ksf)	P' ₀₁		1.262	1.262	1.262	1.262	1.262	1.262	1.262
Initial stress for sublyr 2 (ksf)	P' ₀₂		1.464	1.464	1.464	1.522	1.522	1.550	1.550
Initial stress for sublyr 3 (ksf)	P'03		1.522	1.522	1.522	1.637	1.637	1.723	1.838
Initial stress for sublyr 4 (kst)	P' ₀₄		1.522	1.522	1.522	1.637	1.637	1.752	2.040
Initial stress for sublyr 5 (KST)	P'05		1.522	1.522	1.522	1.637	1.637	1.752	2.098
Ftg stress on sublyr 1 (Kst)		q^l	0.70	0.93	1.16	1.12	1.34	1.29	0.95
Fig stress on sublyr 2 (kst)		q 1 a*l	0.47	0.62	0.70	0.69	0.62	0.77	0.59
Fig stress on sublyr 3 (kst)		q i	0.42	0.50	0.70	0.57	0.00	0.59	0.40
Ftg stress on sublyr 5 (ksf)		q*l	0.42	0.50	0.70	0.57	0.00	0.50	0.31
Sett. of LZ sublaver 1 (in)	Siz1	DP1*HIz1/E1	0.05	0.07	0.09	0.08	0.10	0.00	0.20
Sett. of LZ sublayer 2 (in)	S ₁₇₂	DP2*HIz2/E2	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Sett. of LZ sublayer 3 (in)	S _{IZ3}	DP3*HIz3/E3	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Sett. of LZ sublayer 4 (in)	S _{Iz4}	DP4*HIz4/E4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sett. of LZ sublayer 5 (in)	s _{lz5}	DP5*HIz5/E5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total lower zone sett. (in)	S _{lz}	$s_{lz1}+s_{lz2}+s_{lz3}+s_{lz4}+s_{lz5}$	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total UZ + LZ settlement (in)	S		0.5	0.5	0.6	0.6	0.6	0.6	0.4

Building&Safety: Ryan Rose Approval: Geotechnical Reports

Permits: GRD20-002 **OPIER**[®]

CORRECTANGULAR FOOTINGS Works

GEOPIER[®] Foundation Company

Project: No.:		
Engnr:		
Date:		

Dana Point Harbor Parking Structure GLA-113

AMB 12/6/2019 INPLIT PARAMETER VALUES

IN OTTAINETER TAEOEC		
Parameter	Symb	Val.
RAP diameter (in)	d	24
Depth to groundwater (ft)	dgw	5
Total unit weight of soil (pcf)	g	120
Soil frict. angle (degr)	f	26
Max. hor. pressure (psf)	pmax	2500
From Table 4.2:		
RAP cell cap. (kips)	Qcell	105
Footing bearing press. (ksf)	qall	7
RAP stiffn. modulus (pci)	kg	300
Soil stiffness modulus (pci)	km	38

						OC E	eVersion	306 Aug	Set 2013	es
TOP OF PIER STRESS - RECTANO	GULAR	FOOTINGS					APPE	ROVE		<u> </u>
Parameter	Symb	Equation	F10x11	F10x30	F24x32				$\simeq V \nu$	
Max Column load (kips)	Р		93	1050	3150	et of plan	s and spe	cifications	must be	kept on the
Selected footing width (ft)	В		10.00	10.00	24.00	tions to th	ese plans	without w	ritten per	nission
Required footing length (ft)	Lr		1.33	15.00	18,75	OC Public	Works, C	C Develo	pment Se	rvices
Selected footing length (ft)	L		11.00	30.00	32.00	inge Cour	Ity. The s	tamping o	f these pl	an or be an
Footing bearing pressure	q	P/(B*L)	0.85	3.50	a4019	val of the	violation	f any pro	visions of	any County
Required No. RAP elems	Nr	P/Qcell	0.9	10.0	01060	ance or S	ate law.	10 AN		
Selected No. RAP elems	N		3	10	30		Hadi Ta	batabaee		
Area replacement ratio	Ra	N*Ag/(B*L)	0.086	0.105	0.123		BUILDING	S OFFICI	AL	
Stiffness ratio	Rs	kg/km	7.9	7.9	7.9		1	0.5		
Stress at top of GP (ksf)	qg	q*Rs/(Rs*Ra-Ra+1)	4.20	16.05	17.54					
Load at top of GP (kips)	Qg	qg*Ag	13.2	50.4	55.1					

SHAFT LENGTH REQUIREMENTS

Depth of Embedment Df 3.0 3.0 3.0 9.0 12 9.0 12 Trial shaft length (ft) Hs 9.0 Drill depth (ft) Hdrill Df+Hs 12

INPUT PARAMETER VALUES:

Upper Zone Elastic Parameter	s	
Parameter	Sym	Va
Pier Modulus Layer 1 (ksf)	Eg1	
Pier Modulus Layer 2 (ksf)	Eg2	
Pier Modulus Layer 3 (ksf)	Eg3	
Pier Modulus Layer 4 (ksf)	Eg4	
Pier Modulus Layer 5 (ksf)	Eg5	
Soil Modulus Layer 1 (ksf)	Em1	
Soil Modulus Layer 2 (ksf)	Em2	
Soil Modulus Layer 3 (ksf)	Em3	
Soil Modulus Layer 4 (ksf)	Em4	
Soil Modulus Layer 5 (ksf)	Em5	

UPPER ZONE SETTLEMENT - RE	CTANG	ULAR FOOTINGS							
Parameter	Symb	Equation							
UZ Settlement Approach		1-Stiffness, 2-Modulus	1	1	1	1	1	1	
Thickness of UZ sublayer 1(ft)	H _{uz1}								
Thickness of UZ sublayer 2 (ft)	H _{uz2}								
Thickness of UZ sublayer 3 (ft)	H _{uz3}								
Thickness of UZ sublayer 4 (ft)	H _{uz4}								
Thickness of UZ sublayer 5 (ft)	H _{uz5}								
Total UZ Thickness OK?		Huz = Hs +d							
Composite Modulus Layer 1 (ksf)	E _{comp1}	Eg1Ra + Em1(1-Ra)							
Composite Modulus Layer 2 (ksf)	E_{comp2}	Eg2Ra + Em2(1-Ra)							
Composite Modulus Layer 3 (ksf)	E_{comp3}	Eg3Ra + Em3(1-Ra)							
Composite Modulus Layer 4 (ksf)	E_{comp4}	Eg4Ra + Em4(1-Ra)							
Composite Modulus Layer 5 (ksf)	E_{comp5}	Eg5Ra + Em5(1-Ra)							
Sett. of UZ sublayer 1 (in)	S _{uz1}	qg/kg or q*I σ -vag*H/Ecomp	0.10	0.37	0.41				
Sett. of UZ sublayer 2 (in)	s _{uz2}	q*I <i>σ</i> -2*H _{uz2} /E _{comp2}	N/A	N/A	N/A				
Sett. of UZ sublayer 3 (in)	s _{uz3}	q*I <i>o</i> -3*H _{uz3} /E _{comp3}	N/A	N/A	N/A				
Sett. of UZ sublayer 4 (in)	s _{uz4}	q*I <i>σ</i> -4*H _{uz4} /E _{comp4}	N/A	N/A	N/A				
Sett. of UZ sublayer 5 (in)	S _{uz5}	q*I <i>उ</i> -5*H _{uz5} /E _{comp5}	N/A	N/A	N/A				
Total Upper Zone Settlement (in)	S _{uz}	$s_{uz1}+s_{uz2}+s_{uz3}+s_{uz4}+s_{uz5}$	0.10	0.37	0.41				

INPUT PARAMETER VALUES:

Parameter	Symb	Val.
Allowable end-bearing (kips)	Qeb	0.0
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	800
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	2000
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	2000
E or c_{ϵ} for LZ sublyr 4	E_4 / $c_{\epsilon 4}$	2000
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	2000
Calc. settlement to X*B	Х	2

LOWER ZONE SETTLEMENTS							
Parameter	Symb	Equation	F10x11	F10x30	F24x32		
Dpth to bottm of LZ from ftg (ft)	X*B	X*Beq	21.0	34.6	55.4		
Upper zone thickness (ft)	H _{uz}	Hs+d	11.00	11.00	11.00		
Lower zone thickness (ft)	H _{lz}	H2b-Hlz	10	23.7	44.5		
Thickness of LZ sublayer 1(ft)	H _{lz1}		5	5	5		
Thickness of LZ sublayer 2 (ft)	H _{lz2}		5	5	20		
Thickness of LZ sublayer 3 (ft)	H _{lz3}			5	19.5		
Thickness of LZ sublayer 4 (ft)	H _{Iz4}			5			
Thickness of LZ sublayer 5 (ft)	H _{Iz5}			3.7			
Total thickness ok?			ok	ok	ok		
E or c_{ϵ} for LZ sublyr 1	$E_1 / c_{\epsilon 1}$	E (ksf) or c _ε	800	800	800		
E or c_{ϵ} for LZ sublyr 2	$E_2 / c_{\epsilon 2}$	E (ksf) or c_{ϵ}	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 3	$E_3 / c_{\epsilon 3}$	E (ksf) or c _ε	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 4	$E_4 / c_{\epsilon 4}$	E (ksf) or c _ε	2000	2000	2000		
E or c_{ϵ} for LZ sublyr 5	$E_5 / c_{\epsilon 5}$	E (ksf) or c_{ϵ}	2000	2000	2000		
Initial stress for sublyr 1 (ksf)	P' ₀₁		1.262	1.262	1.262		
Initial stress for sublyr 2 (ksf)	P'02		1.550	1.550	1.982		
Initial stress for sublyr 3 (ksf)	P' ₀₃		1.694	1.838	3.120		
Initial stress for sublyr 4 (ksf)	P'_04		1.694	2.126	3.682		
Initial stress for sublyr 5 (ksf)	P' ₀₅		1.694	2.377	3.682		
Ftg stress on sublyr 1 (ksf)	ΔP1	q*l	0.19	1.63	2.94		
Ftg stress on sublyr 2 (ksf)	ΔP2	q*l	0.11	1.08	1.51		
Ftg stress on sublyr 3 (ksf)	ΔP3	q*l	0.09	0.74	0.62		
Ftg stress on sublyr 4 (ksf)	ΔP4	q*l	0.09	0.53	0.44		
Ftg stress on sublyr 5 (ksf)	ΔP5	q*l	0.09	0.42	0.44		
Sett. of LZ sublayer 1 (in)	S _{IZ1}	DP1*HIz1/E1	0.01	0.12	0.22		
Sett. of LZ sublayer 2 (in)	s _{lz2}	DP2*HIz2/E2	0.00	0.03	0.18		
Sett. of LZ sublayer 3 (in)	s _{iz3}	DP3*HIz3/E3	0.00	0.02	0.07		
Sett. of LZ sublayer 4 (in)	S _{IZ4}	DP4*HIz4/E4	0.00	0.02	0.00		
Sett. of LZ sublayer 5 (in)	S _{IZ5}	DP5*HIz5/E5	0.00	0.01	0.00		
Total lower zone sett. (in)	SIZ	$s_{lz1} + s_{lz2} + s_{lz3} + s_{lz4} + s_{lz5}$	0.0	0.2	0.5		
Total UZ + LZ settlement (in)	S		0.1	0.6	0.9		

Page 3 of 3

1/8/2021

Western Grou	County of Orange - OC Public Works
2372 Morse A	/e APPROVED
Suite 504	
Irvine, CA 926 www.western	I his set of plans and specifications must be kept on the 4 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 ground imported in the tag.
	Hadi Tabatabaee BUILDING OFFICIAL

February 11, 2020

Mr. Dave Atkinson GMU Geotechnical, Inc. 23241 Arroyo Vista Rancho Santa Margarita, California 92688

Re: Quality Control Package for a *Geopier®* Foundation System Dana Point Harbor Parking Structure Dana Point, California GFC Project No.: GLA-113

Dear Mr. Atkinson,

Sincerely,

Geopier Foundation Company, Inc. has completed the Geopier® foundation design for the above project. The following documents are included herein:

• Geopier Quality Control Package

We are pleased to have provided you with our design services. If you have any questions, please contact this office.

Ken Hoevelkamp, P.E. Principal Engineer

WGI GEOPIER® FOUNDATIONS

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

County of Orange - OC Public Works OC Development Services APPROVED

1/8/2021

QUALITY CONTROL PACKAGE FOR GEOPIER FO (Copy to be provided to Owner's QA Representative and the standing of the standing of

Project:	<u>Dana Point Harbor Parking Structure</u> <u>Dana Point, California</u>	Hadi Tabatabaee BUILDING OFFICIAL
Project Number:	<u>GLA-113</u>	
Geopier Designer: Mobile: E-Mail:	<u>Ken Hoevelkamp, P.E.</u> 949.677.6553 <u>ken@westerngroundimprovement.com</u>	
Geotechnical Engineer: Contact: Phone:	<u>GMU Geotechnical, Inc.</u> Dave Atkinson 949.546.0085	
Structural Engineer: Contact: Phone: Referenced Drawings: Date of Drawings:	<u>Culp and Tanner</u> <u>Rory Rottshalk</u> <u>530.895.3518</u> <u>S2.01</u> 12/03/19	

Anticipated Geotechnical Conditions:

The subsurface conditions generally consist of soft to very stiff lean clay fill and medium dense to very dense silty sand fill underlain by medium stiff to very stiff lean clay and medium dense to very dense sand overlying sandstone and siltstone (Capistrano Formation). Groundwater was encountered 12 to 17 feet below existing grade.

Potential Anomalies:

None.

Materials to be Encountered at Bottom of Shaft:

Medium stiff to very stiff clay and/or medium dense to very dense sand.

Other Items:

Piers should completely penetrate the fill.

ATTACHMENTS -

GEOTECHNICAL INFORMATION GEOPIER TEST SCHEDULES

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 Tabatabase BUILDING OFFICIAL

GEOTECHNICAL INFORMATION

The attached boring logs have been prepared by others and are included solely for reference purposes. The boring logs should be used for information only and are not intended to represent geotechnical recommendations for this project. The project geotechnical report should be reviewed in its entirety for more information.

Building&Safety: Ryan Rose

1/8/2021

Pro	ject iect	: D	ana Point Harbor, Commercia	I Component		Log	Approval: Ge	eotec D20-0		B DF	s 1-2	9	
Pro	ject	Nu	mber: 17-206-02				County	of O	of 2 rang	e)+O	C Pi	ıblic	Works
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Meth Drill F	od Rig	CM	E 75	Contractor Diameter(s)	ing		of a Drill Ho from OC P Approxide	eo the ublic \ Infact	se plan Vorks, 9. The ALL N	s without OC Deve stamping	of the	in perm int Servicese pla	ission rices n r be an
Grou [Elev	ndwa ation]	ter D , feet	epth 16.0 [-2.7]	Sampling Method(s) Cal-mod sleeve,	d sampler SPT, and I	with 6-inch bulk	Driving Me	or Sta Na	te law tive a Hadi T	of any p nd Qui abataba	ickre	ons of a ote	ny County
Rema	arks		1	1	1		and Drop	_	AL		imer		
ELEVATION, feet	DEPTH, feet	SRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION A DESCRIPTION	ND	SAMPLE	AUMBER DF BLOWS	DRIVING VEIGHT, Ibs	AOISTURE	NEIGHT, pcf	ADDITIONAL TESTS
—					Asphalt C	concrete (approximate	ely 3	0	20		20		
10 -	-		ARTIFICIAL FILL (Qaf) Subrounded gravel up to 4"		Aggregate SILTY SA brown, sli medium g	e Base (approximatel ND (SM), brown gray ghtly moist, medium o rained, some gravel	y 3 inches) , yellowish Jense,	1 [1] ¹ 1 [5 10 12	140			
	-5		Subrounded gravel 1 to 6"		SANDY C hard, fine gravel	CLAY (CL), dark brow to medium grained, s	n, moist, some	-	50/0.5'	' 140	6	108	
5-	-		Rounded to subrounded gravel and cob up to 7"	bles	brownish	gray, moist, stiff		, 111111111111111111111111111111111111	3 4 5	140			
	- 10		Minor fine grained sand						4 6 7	140	29	92	
0-	-		Scattered gravel		gray and fine grain	orange brown, moist, ed sand	firm to stiff,	1	3 4 4	140			
	- 15 -		MARINE DEPOSITS (Qm) Rounded to subrounded gravel up to 3"		SANDY C medium g	LAY (CL); gray, mois rained sand	t, firm, — — ⊊	-	2 3 4	140	23	100	
-5-	-		CAPISTRANO FORMATION (Tc)		SILTSTO overlying brown and dense, fin	NE (ML), gray, moist SANDSTONE (SP), (d dark orange brown, e to medium grained	, hard brange wet, very	-					

Drill Hole DH-29

Project Dana Point Harbor, Commancial Component Log of Drift Hole DH-29 Project Number: 17:20-02 Colify of Origin - 0.0, euclid Work 00001 01 CLASSFICATION AND DESCRIPTION ORIENTATION DATA CLASSFICATION AND DESCRIPTION CLASSFICATION AND DESCRIPTIO							Building&Sat	ety:	Ryan	Rose			1/8/202
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-15 - 30 Sitstone is thinly bedded with white mottles. SANDSTONE (SP), gray, wet, dense, fine 16 140 121 140 140 140 140 140 140 140 140 140 14	-10 - - -25 -				Interbedd SANDST dark gray dense/ha	led SILTSTONE and ONE (SP and ML), p ish brown and gray, rd, fine grained	pale brown, moist, very		50/4"	140	21	106	
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DH_REV3 17-206-02 (UPDATED ELEV.); GPJ GMULAB.GPJ 4/4/19
Building&Safety: Ryan Rose

1/8/2021

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5-	- 5					SANDY C very stiff	LAY (CL), grayish bi	rown, moist,	-	20 26 12	140	19		
	-		Scattered gravel up to 4"			brown, mo	bist, fine to medium (grained		3 8 9	140			
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ED ELEV.).GPJ GMUL	-					moist, ver	y stiff, fine grained s	and		6 8 10	140			
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GEOTECHNICAL, INC.

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Building&Safety: Ryan Rose

1/8/2021

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5-	- 5	Gra	vel up to 4"			brownish	gray, moist, stiff			3 6 9	140	27	92	
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0 -	- 10					gray and I	brown, moist, fine gra	ained sand		5 7 11	140	22	102	
	-					gray, wet,	soft to firm, fine grai	ned sand [∑]	1 101010100000000000000000000000000000	1 2 2	140			
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Building&Safety: Ryan Rose

Building&Safety: Ryan Rose

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0 -			Rare gravel up to 1"			brown and dense, fine	orange brown, mois grained	st, medium		9 9 9	140			
-	-10					brownish gi	ray, wet, dense, fine	e grained		7 11 17	140	14	114	
-5 -			MARINE DEPOSITS (Qm)			SAND (SP) orange brov grained	, gray, brownish gr. wn, moist, very den	ay and se, fine		4 23 35	140			
-	-15		CAPISTRANO FORMATION (Tc) Minor siltstone, subtle bedding			SANDSTO very dense	NE (SP), grayish br medium to fine gra	own, wet, ained ⊻	-	33 50/4"	140	16	116	
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GEOTECHNICAL, INC.

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DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 4/4/19

GEOTECHNICAL, INC.

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.

GEOPIER TEST SCHEDULES

GEOPIE	R [®] Four	ndation C	ompany			Building&Safety: Ryan Rose 1/8/202 Approval: Geotechnical Reports Permits: GRD20-0021 County of Orange - OC Public Works OC Development Services
Project Na	ame:	Dana Poin	t Harbor Park	ing Structure		A This set of plans and specifications, must be kept on the
Project Lo	ocation:	Dana Poin	t, Ca			Geopier Modulus Test Schedule, changes or alterations to these place without writing permission
Project N	umber:	GLA-113				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.
Ι	Maximum G	eopier Des	sign Stress:	22,010	psf	Modulus Test Location, Har Near Boring DH-35
	Geop	oier Elemer	nt Diameter:	24	in.	Test Geopier Element Shaft Length: 9 ft
		Desig	n Modulus:	300	рсі	Concrete Cap Thickness: 2 ft
Load No.	Ram Load, (kips)	Geopier Element Stress, (psf)	Percent of Design Stress	Minimum Duration	Maximum Duration	Remarks
	3.46	1,101	5.0%	N/A	N/A	seating load
1	11.53	3,669	16.7%	15 min	60 min	
2	23.05	7,336	33.3%	15 min	60 min	
3	34.57	11,005	50.0%	15 min	60 min	
4	46.10	14,674	66.7%	15 min	60 min	
5	57.62	18,341	83.3%	15 min	60 min	
6	69.15	22,010	100.0%	15 min	60 min	
7	80.65	25,672	116.6%	60 min	240 min	
8	92.19	29,346	133.3%	15 min	60 min	
9	103.72	33,015	150.0%	15 min	60 min	
10	69.15	22,010	100.0%	N/A	N/A	rebound, unload
11	45.64	14,527	66.0%	N/A	N/A	rebound, unload
12	22.82	7,263	33.0%	N/A	N/A	rebound, unload
13	3.46	1,101	5.0%	N/A	N/A	rebound, unload

Notes:

1 - The Geopier element to be used in the modulus load testing should be installed in a manner similar to production, at least 4 days prior to testing, so that pore-pressures have adequate time to dissipate.

2 - The modulus load test shall be performed to a stress not less than 150% of the design maximum top-of-pier stress indicated in the Geopier Design Calculations.

3 - The modulus load test Geopier element shall be installed to a depth of 11 feet below the ground surface with a 2-foot thick unreinforced concrete leveling pad. The modulus load test Geopier shall penetrate fill.

4 - A telltale shall be installed in the bottom one-third of the tested Geopier element. Telltale deflections shall be monitored concurrent with top of Geopier deflections during the modulus load test.

5 - The modulus load test setup shall be as shown on Geopier Construction Drawing GP0.1. Helical anchors should be installed in accordance with manufacturers specifications.

6 - A representative of the owner's geotechnical consultant should be present to witness the load test.

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APPENDIX D

Updated GMU Geotechnical Map – Plate 2





IG: q:\2017\17-206-02\dwg\1720602_plate 2_geo map_hybrid.dwg PLOTTED: 2/11/2020 9:35 AM BY:

DH	APPROXIMATE DRILL HOLE LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT 17-206-02 AND 17-206-03
HA-1	APPROXIMATE LOCATION OF GMU HAND AUGER LOCATION (PROJECT 17-206-03)
O H	APPROXIMATE INFILTRATION TEST LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT NO. 17-206-02
DH-4	APPROXIMATE LOCATION OF GMU DRILL HOLE LOCATIONS (PROJECT 11-161-00)
O 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)
CPT-1	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2005-022, DATED 11/29/05)
	PROPOSED THREE LEVEL PARKING STRUCTURE
	PROPOSED ONE LEVEL BOATER SERVICE BUILDING
	EXISTING BUILDINGS
::	PROPOSED GEOPIER COLUMNS
BB	GEOTECHNICAL SECTION
	LIMITS OF ROUGH GRADING

GW DEPTH BELOW GROUND SURFACE MEASURED AT TIME OF DRILLING



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APPENDIX E

Updated GMU Geotechnical Sections – Plate 3





1/8/2021





		<u>∠N 73° W</u> EXISTING PARKING LOT	A - A'		
CPT-1 (11-161-00) Proj. 5'	DH-34 (17-206-02) Proj. 6'	PROPOSED PARKING STRUCTURE, THREE LEVELS ON GRADE.	DH-6 (11-161-00) Proj. 32'	DH-10 (11-161-00) Proj. ~80'	EXISTING GRADE BEYOND
					EXISTING GRADE
2m TD 19'	* TC TD 26'		TC	TD 10'	
			TD 50'		



LEGEND



INTERPRETED GROUNDWATER LEVELS CONSIDERING GEOLOGIC MATERIALS AND GEOTECHNICAL LAB DATA

PROPOSED GEOPIER ELEMENTS

Geotechnical Sections

	Date:	February 10, 2020	Plate
ULID	Project No.:	17-206-02	3



January 22, 2020

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

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 Tabatabase BUILDING OFFICIAL

1/8/2021

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. GRD19-0177

Subject: Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure, and Boater Services Development Buildings, Dana Point Harbor Revitalization, City of Dana Point, California

References: Listed on Page 7

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 rough grading plans and details for the subject site.

RESPONSES TO GEOTECHNICAL COMMENTS

RESPONSE TO COMMENT 1.001

We have reviewed the latest reference (3) Submittal No. 2 rough grading plans and details for the subject site prepared by Tait Engineering. Based on our review, the subject rough grading plans and details have been prepared in accordance with the parameters and recommendations of our reference (2) geotechnical foundation investigation report and are considered acceptable from a geotechnical point of view. Therefore, no additional recommendations are required from a geotechnical perspective. The finalized plans will be signed/stamped by the geotechnical consultant prior to permit issuance.

RESPONSE TO COMMENT 1.002

Acknowledged. The precise grading plans and building plans will be reviewed from a geotechnical perspective and signed. Additional comments will be provided as necessary.

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Revitalisation Orange - OC Public Works City of Dana Point, California **OC Development Services** APPROVED

RESPONSE TO COMMENT 1.003

Questions with regards to the buildings are deferred to the building plan reviewers flowever, for bean clarification, the following explanation is provided:

In the submitted reference (2) report, Item 8 on Page 13 contains a typographical error. The final statement "will need to be founded on Geopiers, the Boater services Building" should be eliminated. The Geopiers will be constructed directly beneath the Parking Structure foundations only, not under the structurally separate Boater Services Building. There is a separation of 5-feet minimum between the Parking Structure and the Boater Services Building shown on Section F-F of Sheet 4 of 6 of the reference (2) rough grading plans.

RESPONSE TO COMMENT 1.004

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

The Geopier design submittal consisting of calculations and plans as well as our geotechnical review of the Geopier submittal were submitted separately to the County of Orange Building Department in December 2019. We understand that these are yet to be reviewed and separate review comments will be developed by the County. Additional comments or discussion will be provided in a separate response to those comments.

RESPONSE TO COMMENT 1.005

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

Because Geopier construction will not be done as part of the rough grading, the cross sections do not need to be updated at this time. However, a note has been added to Sheet 3 of 6 of the reference (3) Submittal No. 2 rough grading plans that Geopiers will be required for parking structure building support.

RESPONSE TO COMMENT 1.006

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Review Corport Provide Orange - OC Public Works City of Dana Point, California Geopier QA/QC will be performed by Geopier as well as GMU. The Geopier recent remember of the kind services shown on the Geopier plans. GMU's separate requirements will be addressed and the state law of the kind services Building plan submittal (i.e., either in the review or as a response to comments) camped on the services of Orange County of All Tabatabaee BUILDING OFFICIAL RESPONSE TO COMMENT 1.007

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

The Geopier material will consist of CMB and hence should be easily integrated into miscellaneous fills required for precise grading. Alternatively, these materials will be exported off site or stockpiled for future use.

RESPONSE TO COMMENT 1.008

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

Geopiers are required beneath the parking structure foundations only. Hence there will be no Geopiers outside the footprint of the future parking structure.

RESPONSE TO COMMENT 1.009

Questions with regards to the proposed Geopiers are related to foundation support for the parking structure building and hence are deferred to the building plan review. However, the following should be noted:

The 7 ksf bearing capacity for the Parking Structure footings was determined by Western Ground Improvement, Inc/Geopier Foundation (WGI). The value considers the effect of the Geopiers as well as settlement of the foundations. Calculations are contained in the Geopier submittal.

RESPONSE TO COMMENT 1.010

The site retaining walls are part of the precise grading plans. No walls are planned as part of the rough grading. Consequently, comments for proposed retaining walls are deferred to the precise grading plan review. However, the following should be noted.

See attached the Appendix C for the calculation of the seismic coefficient.

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Revitalization Orange - OC Public Works City of Dana Point, California CC Development Services RESPONSE TO COMMENT 1.011 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

Questions with regards to the proposed Geopiers are related to foundation support for the part of the

The drilling conditions can be inferred from the material descriptions, boring logs, groundwater discussion, and geotechnical cross sections. All of these have been reviewed and discussed with WGI and they have been incorporated into the Geopier design.

RESPONSE TO COMMENT 1.012

The Capistrano Formation has properties that act more as a stiff soil rather than a bedrock material. Due to these properties, it was determined that using a "soil density/consistency" descriptor was more accurate than using the "bedrock hardness" descriptor. Therefore, the bedrock description on page 5 should have stated that the density/consistency of the bedrock is generally hard to very dense as defined in our soil density/consistency chart included on Plate A-2 (i.e., blow counts greater than 50). It is our opinion that the drill hole logs using the soil density/consistency descriptor is a more accurate depiction of the materials onsite and should not be changed. Additionally, it should be noted that during drilling, discontinuous zones of concreted bedrock were encountered; however, in our experience, these zones will not impact the proposed grading and drilling within the site.

RESPONSE TO COMMENT 1.013

The intention of this recommendation was that all temporary excavations anticipated at this time and shown on the rough grading plans can be made in accordance with Type B soils, but that unanticipated excavations should proceed assuming Type "C" soils until GMU has had the chance to review. It is anticipated that Type "B" soils will be the governing OSHA soil type. It should be noted that our recommendations in our report are a minimum only, and all excavations should meet the minimal safety requirements as set forth by CAL-OSHA.

RESPONSE TO COMMENT 1.014

The description of the proposed Parking Structure on Page 1 of our reference (2) report should have stated that the proposed parking structure is "*partially on-grade*" with the northern half of the structure excavated to 1 level below grade.

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Review OC Public Works City of Dana Point, California

RESPONSE TO COMMENT 1.015

Light poles are not a part of rough grading and hence are deferred to the grading plans. However, the following should be noted:

The entire site will be removed and recompacted down to a depth of 2 feet below pad grade. This includes the ripping and recompacted surface which typically increases the engineered fill by another 8-12 inches. Given this and the conservativeness of our recommendations for the light poles, it is our opinion that our recommendations do not need to be modified. In addition, additional safety factors are typically added by the structural engineer for the light poles. Following grading, we will review the structural calculations and modify the soils parameters if necessary, based on grading observations.

RESPONSE TO COMMENT 1.016

Page 27 of our reference (2) report under "Additional Considerations" for the Utility Design, typographic errors in the first sentence where it states "*pool improvements*" and in the fourth sentence where it states "utilities connected to the hotel building" are to be corrected to read simply "*improvements*" and "*utilities connected to the buildings*," respectively.

RESPONSE TO COMMENT 1.017

Cross Section A-A' has been revised to delete the commercial building shown and the proposed desilting basin near the bend in the section has been added. Please see the attached Appendix B for the revised Cross Section A-A'.

Building&Safety: Ryan Rose Approval: Geotechnical Reports

ermits: GRD20-0021

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Review OC Public Works City of Dana Point, California OC Development Services

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

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his set of plans and specifications must be kept on the board plantations. It is unlawful to make any changes or iterations to these plans without written permission rom OC Public Works, OC Development Services of Orange County. The stamping of these plan pecifications SHALL NOT be held to permit or be an

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Respectfully submitted,

AK (themson

David R. Atkinson Project Manager / Senior Engineer

Katie Farrington, M.Sc., PG, CEG 2611 Senior Engineering Geologist



No. 2611 CERTIFIED ENGINEERING GEOLOGIST

OFCA

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 – Revised Cross Section A-A'

Appendix C – Earth Pressure Distribution Seismic Loads

(Two (2) wet signature copies and 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)

Choate Parking Consultants Attn: Mr. Rick Choate (electronic copy)

dra/17-206-02L GRD19-0177 Dana Point Harbor Parking Structure Geotechnical Report Review Response Letter (1-22-20)

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Response to County of Orange Geotechnical Review Comments Pertaining to Rough Grading, Parking Structure and Boater Services Development Buildings, Dana Point Harbor Revitalization, Orange - OC Public Works City of Dana Point, California

REFERENCES

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- County of Orange Geotechnical Comments, GRD19-0177 Dana Point Harbor Revitalization: Parking Structure and Boater Services Building - Commercial Component, City of Dana Point, California, First Submittal, submittal date December 6, 2019, plan check date January 6, 2020, prepared by Ryan Rose of OC Public Works.
- (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU Project 17-206-02).
- (3) "Dana Point Harbor Commercial Core Parking Structure Submittal No. 2 Rough Grading Plans, 24650 Dana Point Harbor Drive, Dana Point, California 92629," prepared by Tait Engineering, dated January 22, 2020.

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 Tabatabase BUILDING OFFICIAL

APPENDIX A

County of Orange Geotechnical Report Review Comments





1/8/2021

County of OC	Orange - OC Public Works Development Services APPROVED
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PLAN CHECK COMMENTS		This set of plans and specifications mu job at all times. It is unlawful to make a alterations is these plans without writte from OC Public Works. OC Developme of Orange County. The stamping of this specifications SHALL NOT be held to p
Permit Application No.	GRD19-0177	approval of the violation of any provision Ordinance of State law.
Plan Check No.	First Submittal-GRD19-0177	BUILDING OFFICIAL
Plan Check Date	01-06-2020	
Applicant	Erick Marroquin	
Submittal Date	12-06-2019	

#	Review	Category	Comment	Applicant Response	Status	File Name & Page
1.001	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	Review the Rough Grading Plans and applicable details submitted to the County that will be utilized during construction of the project. Provide additional recommendations as necessary. The approved grading plans and applicable details must be reviewed and signed/stamped by the geotechnical consultant prior to permit issuance. Note – The currently submitted rough grading plans are incomplete and do not include the recommended ground improvement plans/details. Please coordinate w/project team to ensure the geotechnical ground improve-ment recommendations/details are included on the project grading plans.	Response	Required	
1.002	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	A Precise Grading Permit and Plan and Multiple Building Permits and Plans are required for completion of this project (e.g. parking structure, boater service building, site walls, etc.). Please review when available and provide additional recommendations as necessary. The ap-		Required	

1/8/2021

#	Review	Category	Comment	County of Orange - OC Public Works Applicantme sonse APPROVED	Status	File Name & Page
			proved precise grading and building plans and applicable details must be reviewed and signed/stamped by the geotechnical consultant prior to permit issuance.	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.		
1.003	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The submitted report dated 12/4/19 (Page 13) states "Based on Conclusions 3-6 above, the fol-lowing remediation will be required: 1) corrective grading beneath the entire site, 2) Geopier ground improvement below the parking structure foundations and 3) use of a WRI foundation system for the Boater Services Building, will need to be founded on Geopiers, the Boater Ser-vices Building". Please provide additional comment/discussion to confirm if the Boater Ser-vices Building is to be founded on Geopiers or not. If so, please provide comment/discussion to confirm the lateral extent of Geopiers beyond the outside edge(s) of the proposed Boater Services Building. Please also provide additional comment/discussion to on the differential settlement potential between Parking Structure and Boaters Service Building for proposed construction method (i.e. with or without Geopiers). Provide additional recommendations as pecessary.	BUILDING OFFICIAL	Required	
1.004	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	Provide additional comment/discussion to confirm your complete geotechnical recommenda-tions for design and construction of the proposed ground improvement/Geopier system at the subject site based on your review of the currently submitted project plans. Specifically, please address who will be the designer of the ground improvement/Geopier system (i.e. your		Required	

1/8/2021

#	Review	Category	Comment	County of Orange - OC Public Works Approximit Response APPROVED	Status	File Name & Page
			firm or a specialty contractor). Include updated plot plan/map to indicate the location of the proposed Geopiers (i.e. entire building pad w/lateral extension beyond building edges or isolated to foundation elements only). Provide additional recommendations as necessary.	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		
1.005	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The Geotechnical Sections in your submitted report(s) should be updated to include the rec-ommended Geopiers (location and depth of installation). Additional Geotechnical Section(s) should also be provided as necessary based on your review of the currently submitted project plans. Provide additional recommendations as necessary.		Required	
1.006	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	Provide additional comment/discussion to confirm your geotechnical QA/QC recommenda-tions for the proposed geopier construction based on your review of the currently submitted (and forthcoming) project plans. Include confirmation of your recommendations for QA/QC during construction (e.g. full-time observation/testing, material quality/spec. confirmation testing, etc.) and post- construction (e.g. CPT soundings, field testing, etc.) prior to pad release for building construction. Provide additional recommendations as necessary.		Required	
1.007	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant recommends that the top of the Geopiers extend about 6 inches above the Parking Structure spread footing bottom elevations. The consultant also recommends that the subject spread footings be supported on the Geopiers. That means that during the foundation		Required	

1/8/2021

#	Review	Category	Comment	County of Orange - OC Public Works	Status	File Name & Page
			subgrade preparation, considerable amount of coarse aggregates including unknown quanti-ties of oversize rocks will be generated while removing the tops of the Geopiers across the Parking Structure pad. The consultant must address how such oversize materials should be handled during construction - whether these should be blended into the excavated soil or dis-carded offsite based on their size.	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 Tabatabase BUILDING OFFICIAL		
1.008	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant should recommend the lateral extent of Geopier improvements beyond the perimeter of the Parking Structure footprint.		Required	
1.009	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant should justify the use of a preliminary bearing capacity of 7 ksf for the Parking Structure footings. What is this preliminary value based on? The consultant should provide jus-tifications for this value.		Required	
1.01	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant recommends a seismic earth pressure of 17 pcf for the site retaining walls. The consultant should explain how they arrived at this earth pressure magnitude.		Required	
1.011	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant should describe the anticipated drilling conditions that will be encountered during construction of the Geopiers. Geotechnical considerations should be provided for the Geopier construction including drilling difficulty based on bedrock described as hard to very hard, mitigating caving, handling groundwater, casing withdrawal (if used) during ramming, etc.		Required	

1/8/2021

#	Review	Category	Comment	County of Orange - OC Public Works Applicantmilesponse APPROVED	Status	File Name & Page
1.012	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	On page 12 of the report, the consultant states that soil and bedrock materials can be easily excavated. This is inconsistent with bedrock described as hard to very hard on page 5 of the report, and as defined on Plate A-2, Legend to Logs, for bedrock hardness. Furthermore, the descriptions on the boring logs appear to be using soil density descriptors and not bedrock hardness descriptors in accordance with Plate A-2. Very hard bedrock that scratches with a knife and chips with hammer blows would generally not be drillable by a CME 75 hollow-stem auger drill rig. The logs should be corrected and the bedrock description in the report should be revised, as appropriate.	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 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 Tabatabase BUILDING OFFICIAL	Required	
1.013	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	The consultant should clarify their recommendations for temporary excavations. On page 17 of the report they state that vertical excavations up to 4 feet are anticipated to be stable. Ver-tical excavations are not allowed for Type C soils per OSHA guidelines.		Required	
1.014	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	On page 1 of the report, the consultant describes the proposed parking structure as an on-grade structure. However, recommendations are provided for parking structure basement re-taining walls, please clarify.		Required	
1.015	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	On page 23 of the report, the consultant states that pole foundations should be at least 4 feet deep. On page 24 they indicate that bearing materials consist of engineered fill approved by GMU. The recommended remedial grading depths for		Required	

1/8/2021

#	Review	Category	Comment	County of Orange - OC Public Works	Status	File Name & Page
			parking areas will not provide 4 feet of engineered fill. Please clarify if deeper localized remedial grading will be performed to the planned depths of the light pole foundations.	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.		
1.016	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	On page 27 of the report, under Additional Considerations for Utility Design, the consultant mentions improvements that are not part of the project (pool, hotel building).	Hadi Tabatabaee BUILDING OFFICIAL	Required	
1.017	Geotechnical Review- GRD19-0177 Ryan Rose	Geotechnical/G eology Check List	Cross Section A-A' depicts a commercial building near projected borings DH-19 and DH-25 that is not shown on the grading plans or Plate 2. The proposed grade line also does not reflect the proposed desilting basin near the bend in section. The cross section should be revised.		Required	
2.001	MPD & C- WQMP Review- GRD19-0177 Jung-Tsun Yean		Show Grading Permit No. GRD19-0177 on the cover page		Required	/GRD19- 0177 MPD & C-WQMP (Redlined 12- 12-2019).pdf 1.0
2.002	MPD & C- WQMP Review- GRD19-0177 Jung-Tsun Yean		Stamped and singed by the engineer.		Required	/GRD19- 0177 MPD & C-WQMP (Redlined 12- 12-2019).pdf 1.0
2.003	MPD & C- WQMP Review- GRD19-0177 Jung-Tsun Yean		Submit all Appendixes		Required	/GRD19- 0177 MPD & C-WQMP (Redlined 12- 12-2019).pdf 4.0

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 Tabatabase BUILDING OFFICIAL

APPENDIX B

Revised Cross Section A-A'





1/8/2021





			<u>∠N 73° W</u> EXISTING PARKING LOT	SECTION A - A'			
	CPT-1 11-161-00) Proj. 5'	DH-34 (17-206-02) Proj. 6'	PROPOSED PARKING STRUCTURE, THREE LEVELS ON GRADE.	DH-6 (11-161-00) Proj. 32'	DH-10 (11-161-00) Proj. ~80'		EXISTING GRADE BEYOND
 Qm	TD 19'	Ţ Ţ Ţ	Qaf	Qaf	TD 1 <u>0'</u>	GRADE	
		TD 26'		TD 50'			



LEGEND

Geote	echnic	al S	ections	
	Date:	January	/ 22, 2020	Plate
ULIN	Project No.:		17-206-02	3

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 the law. Hadi Tabatabase BUILDING OFFICIAL

APPENDIX C

Earth Pressure Distribution Seismic Loads







December 11, 2019

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021 1/8/2021

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

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 Geopier Submittal, Dana Point Harbor Revitalization:
Parking Structure – Commercial Component, City of Dana Point, California

- References: (1) Design Submittal for a Geopier Foundation System, Dana Point Harbor Parking Structure, Dana Point, California, prepared by Western Ground Improvement, Inc., dated December 11, 2019.
 - (2) Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU 17-206-02).

Dear Mr. Ward:

The purpose of this correspondence is to confirm in writing that that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) Geopier submittal for the subject project. The Geopier submittal is to support the foundation design of the proposed parking structure. The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south.

Based on our review, the reference (1) Geopier design submittal has been prepared in general accordance with the parameters and recommendations of our reference (2) report. All the recommendations included in our reference (2) report remain applicable to the site improvements. Therefore, the Geopier design submittal is considered acceptable from a geotechnical point of view.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Geopier Submittal, Dana Point Harbor Revitalization: Parking Structure – Commercial Component, City of Dana Point, California Control C

Should you require further assistance, please do not hesitate to call.

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

Tom 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 Cou Ordinance or State law.

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Varia R. Atterio

Project Manager / Senior Engineer

Respectfully submitted,

David R. Atkinson

Nadim Sunna, M.Sc., QSP, PE 84197 Senior Engineer

Reviewed by:

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

(Two (2) wet signature copies and electronic copy)

cc: Choate Parking Design Attn: Mr. Rick Choate and Mr. Emerson Flint Schmieder (electronic copies)

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

dra/17-206-02L Rough Grading Plan Review for DPHP, LLC P.S. and Boater Services Building (12-6-19)



December 6, 2019

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021 1/8/2021

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

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 Rough Grading Plans, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, 24650 Dana Point Harbor Drive, City of Dana Point, California
- References: (1) Dana Point Harbor Commercial Core Area Parking Structure Rough Grading Plans, prepared by Tait Engineers, dated December 6, 2019.
 - Our "Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building

 Commercial Component, City of Dana Point, California," dated December 4, 2019 (GMU 17-206-02).

Dear Mr. Ward:

INTRODUCTION

The purpose of this correspondence is to confirm in writing that that GMU Geotechnical, Inc. (GMU) has performed a geotechnical review of the reference (1) rough grading plans for the subject site. The rough grading is to support site grading and construction of the proposed parking structure, the adjacent boater services building, and other site improvements (i.e. roadways, parking lots, site walls, exterior concrete flatwork, etc.). The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south.

Future development will consist of an on-grade 3 story parking structure, a boater service building, a realignment of Golden Lantern Drive, parking and drive aisles as well as landscaping and flatwork. Detailed recommendations for all these improvements along with an overall geotechnical site assessment are contained in our Reference (2) report discussed below.

Our review of the Tait Engineering rough grading plans (reference (1)) presented herein provides recommendations specific to the rough grading shown on these plans only. To support the rough grading plans, GMU previously performed a geotechnical foundation investigation and compiled our detailed site recommendations for all of the above described future improvements in our reference (2) report. The subject supporting geotechnical foundation investigation report contains:

- Geotechnical Map and Cross Sections 0
- Drill Hole and CPT logs 0
- Laboratory testing 0
- Infiltration test results 0
- Geotechnical engineering analyses including liquefaction and lateral spreading, and 0
- Detailed recommendations for the design of all proposed future improvements. 0

REVIEW OF ROUGH GRADING PLANS

The rough grading consists of:

- Cuts to create flat pad areas ranging from approximately a few inches to approximately 6feet. The largest cuts are along the north side of the parking structure pad.
- A large temporary soil stockpile area of up to 20-feet in height with 1.5:1 slopes is also shown along the west side of the proposed parking structure pad between the planned parking structure and existing Golden Lantern.
- Two temporary desilting basins are reflected on the rough grading plans at the southeast and southwest corners of the project site, along with a desilting trap located at the center of the south side of the site. The desilting basins and trap are all approximately 3-feet in depth.
- Temporary Cut Slopes and Excavations and Temporary Stockpile Slopes consist of the following:
 - Temporary 1 ¹/₂ :1 and 2:1 Slopes Below Gold Lantern
 - A temporary stockpile fill slope will be created with $1\frac{1}{2}$:1 side slopes. (see Section B-B' on grading plans). The temporary stockpile slope will be placed over a 1 1/2:1 temporary cut slope. The overall height of the temporary stockpile slopes ranges from approximately 12'-20' in height
 - Temporary 4' high 2:1 cut slopes are planned in portions of the slope to create temporary surface drainage facilities.
 - Temporary 2:1 Cut Slopes Along the South and Est Site Boundaries 0
 - Approximately 1-3' high temporary slopes will be created along the south and east boundaries for temporary drainage swales and desilting basins (See sections B-B' and D-D' on the grading plans).
 - Temporary 2' high 1 ¹/₂:1 cut slope below Dana Point Harbor Drive above a 0 temporary 4' high vertical excavation.
 - see Section A-A on grading plans.

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Rough Grading Plans, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, 24650 Dana Point Harbor Drive, City of Dana Point, California

GEOTECHNICAL FINDINGS

Geotechnical Materials



The following items summarize the geotechnical materials and groundwater conditions that will be encountered during rough grading. The support for the following items is contained in our Reference (2) report.

- The proposed grading including all cut slopes will expose existing engineered fill soils.
- The fill soils should be suitable with regard to slope stability. However, the fill soils on the pad are anticipated to be disturbed from demolition of the existing parking lot and posses differing compressibility and expansion characteristics.

Groundwater and Dewatering

Groundwater is not anticipated to be encountered during grading and hence dewatering is not anticipated to be required.

Shrinkage/Bulking

Soil materials encountered during rough grading are anticipated to shrink on the order of 5-10%. For rough planning purposes a volume loss of 7.5% may be assumed.

Subsidence

Significant subsidence due to the planned grading is not anticipated.

Slope Stability of Temporary Slopes and Excavations

All of the proposed slopes and excavations shown on the rough grading plans are temporary. Final slopes will be shown on a future precise grading plan. All of the temporary slopes and excavations are anticipated to be stable during the course of construction subject to the recommendations contained herein (See "Recommendations").

RECOMMENDATIONS

Corrective Grading

Corrective grading will be required for the 2 building pads and the remainder of the flat portion of the site. Detailed corrective grading recommendations are contained in our Reference (2) report and have been incorporated into corrective grading for the rough grading for the site as shown in Sections A-A' through E-E' on Sheet 4 of 6 of the reference (1) rough grading plans. Corrective grading recommendations are summarized as follows:

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Rough Grading Plans, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, 24650 Dana Point Harbor Drive, City of Dana Point, California

Parking Structure Pad

Corrective grading should consist of the following:

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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 Coun Ordinance or State law.

- The parking structure pad should be excavated to a depth of at least 24 inches below the bottom of the proposed pad grade shown via elevations on Sheet 3 of 6 of the grading plans and is also reflected on the cross sections shown on Grading Plan Sheet 4 of 6.
- The lateral extent of the parking structure pad over-excavation shown extend a minimum of 5 feet away from the outside edge of the future building as shown on the grading plans.
- The bottom of the excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- The onsite material may then be used as fill material to achieve the planned SOG subgrade 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.

Boater Services Building Pad

Corrective grading should consist of the following:

- The building pad should be excavated to a depth of at least 4 feet below the bottom of the proposed pad grade shown on sheets 3 and 4 of 6 of the rough grading plans.
- The lateral extent of the over-excavation should be at least 5 feet beyond the edge of the building envelope.
- The bottom of the excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- The onsite material may then be used as fill material to achieve the planned slab-on-grade 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.

Grading Outside the Building Pads

Outside the corrective grading for the building pads, the site area subgrade should be excavated to a depth of at least 24 inches below the bottom of the planned top of rough grade. This overexcavation will be sufficient to meet the improvement specific requirements contained in our reference (2) report.

General (applicable to all corrective grading)

- Loose materials
 - If existing loose fill materials are found to be disturbed to depths greater than the proposed remedial grading, the depth of excavation, scarification, and recompaction should be increased accordingly in local areas as recommended by
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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Rough Grading Plans, Dana Point Harbor Revitalization: County of Orange - OC Public Works **OC Development Services** APPROVED This set of plans and specificat job at all times. It is unlawful to he kent on the ermiss GMU personnel as the Geotechnical Engineer of Record CMU will need to services provide site-specific recommendations based on their observations in the state of the and erovisions of any Cou Hadi Tabatabaee

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Slopes

- Cut Slopes .
 - All of the temporary cut slopes shall be evaluated in the field by a representative of GMU to confirm that the geotechnical conditions are as anticipated.
- 4' Vertical Excavation Below Temporary 1 1/2:1/2:1 Slope

Parking Structure and Boater Services Building – Commercial Component,

24650 Dana Point Harbor Drive, City of Dana Point, California

- 0 This excavation will be monitored by a representative of GMU to confirm that the geotechnical conditions are as anticipated and consistent with temporary stability.
 - Should the vertical face exhibit minor sloughing it will be laid back to "limit of grading"
- **Temporary Stockpile Fill Slopes**
 - The fill materials shall be placed in a controlled manner in loose lifts not 0 exceeding 12-inches in thickness.
 - The fill materials shall be mechanically compacted as the materials are placed. 0
 - The slope surface of the stockpile shall be mechanically compacted to minimize 0 the potential for sloughing and/or erosion.
 - All of the fill placement shall be observed by a representative of GMU. 0

Miscellaneous Temporary Excavation Recommendations

All other temporary excavations required for the rough grading not shown on the grading plans shall be completed with full compliance with OSHA assuming Class "C" soils.

Additional temporary excavation recommendations include:

- 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 excavations resulting in sloughing and/or erosion of the slope faces.

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 and temporary slope construction, maintenance, and safety are the responsibility of the contractor.



LIMITATIONS

All parties reviewing or utilizing this letter 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.

This letter has not been prepared for use by other parties or projects other than those named or described herein. This letter may not contain sufficient information for other parties or other purposes.

APPROVED

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES Geotechnical Review of Rough Grading Plans, Dana Point Harbor Revitalization: County of Orange - OC Public Works Parking Structure and Boater Services Building - Commercial Component, **OC Development Services** 24650 Dana Point Harbor Drive, City of Dana Point, California

CLOSURE/ROUGH GRADING PLAN APPROVAL

Based on our review, the reference (1) rough grading plans have been prepared in general accordance with the parameters and recommendations of our reference (2) report and specific rough grading recommendations contained herein. Therefore, the rough grading plans are considered acceptable from a geotechnical point of view.

Should you require further assistance, please do not hesitate to call.

No. 1789 CERTIFIED ENGINEERING GEOLOGIST

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OF CA Respectfully submitted,

hind R. atthings

David R. Atkinson Project Manager / Senior Engineer

Alan B. Mutchnick, PG, CEG 1789 Associate Engineering Geologist

PE. GE 2336 ilver, M.Sc., President CEO Principal Geotechnical Engineer

(Two (2) wet signature copies and electronic copy)

cc: Tait Engineering Attn: Mr. Todd Schmieder (electronic copy)

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

dra/17-206-02L Rough Grading Plan Review for DPHP, LLC P.S. and Boater Services Building (12-6-19)

1/8/2021

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Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California

Prepared For DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES

December 4, 2019

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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DANA POINT HARBOR PARTNERS, LLC c/o BURNHAM-WARD PROPERTIES

1100 Newport Center Drive, Suite 200 Newport Beach, CA 92660

- DATE: December 4, 2019
- PROJECT: 17-206-02
- ATTENTION: Mr. Bryon Ward, President
- SUBJECT: Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California

DISTRIBUTION:

Addressee: (3 wet signature copies + electronic copy)

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

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

Tait Engineering Attn: Mr. Todd Schmieder (electronic copy)

Choate Parking Consultants Attn: Mr. Rick Choate (electronic copy)

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Gentechnical Foundation Investigation Report Dana Point Harbor Revitalization Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Gentechnical Foundation Investigation Report Dana Point Harbor Revitalization Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: **OC Development Services** Parking Structure and Boater Services Building – Commercial Component

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Plate 2	Geotechnical Map
Plate 3	Geotechnical Sections
Plate 4	Tsunami Inundation Map for Emergency Planning
Plate 5	Estimated High Tide Groundwater Levels Plan
Plate 6	Retaining Wall Construction Detail

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APPENDIX A-2:	GMU CPT Logs
APPENDIX A-3:	Previous Boring Logs by Others
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APPENDIX B-1:	Geotechnical Laboratory Procedures and Test Results
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This report presents the results of our geotechnical investigation for the Parking Structure portion of the "Commercial" component of the Dana Point Harbor Rev talization Project. The purpose of our investigation was to develop geotechnical recommendations pertaining to site grading and design and construction of the proposed parking structure, the adjacent boater services building, and other site improvements (i.e. roadways, parking lots, site walls, exterior concrete flatwork, etc.). Our investigation included performing laboratory testing and data analysis.

PURPOSE

PROPOSED IMPROVEMENTS

It is our understanding that the proposed development will consist of a 3-story on-grade cast-inplace concrete parking structure, an adjacent 1-story boater services building along with a re-alignment of Golden Lantern, parking, landscaping, small retaining walls, flatwork and other appurtenant structures. Plate 2 included herein shows the location of the structures. Parking areas will be located south and east of the parking structure while the realignment of Golden Lantern will occur on the west side of the structure.

SITE LOCATION AND DESCRIPTION

The subject site is bounded by Dana Point Harbor Drive on the north, the Dry Stack Storage component site on the east, and Golden Lantern on the west and south (see Plate 1 - Location Map).

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 approximately 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. In the flat portion of the site, elevations range from a high of approximately 13.5 feet above mean sea level in the northern portion of the site. The majority of the site is covered by either asphalt pavement or concrete flatwork with some planters and landscape areas with flowers, groundcover, shrubs and occasional trees.



In order to research the site 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 seawalls.

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 headland, a sandy shore was able to develop 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 de-watered, 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 seawalls, boat ramps, docks, and buildings were then constructed. In addition, a rubble 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 seawalls was performed by Bluewater Design Group in December of 2003. Their evaluation indicated that most of the existing seawalls are "Quay" walls which consist of slightly battered, cantilevered, reinforced-concrete gravity walls constructed directly above 1.5H:1V slopes. The slopes are either covered by concrete panels or are constructed with rock riprap. As a result, the wall footings are supported on either fill materials or rock 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.

BUILDING OFFICIAL

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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 ange from 2 to 15 feet in height with footings founded into fill materials.

AERIAL PHOTOGRAPHY REVIEW

An aerial photo review was performed for the subject site in order to assess historical land use and site development. Continental Aerial Photo provided 20 sets of stereo-paired air photos spanning from 1952 through 1999. 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 in essentially the same condition as it is currently, with all existing buildings constructed and paved areas completed. Photos reviewed after 1975 show no significant changes to the area.

SUBSURFACE EXPLORATION

GMU conducted a subsurface exploration program to evaluate the soil conditions within the project area. A total of eighteen (18) deep exploratory drill holes, eight (8) shallow exploratory drill hole for infiltration testing, and seven (7) cone penetration test (CPT) soundings were performed by GMU which consisted of the following:

- Eighteen (18) 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.
- Eight (8) hollow-stem-auger exploratory drill holes by GMU to a depth of up to approximately 10.0 feet below the existing ground surface in order to perform preliminary infiltration testing.
- Seven (7) CPT soundings by GMU to a maximum depth of 24 feet below the existing ground surface.

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WA Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component	RD PROPERTIES County of Orange - OC Public Works OC Development Services APPROVED
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The drill holes were logged by our Staff Geologist and samples were colle	of Grange County. The stamping of these plan Cteching of the stamping of the plan is the stamping of the stamp
our facility for observation and testing. The drill holes and CPT locations	are shown on Plate 2 –
Geotechnical Map. Drill hole logs are contained in Appendix A and CP	Γ reports are presented

in Appendix A-1.

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 and proposed parking structure, adjacent boater services building, and other site improvements are within the cove area of the harbor and is underlain by artificial fills and marine deposits which in turn overlie 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, 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.

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Marine Deposits (Qm)



The marine deposit materials within the site are comprised of materials deposited in beach and submarine environments and, where encountered, generally consist of wet, loose to medium dense, silty sands to sands. Marine deposits were encountered underlying the artificial fill within five of our current drill holes (DH-26, DH-29, DH-34, DH-35, and DH-46).

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.

Summary of Subsurface Conditions

Based on the results of past and recent subsurface explorations, the geo-materials underlying the proposed parking structure and the adjacent boater services building are summarized as follows:

• The planned parking structure, the adjacent boater services building, and other site improvements are underlain by approximately 15 to 20 feet of surficial soils consisting of artificial fill and marine deposits which in turn overlie Capistrano Formation bedrock (see Plate 3 – Geotechnical Sections). Fill depths appear to range from 15 to 19 feet and the thickness of the marine deposits appear to range from approximately 0 to 5 feet. In general, the depths of the surficial soils are relatively consistent across the site.

GROUNDWATER

Groundwater is present at shallow depths below the subject site. Review of the Seismic Hazard Zone Report for the Dana Pont Quadrangle indicates that the historic high groundwater level 5 feet below the existing grade at the project site. In addition, Groundwater was encountered within our recent and previous subsurface exploration at depths ranging from 5 to 16 feet below the existing grade. Groundwater levels were measured during our subsurface exploration utilizing a measuring tape or groundwater sounder within the boring during drilling, however, drill holes were not left open for extended periods of time to allow the groundwater to come to equilibrium within the drill hole. 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 average of the groundwater levels shown on the boring logs and represent a best fit geologic model.

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To aid in the interpretation of groundwater levels for use in the design of underground utilities and groundwater levels that may be encountered by contractors, groundwater levels, as shown on the cross sections, were then adjusted to account for average high tide conditions. These "estimated high tide" groundwater levels are shown on Plate 5. It should be noted these groundwater levels should be used with caution as they do not account for: 1) King tides, Maximum High Tides, and effects due to climate change.

The following summarizes groundwater levels at the site:

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 be saturated. Consequently, appropriate construction precautions should be utilized (i.e. casing for geo-piers, etc.). It is further noted that the groundwater levels represent our best interpretation of the information available at the time of this report. Consequently, groundwater levels at the time of construction may exceed the levels contained in any of the above references. It is up to the contractor to determine applicable groundwater levels at the time of construction. The contractor is encouraged to directly determine groundwater levels immediately prior to construction.

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 for the site. The nearest known active fault is the offshore segment of the Newport-Inglewood fault, which is located approximately 3.9 kilometers southwest of the site and is capable of generating a maximum earthquake



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 conditions encountered in the subsurface explorations for this project, the building sites may potentially be subject to significant amounts of seismic settlement and lateral spreading related to liquefaction. Liquefaction, seismic settlement, and lateral spreading were quantitively analyzed, and the results are discussed under "Geotechnical Engineering Findings" (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 adjacent to the proposed development. The adjacent mapped areas are 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 coseismic 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).

Tsunami Inundation Maps



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In 2009, the California Emergency Management Agency, California Ceological Survey, rand 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. Rather, it is the result of combining inundation lines from multiple source events. Therefore, the entire inundation region will not likely 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). In considering the Tsunami Inundation Map with respect to the proposed development, 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 for Emergency Planning, 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. In addition, it should also be noted that the probability and severity of tsunami inundation in the lowland areas cannot be estimated based on current available information.

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.

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Flooding



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According to the County of Orange FEMA Flood Insurance Rate Map the proposed Boaters Services Buildings are 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

Seismic input values for numerical analyses were based on ASCE 7-10 and the 2016 CBC for an MCE event (Magnitude 6.8 and PGA = 0.60).

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).

A liquefaction evaluation was performed on each CPT by means of CLiq, v.1.7.6.49 software and the Robertson (2009) methodology. In addition, SPT data obtained from our drill holes were also utilized to perform liquefaction analysis using Youd and Idriss et al. (2001). The analysis was based on the 2016 CBC and ASCE 7-10 criteria. A historic high groundwater depth of 5 feet was used in the analysis. Our CPT liquefaction analysis is presented in Appendix D, and our SPT liquefaction analysis is presented in Appendix D-1.

Based on our seismic settlement analysis and review of overall soil conditions, the earthquakeinduced (EQ-induced) settlement is estimated to be 0.75 inches for the MCE event. A differential EQ-induced settlement of 0.5 inches over a span of 40 feet should be prudently considered in the design. Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component This set of plans and specifications must be kept on to job at all times. It is unlawful to make any changes of

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' and B-B' for the MCE seismic loading. Our analyses revealed that the post-earthquake slope stability safety factors with liquefied residual shear strengths were greater than 3.4, indicating a very low potential for earthquake-induced flow failure.

Both sections exhibited a post-earthquake safety factor greater than 1.6 with an inertia acceleration of 0.15. Therefore, potential for lateral spreading to affect the subject site after liquefaction of the soils during the design earthquake is considered very low.

SOIL EXPANSION

Surficial Soils

The expansion potentials of the artificial fills mantling the site are highly variable ranging from very low to medium. Consequently, the design of parking structure and boater service building slabs and exterior hardscape features should consider a medium expansion potential.

SOIL 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 to severe sulfate content or "S1" sulfate exposure to concrete per ACI 318, Table 19.3.1.1.
- A low minimum resistivity indicating conditions that are severely corrosive to ferrous metals.
- A moderate to high chloride content (corrosive to severely corrosive ferrous metals).

The results of the laboratory chemical tests performed within the site are included in Appendix B.

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Mr. Brvon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES County of Orange - OC Public Works Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: **OC Development Services** Parking Structure and Boater Services Building – Commercial Component APPROVED This set of plans and specifications must job at all times. It is unlawful to make any alterations to these plans without written

STATIC SETTLEMENT / COMPRESSIBLITY

Grading

I to make any changes or thout written permission OC Develop nent Services of Oran it or be an Hadi Tabatabaee BUILDING OFFICIAL As final grades for the site are not anticipated to significantly change, loading from grading is not expected to be significant. In addition, any settlement will be complete at the completion of

Buildings

load application.

Static settlement will be induced by the introduction of new building loads. The underlying artificial fill and bedrock 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 the high building loads from the parking structure, it was decided that ground improvement - specifically Geopiers - would be required beneath the parking structure foundations. The boater serves building is anticipated to be lightly loaded and thus the building can be founded on a shallow footing system with local over-excavation and recompaction.

The static settlement of the parking structure was analyzed with our recommended bearing capacity utilizing assumed building foundation loads, the construction of Geo-piers and based on project experience. The estimated total static settlement for the parking structure is anticipated to be less than 1 inch, with differential settlement of approximately 0.5 inches over a span of 40 feet, however, final settlement estimates will be provided by Geopier as part of their design, and will be reviewed by this office.

The estimated static settlement for the boater's service building is estimated to be less than 0.5 inch with different settlement of approximately 0.25 inches over a span of 30 feet.

PRELIMINARY INFILTRATION TESTING

Eight (8) 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 - Geotechnical Map, were excavated to depths of from 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:

Mr. Bryon Wa Geotechnical Parking Sta	ard, DANA POINT HAI Foundation Investigatio ructure and Boater Servi Int	RBOR PARTNERS, LLC, c/o BUI on Report, Dana Point Harbor Revi ices Building – Commercial Compo filtration Rates Results Sum	RNHAM-WA talization: onent mary	This set of plans job at all times alterations to the from OC Public of Orange Coun specifications Si approval of the Ordinance or St	PTTES Prange - OC Public Works evelopment Services APPROVED and specifications must be kept on the It is unlawful to make any changes or use plans without written permission Works. OC Development Services ty. The stamping of these plan HALL NOT be held to permit or be an violation of any provisions of any County ate law.
		Depth Below Finish	Unfacto	red Raw	BUILDING OFFICIAL
	Drill Hole	Grade (feet)	Obse	rved	
			Infiltrati	on Rates	
			(inches/	'hour) *	
		GMU 17-206-02			
	DH-17	5.0	1.	19	
	DH-18	5.0	0.2	28	
	DH-19	4.0	0.0	01]
	DH-20	5.0	0.0	07]
	DH-21	5.0	0.0	05	
	DH-22	5.0	0.	11	
		GMU 11-161-00			
	DH-10	3.25	0.1	35	
	DH-22	7.0	0.0	74	7

*Rates do not incorporate a factor of safety.

The results of the infiltration testing indicate that the unfactored raw observed infiltration rates within the southern side of the development range from 0.01 to 1.19 inches per hour, with an average unfactored infiltration of 0.28 inches per hour. The northern side of the development revealed an unfactored infiltration rates ranging from 0.04 to 0.35 inches per hour with an average unfactored infiltration rate of 0.20 inches per hour. *Thus, we conclude for the entire site that infiltration rates <u>do not meet</u> 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 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).

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CONCLUSIONS

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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 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 2016 CBC based on ASCE 7-10.
- 2. As described in detail in the "Groundwater" section of this report, groundwater may be as high as five feet bgs and is anticipated to impact construction of the Geopiers. It is not anticipated to impact corrective grading.
- 3. The potential for lateral spreading is considered very low within the limits of the proposed development. Therefore, mitigation for lateral spreading is not required.
- 4. The site will be subject to seismic settlement and settlements should be incorporated into the structure design.
- 5. The parking structure foundations may be subject to significant differential static settlements due to compression variability.
- 6. Site soils within the foundation influence zone are anticipated to have a low to medium expansion potential based on our recent laboratory test results and local experience.
- 7. Corrosion testing indicates that the on-site soils have a moderate sulfate exposure level and are corrosive to buried ferrous metals and reinforcing steel. Consequently, any metal exposed to the soil will need protection.
- 8. Based on Conclusions 3-6 above, the following remediation will be required: 1) corrective grading beneath the entire site, 2) Geopier ground improvement below the parking structure foundations and 3) use of a WRI foundation system for the Boater Services Building. will need to be founded on Geopiers, the Boater services Building.
- 9. 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.



The following summarizes the required geotechnical mitigation for the site improvements:

- Parking Structure
 - Foundations to be supported on Geopiers due to:1) fill variability and related differential movements (both expansion and settlement), and 2) seismic settlement.
 - \circ Slab on grade to be supported on removed and recompacted engineered fill
- Boater Services Building
 - WRI foundation system
 - Removed and recompacted fill below the foundations
- Flatwork, Pavements
 - Supported by removed and recompacted engineered fill

GENERAL SITE PREPARATION AND 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.

Clearing and Grubbing

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 from the areas to be graded. No rock or broken concrete greater than 6 inches in diameter should be utilized in the fills.

Corrective Grading

Parking Structure

The 3-level on-grade parking structure may be founded on shallow spread footings supported on Geopiers or equivalent gravel piers. The slab-on-grade (SOG) subgrade will require corrective grading prior to construction of the slab structural section. Grading should consist of the following:

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- The SOG subgrade should be excavated to a depth of at least 24 in chest bottom of the section of the slab section (i.e., below the bottom of the aggregate base section).
- The bottom of the excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- The onsite material may then be used as fill material to achieve the planned SOG subgrade 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.

Boater Services Building

The 1-level boater services building may be founded on shallow spread footings supported on a minimum of 2 feet of engineered fill. Grading should consist of the following:

- The building pad should be excavated to a depth of at least 4 feet below the bottom of the slab-on-grade or 2 feet below the bottom of the spread footings, whichever is lower below finish grade. The lateral extent of the over-excavation should be at least 4 feet beyond the edge of the building envelope.
- The bottom of the excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to 2% above optimum moisture content, and recompacted to at least 92% relative compaction.
- The onsite material may then be used as fill material to achieve the planned slab-on-grade 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.

Appurtenant Structures / Site Retaining Walls

Grading recommendations for the appurtenant structures and site retaining walls should consist of the following:

- The 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.

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Parking Structure and Boater Services Building – Commercial Component

Vehicular Pavement

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Grading recommendations for the new vehicular pavement areas should consist of the low ang:

- 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.
- The fill material should then 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 then 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.

Additional Grading Recommendations

If the 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 the Geotechnical Engineer of Record. The Geotechnical Engineer of Record will need to provide site-specific recommendations based on their observations in the field.

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Dewatering



Groundwater is not anticipated to be encountered during corrective grading. Consequently, dewatering is not anticipated. Final evaluation as to the need for dewatering should be made by the contractor immediately prior to grading.

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.

TEMPORARY EXCAVATIONS

Temporary excavations for demolitions, earthwork, footings, and utility trenches are expected. We anticipate that unsurcharged excavations with vertical side slopes less or equal to 4 feet high will generally be stable; however, all temporary excavations should be observed by a representative of GMU to evaluate their stability. Our 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.

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.



boring logs, and laboratory testing provided in this report. Shoring design performed by others should be reviewed by this office.

PARKING STRUCTURE AND BOATER SERVICES BUILDING DESIGN

No active or potentially active faults are known to cross the site, therefore, the potential for primary ground rupture due to faulting on-site is very low. However, the site will likely be subject to seismic shaking at some time in the future.

Seismic Design Parameters (2016 CBC Table)

Site-specific seismic design parameters were determined using the USGS computer program title 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 7-10 and 2016 CBC are listed in table below.

Parameter	Factor	Value
Mapped Spectral Response Acceleration (0.2 sec Period)	S_S	1.452g
Mapped Spectral Response Acceleration (1.0 sec Period)	\mathbf{S}_1	0.547g
Site Class	Site Class	С
Site Coefficient	Fa	1.0
Site Coefficient	F_{v}	1.5
Maximum Considered Earthquake Spectral Response Acceleration (0.2 sec Period)	S_{MS}	1.452g
Maximum Considered Earthquake Spectral Response Acceleration (1.0 sec Period)	S_{M1}	0.821g
Design Spectral Response Acceleration (0.2 sec Period)	\mathbf{S}_{DS}	0.968g
Design Spectral Response Acceleration (1.0 sec Period)	S _{D1}	0.547g
MCE Peak Ground Acceleration*	PGA	0.591
Site Coefficient (Table 11.8-1)	FPGA	1.000
MCE Peak Ground Acceleration*	РБАм	0.591

*MCE: Maximum Considered Earthquake

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 2016 CBC is not meant to completely

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Parking Structure - Geotechnical Slab and Foundation Recommendations

General

The parking structure will be founded on conventional foundations supported on Geopiers or equivalent gravel piers and a slab-on-grade supported on a blanket of removed and recompacted engineered fill.

Slab Design

- Slab Support
 - Minimum 2-foot-thick section of removed and recompacted subgrade, overlain by 6 inches of CMB
 - Subgrade compaction
 - 92% relative compaction
 - 2% over optimum moisture content
 - CMB Compaction
 - 95% relative compaction
 - Optimum moisture content
- Slab Type
 - Conventional
 - Minimum Thickness
 - 6 inches
 - Final thickness to be determined by SE
 - Minimum Reinforcement
 - #4 bars at 24 inches o.c.
 - Final reinforcement to be specified by SE
 - Moisture Retarder/Barrier
 - Not required from a geotechnical standpoint

Foundation Design

- Footing Type
 - \circ $\;$ Conventional spread and continuous footings
- Footing Support Geopiers
 - Geopier or equivalent gravel piers extended into bedrock
 - Minimum 12 inches into bedrock as verified by the project geotechnical engineer
 - The top of the Geopier or equivalent gravel piers should be at a minimum depth of 6 inches above bottom elevation of foundations

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- Note: Groundwater is anticipated to be encountered during construction of the Geopiers.
- Minimum Footing Size •
 - Minimum dimensions 0
 - Width: 24 inches
 - Depth: 24 inches below lowest adjacent grade
- Preliminary Bearing Value •
 - o 7ksf
 - Final bearing value to be provided by the Geopier
- Preliminary Settlement Estimate
 - Geopiers
 - Static Total: 1 inch
 - Static Differential: ¹/₂-inch over a span of 40 feet
 - Final settlement estimate to be provided by the Geopier engineer
 - Seismic Settlement (will only impact slab-on-grade) 0
 - Total: 0.75 inches
 - Differential: 0.5 inches over a span of 40 feet
- Passive Resistance and Preliminary Friction Coefficient:
 - Passive resistance: 300 psf/ft (engineered fill) 0
 - Disregard upper 6 inches
 - Friction coefficient: 0.45 (Combination rock and soil) 0
 - Final friction value to be provided by Geopier engineer.
 - \circ 1/3 increase for wind or seismic
- Concrete (Foundation and Slab)*
 - Type: II/V
 - Maximum water/cement ratio: 0.5 .

*See "Structural Concrete" section of this report.

Parking Structure Basement Retaining Wall Design and Construction

General

The recommendations for parking structure basement walls provided herein assumes that the walls will be incorporated into the overall design of the structure. Thus, the foundations for support of these walls should in accordance with the building foundation recommendations provided in this report.

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Foundation Design Type

Geopier supported conventional foundations (see previous section)

Wall Design Parameters

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•	At-Rest Earth Pressure:	60 pcf.
		Assumptions: 1) level backfill; 2) select backfill;
		3) backdrainage
•	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, 0.50 w/c ratio (geotechnical perspective only)
•	Backfill and Drainage:	See attached Plate 6
•	Select Backfill:	Low expansion;
		Subject to geotechnical approval;
		On-site materials anticipated to meet this criterion.

*See "Structural Concrete" section of this report.

Boater Services Building – Geotechnical Foundation and Slab Recommendations

Foundation/Slab Design

- Footing Type and Minimum Reinforcement:
 - Conventional slab-on-grade foundation system designed per WRI
 - Minimum reinforcement as per WRI
- Bearing Material: Certified Engineered Fill
- WRI Design
 - Expansion
 - PI = 20
 - Settlement:
 - Static + Seismic:
 - Total: 1.25"
 - Differential: 0.75" over a span of 30 feet
 - Allowable Bearing Capacity: 2,500 psf
 - Above value may be increased by 1/3 for temporary loads such as wind or seismic

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- Lateral Foundation Resistance:
 - Allowable passive resistance: 300 psf/ft (disregard upper 6 inches)
 - 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
- Minimum Slab Thickness: 5 inches
 - Final thickness to be determined by the structural engineer
- Minimum Slab Reinforcement: As per WRI design
- Minimum reinforcement consisting of No. 4 bars placed 18 inches on center.
- Slab Subgrade
 - Certified Engineering Fill moisture conditioned to a minimum of 2% over optimum moisture content (see "Corrective Grading" section of this report)
- Moisture Vapor Barrier
 - A moisture vapor barrier in minimum conformance with Stego 15 Mil Class A or equivalent should be utilized over properly compacted subgrade.
 - Sand above or below the vapor barrier is not required from a geotechnical perspective.
- Concrete*
 - o Structural Elements
 - Cement Type: II/V
 - Maximum w/c ratio: 0.50 (geotechnical perspective only)

*See "Structural Concrete" section of this report.

Site Retaining Walls Design and Construction

- o Foundation Design
 - Minimum Foundation Width:
 - Minimum Foundation Depth:
 - Bearing Materials:
 - Allowable Bearing Capacity:

24 inches Depth below lowest adjacent grade to bottom of footing: 24 inches Minimum of 2 feet of engineered fill 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) 125 pcf

- Unit Weight of Backfill:
- 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

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125 pcf

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- Wall Design Parameters
 - Active Earth Pressure:

40 pcf – Assumptions: 1) Tevel backfill: 2) select backfill; 3) back-drainage, and FICIAL 4) wall moment > 0.01 H allowed.

- Seismic Earth Pressure Walls > 6 feet:
- Weight of Backfill:
- Control/Construction Joints: As a minimum, maximum spacing of 15 feet
 - Waterproofing: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.

17 pcf -triangular distribution

• Concrete*:

Type II/V cement (geotechnical perspective only).

0.50 w/c ratio

*See "Structural Concrete" section of this report.

- Wall Backfill and Drainage: See Attached Plate 6
- Select backfill
 - Low expansion
 - Subject to geotechnical approval.
 - On-site materials are anticipated to meet this criterion.

Screen Wall Design Parameters

For standard screen walls on flat ground, footings should be a minimum of 24 inches deep below the lowest outside adjacent grade. Wall foundations should be reinforced with two #4 bars top and bottom, and joints in the wall should be placed at regular intervals on the order of 10 to 20 feet. The wall foundation shall be underlain by at least a 2-foot-thick section of engineered fill.

Pole Foundations

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.

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Passive resistance should be ignored 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 318-14, 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.

Wet curing of the concrete per ACI Publication 308 is also recommended. 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 the designing a durable concrete with respect to the potential for sulfate exposure from the on-site soils and/or changes in the environment.

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 severely corrosive to ferrous metals. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal signposts, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.)

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may be subject to corrosion. The use of special coatings or cathodic protection around the second provisions will be required to address high chloride contents of the soil 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 boater service building slab. The retarder/barrier should be installed as follows:

- Below moisture-sensitive floor areas.
- Installed per 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

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sources above the retarder (i.e., concrete). Sources above the retarder include any source and 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

Based on our infiltration testing as discussed earlier in this text and geologic findings, we note that the installation of an infiltration facility such as an infiltration basin or trench within the subject property is not feasible from a geotechnical standpoint. On this basis, we recommend that one of more of the following BMP's be considered:

- Rain gardens and dispersion trenches
- Bioretention 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



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If bioretention features are installed, we recommend that an impermeable liner be installed at the bottom and sides of all bioretention areas at the subject site 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

Buoyancy

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.

Additional Considerations

The site liquefaction may also affect the utilities, pavements, and pool improvements at the site. 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. We also recommend flexible connections for the utilities connecting to the hotel buildings, and earthquake shut off valves for pressured utilities at their entrance to the site. 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. Building mat slabs may require repair and re-leveling after a significant earthquake.

Utility Backfill

<u>General</u>

New utility line pipeline trenches should be backfilled with select bedding materials beneath and around the pipes and compacted soil above the pipe bedding. 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

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 ³/₄-inch crushed rock that conforms to Table 200-1.2.1 (A) of the 2018 "Greenbook." Pipe

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bedding should also meet the minimum requirements of the County of Canac County The stanging of the requirements of the County are more stringent, they should take geotechnical recommendations. Sufficient laboratory testing should be performed to werify the bedding meets the minimum requirements of the Greenbook and City of Dana Point grading code.

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.

Trench Backfill

All existing soil material within the limits of the pipeline alignment is considered suitable for use as trench backfill above the pipe bedding zone 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.
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 DEWATERING

DEWATERING

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 loading, 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

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 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.

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• The CMB or CAB and AC should be compacted to at least 95% relative compaction (per ASTM 1557).

Permeable Interlocking Concrete Paver Design

We understand that the designated parking areas of the Commercial Component may utilize permeable interlocking concrete pavers (PICP) and will assume subgrade soil conditions (R-value) of at least 10, according to the "Design Manual for Permeable Interlocking Concrete Pavements" by ICPI (2011). The final structural base and subbase thicknesses will need to be designed by the project civil engineer in order to meet storage requirements. This minimum section assumes a T.I. of up to 6.3 (GMU assumes a T.I. of 5.5 for the mixed use of parking and drives in this parking lot) and calls for a 3½-inch-thick (80 mm) concrete paver, over compacted layers of 2" of bedding course sand (ASTM No. 8 aggregate), over 4" of ASTM No. 57 stone as open-graded base, over 6" of ASTM No. 2 stone as open-graded sub base, over a Class 1 geotextile fabric* (highest strength) per AASHTO M-288.

*Due to the presence of gravel and some rock in the existing fill soils that will likely function as subgrade support for the PICP, GMU recommends using a Class 1 geotextile fabric (highest strength) placed both vertically at the sides of all PICP excavations and on top of the compacted subgrade soil below the stone sub base layer in order to protect the bottom and sides of the open-graded base and sub base. This geotextile fabric must meet AASHTO M-288 Class 1 geotextile strength property and subsurface drainage requirements (per Table 3-3 and Table 3-4 from Page 31 of the ICPI Design Manual (2011) for AASHTO M-288 requirements).

RECYCLED AC MATERIAL

The use of stockpiled in-place recycled AC and crushed miscellaneous base (CMB) for new engineered fill subgrade, and CMB outside building 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 asphalt pavement to confirm that the samples meet the 2019 Greenbook Section 200-2.4 standards for Crushed Miscellaneous Base (CMB). GMU recommends that this recycled CMB 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 concrete pavement is not to be used as compacted fill for support under any of the building areas or in the planters on the subject site.

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FLATWORK DESIGN RECOMMENDATIONS

We anticipate that the proposed improvements will be constructed on previously placed compacted fill material and will require minimum processing prior to construction of the improvements. The following recommendations are for integration of flatwork grades into the grading plans.

Description	scription Subgrade Preparation ⁽¹⁾		Reinforcement ⁽²⁾	Expansion Joint Spacing	Concrete ⁽⁴⁾	
	1) 20/	Thickness	N 21 0 102 1	(⁽³⁾ (Minimum)	T 11/17	
(Sidewalk) ⁽⁵⁾	1) 2% over optimum to 8-	4-inches	No. 3 bars (a) 18 o.c. and dowel into existing flatwork	6-1001 X 6-1001	1 ype II/V 3 250 psi min	
(Sidewalk)	compaction		doorways and curbs	speed dowels	<i>5,250</i> psi min.	
	2) *4-inches of CAB or		using No 3 bars @ 18"o c	with No 3 bars		
	CMB compacted to a			@ 18" o.c.		
	minimum of 95% relative			0		
	compaction					
Concrete Paving	1) 2% over optimum to 8-	5-inches	No. 3 bars @ 18" o.c. and	10-foot x 10-	Type II/V	
(Patio) ⁽⁵⁾	inches at 92% relative		dowel into existing flatwork,	foot using 9-	3,250 psi min.	
	compaction		doorways, and curbs existing	inch speed		
	2) *4-inches of CAB or		paving using No. 3 bars @	dowels with		
	CMB compacted to a		18°0.C	No. 3 bars (a)		
	compaction			18 0.0.		
Concrete	1) 2% over optimum to 8-	4-inch	1) Slab – No. 3 bars @ 18"	10-foot x 10-	Type II/V	
Interlocking	inches at 92% relative	concrete	o.c. and dowel into existing	foot using 9-	3,250 psi min.	
Pavers underlain	compaction; 2) 4-inches	sub slab if	flatwork, doorways and,	inch speed	, I	
by 1" of sand	of CAB or CMB	4-inch	curbs using No. 3 bars @	dowels with		
(non-vehicular) ⁽⁶⁾	compacted to a minimum	CMB base	18"o.c; 2) where adjacent to	No. 3 bars @		
	of 95% relative	section	structures, curbs, etc. and at	18" o.c.		
	compaction or concrete	not used	cold joints - use dowels: No.			
	sub slab may be used in		3 @ 18" o.c			
	lieu of base section (see					
Concrete	adjacent column).	6 inch	1) Slab No. 2 hars $@$ 19"	10 foot v 10	Tuno II/V	
Interlocking	inches at 92% relative	0-IIICII concrete	1) $Siab = 100.5$ bars ($@$ 18	foot using 9	3 250 pi min	
Pavers underlain	compaction: 2) 12 inches	sub slab if	flatwork doorways and	inch speed	<i>5,250</i> pr mm.	
by 1" of sand	of CAB or CMB	12-inch	curbs using No. 3 bars @	dowels with		
$(vehicular)^{(6)(7)}$	compacted to a minimum	CMB base	18"o.c.; 2) where adjacent to	No. 3 bars @		
Ì, Í	of 95% relative	section	curbs and at cold joints - use	18" o.c.		
	compaction over Mirafi	not used	dowels: No. 3 bars @ 18"			
	600X or equivalent fabric		0.C.			
	or concrete sub slab may					
	be used in lieu of					
	base/fabric section (see					
	adjacent column)					

Flatwork Table

*Recommended 4" of AB/CMB under pedestrian concrete pavement to be confirmed by project design team.

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- (3) Control Joints: Suggested spacing of sidewalk areas at 6-foot square and patio areas at 10-foot square.
- (4) Final concrete mix design to be supplied by others.
- (5) Where new trees or large shrubs are to be located in close proximity of new concrete flatwork, rigid moisture/root barriers should be placed around the perimeter of the flatwork to least 2 feet deep in order to offer protection to the adjacent flatwork against potential root and moisture damage. Existing mature trees near flatwork areas should also incorporate a rigid moisture/root barrier placed to at least 2 feet below the top of the flatwork.
- (6) 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 should maintain an aspect ratio of 3 to 1 or less (where the length of the paver is 3 times the thickness of the paver or less) in order to minimize edge cracking.
- (7) Concrete bands adjacent to the vehicular interlocking pavers should consist of a design section of 8 inches of PCC over at least 6 inches of AB or equivalent, moisture conditioned to at least optimum moisture, and compacted to at least 95% relative compaction.

<u>General Note</u>: Minor deviations to the above recommendations may be required at the discretion of the soils engineer or his representative.

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 to the adjacent flatwork against potential root and moisture damage. Flatwork areas with 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 / GEOTECHNICAL TESTING DURING GRADING / FUTURE REPORTS

Plan Review

Our office should review the final approved precise grading plans, Geopier/aggregate pier, and landscape plans for the site and comment on the anticipated effects of any major changes from the plan reviewed for this report. In addition, the final parking structure and boater service building foundation plans and final foundation loads will need to be reviewed to confirm that settlements are within tolerable limits.

FUTURE SERVICES

GMU should review the final construction plans to confirm they are consistent our recommendations provided in this report.

Geotechnical Testing

It is recommended that geotechnical observation and testing be 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 Geopiers or aggregate piers.
- 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

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OC Public Works

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

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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 that complete this report are listed in the Table of Contents.

Respectfully submitted,

David R. attenson

David R. Atkinson Project Manager / Senior Engineer

CERTIFIED 2 CERTIFIED 2 ENGINEERING GEOLOGIST ★



Katie Farrington, M.Sc., PG, CEG 2611 Senior Engineering/Geologist

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

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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WA Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component	County of Orange - OC Public Works OC Development Services APPROVED
SITE-SPECIFIC REFERENCES	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
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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WARD PROPERTIES Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization:

Parking Structure and Boater Services Building – Commercial Component

AERIAL PHOTOGRAPHS

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DATE	FLIGHT	РНОТО
4-19-99	C136-45	170-171
10-15-97	C117-45	118-119
1-2-95	Cl01-45	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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NG: q:\2017\17-206-02\dwq\1720602_plate 2_geo map_h\brid.dwg PLOTTED: 12/4/2019 9:15 AM BY:

	APPROXIMATE DRILL HOLE LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT 17-206-02 AND 17-206-03
HA-1	APPROXIMATE LOCATION OF GMU HAND AUGER LOCATION (PROJECT 17-206-03)
O H	APPROXIMATE INFILTRATION TEST LOCATIONS BY GMU GEOTECHNICAL, INC., PROJECT NO. 17-206-02
DH-4	APPROXIMATE LOCATION OF GMU DRILL HOLE LOCATIONS (PROJECT 11-161-00)
O 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)
CPT-1	ESTIMATED LOCATION OF PREVIOUS CPT BY LEIGHTON (PROJECT 600024-001, DATED 12/3/02)
B-2	ESTIMATED LOCATION OF PREVIOUS BORING BY DIAZ YOURMAN (PROJECT 2005-022, DATED 11/29/05)
	PROPOSED THREE LEVEL PARKING STRUCTURE
	PROPOSED ONE LEVEL BOATER SERVICE BUILDING
	EXISTING BUILDINGS
BB	GEOTECHNICAL SECTION
	LIMITS OF ROUGH GRADING
GW	DEPTH BELOW GROUND SURFACE MEASURED AT TIME OF DRILLING

Geotechnical Map Parking Structure for Commercial Component Dana Point Harbor Partners, LLC.				
	Date:	December 4, 2016	Plate	
	Project No.:	17-206-02	2	



1/8/2021





		<u>∠N 73° W</u> EXISTING PARKING LOT	SECTION A - A'			
CPT-1 (11-161-00) Proj. 5'	DH-34 (17-206-02) Proj. 6'	PROPOSED PARKING STRUCTURE, THREE LEVELS ON GRADE.	DH-6 (11-161-00) Proj. 32'	DH-10 (11-161-00) Proj. ~80'	- EXISTING GRADE	EXISTING GRADE BEYOND
Qm TD 19	TD 26'	Qaf	Qaf TC TD 50'			



LEGEND

Geote	echnica	al S	ections	1
	Date:	Decemb	er 4, 2019	Plate
ULID	Project No.:		17-206-02	3



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APPENDIX A-1

GMU Geotechnical Exploration Procedures and Logs



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Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WA Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization: Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California	County of Orange - OC Public Works RD PROFENDED 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
APPENDIX A-1	Hadi Tabatabaee BUILDING OFFICIAL

GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS

Our exploration at the subject site consisted of twenty (18) drill holes to a maximum depth of 50 feet below the existing grade, one (1) hand auger to a depth of 15 feet below existing grade, eight (8) shallow drill holes for infiltration testing, and seven (7) Cone Penetration Testing (CPT) soundings to a maximum depth of 24 feet below the existing grade. Our drill holes were logged by a Certified Engineering Geologist or Engineer, and drive, bulk, and SPT samples of the excavated soils were collected. The logs of each drill hole are contained in this Appendix A-1, and the Legend to Logs is presented as Plates A-1 and A-2. The CPT data are presented in Appendix A-2. The approximate locations of the drill holes and CPT's are shown on Plate 2 -Geotechnical Map.

"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 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.

Building&Safety: Ryan Rose Approval: Geotechnical Reports

Permits: GRD20-0021

1/8/2021

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COARSE-GRAINED SOLS GRAVES Disk or Mode of Coarse Fraction No. 200 Sirve GRAVES Disk or Mode of No. 200 Sirve GRAVES Disk of Mode of Disk	Image: State Stat	MAJOR	DIVISIONS		Group Letter	Symbol	TYPICAL	County of Orange - O NAMESC Developmen APPROV This set of plans and specificati	C Public Wo It Services ED)
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Passing The 3-Inch (Tomm) Sieve. SANDS More Than Six of Comparison Passing No.4 Sieve SANDS Subset Sands SW Well Graded Sands and Gravelly Sands, Little or No Fines. ASTM Standard D2487 SANDS More Than Six Obset Passing No.4 Sieve SM Silty Sands, Sand-Silt Mixtures. FINE-GRAINED SOLS 50% or More Passe The No 200 Sieve SILTS AND CLAYS Liquid Limit Less Than 50% ML Clayey Slats With Sight Plasticity. Based on The Material Passing The 3-Inch (75mm) Sieve. SILTS AND CLAYS Liquid Limit S0% ML Inorganic Sits, Vary Fine Sands Chaye Sits With Sight Plasticity. Reference: ASTM Standard D2487 SILTS AND CLAYS Liquid Limit S0% ML Inorganic Sits, Vary Fine Sands Chaye Sits With Sight Plasticity. Reference: ASTM Standard D2487 SILTS AND CLAYS Liquid Limit S0% ML Inorganic Sits, Macaceous or Diatomaceous Fine Sandy or Sity Sols, Elastic Sits. HIGHLY ORGANIC SOLS SILTS AND CLAYS Liquid Limit S0% MH Inorganic Clays of High Plasticity, Organic Sits. HIGHLY ORGANIC SOLS SILTS AND CLAYS Liquid Limit S0% MH Inorganic Clays of High Plasticity, Organic Sits. HIGHLY ORGANIC SOLS SILTS AND CLAYS Liquid Limit S0% MH Inorganic Clays of High Plasticity, Organic Sits. HIGHLY ORGANIC SOLS SILTS AND CLAYS Liquid Limit S0% MH Inorganic Clays of Medium To	Pre-Bind Sum S Color SW Well Craded Sands and Gravelly Sands, Little or No Fines. Reference: No.4 Sine Sands Sin	Based on The Material		Fines	GC		Clayey Gravels, Gravel-Sand-Cla	y Mixtures.		1
Reference: More Transition Circle SP Poorly Graded Sands and Gravelly Sands, Little or No Fines. ASTM Standard D2487 More Transition Growse Finces Sill Sands SM Silly Sands, Sand-Clay Mixtures. FINE-GRAINED SOLS SILTS AND CLAYS Inorganic Sitts, Very Fine Sands or Clayey Sitts With Sight Plasticity. 50% or More Passe Sill Sandb CLAYS Inorganic Sitts, Very Fine Sands or Clayes of Low To Medium Plasticity. 50% or More Passe Sill Sandb CLAYS Inorganic Sitts, Very Fine Sands or Clayes of Low Plasticity Isolation. 50% or More Passe Sill Sandb CLAYS Inorganic Sitts, Meaceous or Diatomaceous Fine Sandy or Sitts with Solate Sitts. 8 Sill Sandb CLAYS Inorganic Clays of Low To Medium To High Plasticity. Inorganic Sitts. Reference: Sill Sandb CLAYS Inorganic Clays of High Plasticity. Fat Clays. Inorganic Clays of High Plasticity. Fat Clays. ASTM Standard D2487 Sill Sandb CLAYS Inorganic Clays of Medium To High Plasticity. Organic Silts. HighLy Organic Solls PT PT PT HighLy Organic Silts. PT Pastice Silts. PT Carl More Faceo Silt Sandb CLAYS Inorganic Silts. PT Inorganic Silts.	Reference: Mode Tamo You Status SP Control Graded Sands and Gravely Sands, Little or No Fines. Normality Based on the Material Pressore Sands Sands Silvy Sands, Sand-Silv Mutures. Image: Silvy Sands, Sand-Silvy Mutures. Image: Silvy Sands, Sand-Silvy Mutures. Image: Silvy Sands, Sand-Silvy Mutures. Silvy Sands, Sand-Silvy Mutures. Image: Silvy Sands, Sand-Silvy Sands, Sand-Silv	Passing The 3-Inch (75mm) Sieve.	SANDS	Clean	sw		Well Graded Sands and Gravelly	Sands, Little or No Fines.	-	
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Indelly organic soils PT Pr Pr<	Iterature States Production 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 = Direct Shear = Hydrometer Test = Traixial Compression Test = Consoliditation Test = Compaction Test = Stand Equivalent Test = Atterberg Limits = Resistance Value = Specific Cravity = Statestime Value = Statestime Value = Charles E = Minimum Resistivity = Natural Undisturbed Sample = Collapse Test/Swell-Settlement = Collapse Test/Swell-Settlement	ASTM Standard D2487	or Great	ter	он		Organic Clays of Medium To High	Plasticity, Organic Silts.	-	
Triaxial Compression Test = Expansion Test = Expansion Index = Expansion Index = Specific Gravity = Specific Gravity = Suffates = Chlorides = Minimum Resistivity	Particle Stars Expansion Test Expansion Test	HIGHLY ORGANIC SOILS			РТ	8.a.	Peat and Other Highly Organic So	pils.		
 a) = Natural Undisturbed Sample b) = Remolded Sample c) = Collapse Test/Swell-Settlement c) = Collapse Test/Swell-Settlement 	for 12-Inches Penetration- Standard 20% Penetration Test (SPT)	 Direct Shear Hydrometer Test Triaxial Compression Test Unconfined Compression Consolidation Test Time Rate Expansion Test Particle Size Distribution Expansion Index Sand Equivalent Test Atterberg Limits Chemical Tests Resistance Value Specific Gravity Sulfates Chlorides Minimum Resistivity Natural Undisturbed Sample Reolapse Test/Swell-Settlemen 	B = Bedd F = Frac RS = Rup = Gr S S 10: 10 f 6/4: 6 B P: Pus P: Pus (13): Unc	C = Co Cture Flt = F oture Surface roundwater AMPLE S Undistur (Caliform Undistur (Shelby' Bulk Sar Bulk Sar Samplin SPT Sar Blows for 12-In lows Per 4-Incl sh corrected Blow	ntact Fault YMB bed S Tube) mple essful g Atte mple cches P hes Pe Counts	J = J S = S S = S OLS Counter the second	ion n alues)			

Building&Safety: Ryan Rose Approval: Geotechnical Reports

ermits: GRD20-0021

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				SC	OIL DENSIT	Y/CONSISTENC	Y		County of (Trange - OC Public W
					FINE G	BRAINED			000	velopment Services
	Con	sistency			Field Test		SPT	- 4)	Mod This set of plan	APPROVED and specifications must be kept
	Verv S	Soft	Easilv	penetrated by the	umb. exudes b	between fingers	(#DIOWS/10	OL)	alterations to th	is unlawful to make any change e plans without written permissi
	Soft		Easily p	penetrated one in	nch by thumb,	molded by fingers	2-4		of Orange Course	The stamping of these plan
	Firm		Penetra	ated over 1/2 inc	h by thumb wi	th moderate effort	4-8		approval of the Or 6 inlance or S	plation of any provisions of any e law.
	Stiff		Penetra	ated about 1/2 in	ch by thumb v	vith great effort	8-15		12-25	Hadi Tabatabaee
	Very S	Stiff	Readily	indented by thu	mbnail		15-30		25-50	BUILDING OFFICIAL
	Hard		Indente	ed with difficulty l	by thumbnail		>30		>50	
					COARSE	GRAINED				
	D	ensity			Field Test		SPT (#blows/fo	ot)	Mod (#blows/foot)	
	Very L	.oose	Easily p	penetrated with ().5" rod pushe	d by hand	<4		<5	
	Loose		Easily p	penetrated with ().5" rod pushe	d by hand	4-10		5-12	
	Mediu	m Dense	Easily p	penetrated 1' wit	h 0.5" rod driv	ven by 5lb hammer	10-30		12-35	
	Dense		Dificult	to penetrat 1' wi	th 0.5" rod driv	ven by 5lb hammer	31-50		35-60	
	Very D	Dense	Penetra	ated few inches	with 0.5" rod d	riven by 5lb hammer	>50		>60	
Density			Field	Test		SPT (#blows/foot)			MODIFIERS	
t	Can be crus	hed by har	nd, soil l	ike and structure	eless	1-30		Tr	ace	1%
derately Hard	Can be groo	wed with fi	ngernail	ls, crumbles with	hammer	30-50		Fe	ew	1-5%
d	Can't break	by hand, c	an be g	rooved with knife	9	50-100		Sc Ni	umerous 1	5-12% 2-20%
y Hard	Scratches w	ith knife, c	hips wit	h hammer blows	;	>100		Ab	oundant >	>20%
									÷	
		(GRAIN	I SIZE						
Desc	ription	Sieve	e Size	Grain Size	Appro	oximate Size			MOISTURE C	ONTENT
Bou	lders	>12"		>12"	Larger than a	a basketball	Dry- \	/ery	little or no moistu	re
Cob	bles	3-12"		3-12"	Fist-sized to	basketball-sized	Damp Moist-	- So	ome moisture but l	ess than optimum
Gravel	Coarse	3/4-3"		3/4-3"	Thumb-sized	to fist-sized	Very N	/loist	t- Above optimum	
	Fine	#4-3/4"		0.19-0.75"	Pea-sized to	thumb-sized	Wet/S	atura	ated- Contains fre	ee moisture
	Coarse	#10-#4		0.079-0.19"	Rock-salt-siz	ed to pea-sized				
Sand	Viedium	#40-#10)	0.017-0.079"	Sugar-sized	to rock salt-sized				
Sand	Fine #200-#40 0.0029-0.017"			<0.0029-0.017	Flour sized to					
Sand		es passing #200 <0			Flour-sized a	and smaller				



P8-11/16/2012

LEGENDTOLOGS

ASTM Designation: D 2487 (Based on Unified Soil Classification System) Plate

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

GMU Project 17-206-02



									Building&Safe Approval: Geo	ety: I Stecl	Ryan I hnical	Rose Report	s		1/8/20
Pro Pro	jec jec	t: D t Lo	Dana Point Harbor, Commercia cation: Dana Point Harbor Dr	al Co 'ive	mpon	ent		Log	of Dril	20_0		e DI	- -1	7	
Pro	jec	t Nu	mber: 17-206-02						Countly 6	1 0 : De	rang velo	e - OC pment	C Pu Ser	blic vices	Works
Date Drille	(s) d	9/1	2/2018	Logg By	jed	WD			Checked By _{his set of p}	lans	APP and sp	ROVE	D ns mu	st be ke	pt on the
Drillin Meth	ng od	Но	Ilow Stem Auger	Drillin Cont	ng ractor	2R Drill	ing		Total Dept	es. It othes Ric V	t is unla se plan Vorks, (v The	Stamping	nake a writter lopme	ny char n permi nt Servi	nges or ssion ices
Type Grou	ndw	CN ater D	lE 75	of Ho	neter(s) ble, inch pling	es 8	d sampler	with 6-inch	Approx: SI Elevation;	fteM fteM or Sta	CLL N Slation te law.	of any p	ld to p ovisio	ermit or ns of ar	r be an ny County
(Eleva Bema	ation	n], fee		Meth	iod(s)	sleeve,	SPT, and I	bulk	Backfill Driving Me	Na thoc	NILDIN	Indiada G OFFIC	ickre HAL	ete	
		 T	······································						and Drop		Ä				
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIEN DA	TATION ATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	à AND I	SAMPLE SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
10-	-		ARTIFICIAL FILL (Qaf)				Asphalt C Inches) Aggregate CLAYEY S brown and loose, fine	oncrete (approximate Base (approximate SAND (SC), grayish d orange brown, slig g grained	ely 3 ly 3 inches) brown, htly moist,			140			
-	- 5		Scattered gravel up to 0.5"				pale grayis dense, fine	sh brown and brown e grained	, moist,		11 10 12	140			
							Total Dept Groundwa	th = 6.5 feet tter Not Encountered	1						
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									D	 ril	I He	ole	DH	 -17	,

DH_REV3 17-206-02 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19

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Project	Nu	mber: 17-206-02					County	0	range	0 + 0	C Pu	blic	Wo
Date(s)	9/1:	2/2018	Logg	ed WD			Checked	7	APPI	ROVE	P		
Drilling Method	Ho	llow Stem Auger	Drillin	ig actor 2R Drill	ing		Total Dept	ans es. I the	and spe t is unla se plare	wful to n	ns mu nake a writte	st be k ny cha n perm	ept or inges lission
Drill Rig	СМ	E 75	Diam	eter(s) 8	· · · · · · · · · · · · · · · · · · ·		Approx Su	nic v niac t M	Vorks, C V The s RLL NC	stamping	opme of the ld to p	ent Sen ese pla permit o uns of a	nces n or be
aroundwa Elevation	ater D], feet	^{epth} NA []	Samp	oling Cal-mo	d sampler with 6-inch SPT, and bulk		Drill Hole Backfill	Na	te law.	nd Qu	ickr	ete	ily of
Remarks			•				Driving Met and Drop	hoc		s offic itohar		ř	
	<u> </u>							SA	MPLE	DATA	1	EST	DA1
ELEVATION, feet DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	c	DRIENTATION DATA	ENGINEEF CLASSIFICATI DESCRIPT	ring Ion A Fion	AND	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
10-		ARTIFICIAL FILL (Qaf)			Asphalt Concrete (appro Inches) Aggregate Base (approx CLAYEY SAND (SC), br slightly moist, medium de	imatel	y 5 inches) gray brown,						
-		Possibly highly weathered bedrock (inconclusive)			medium grained, some g	ravel			8 7 8	140			
-5					Total Depth = 5.1 feet Groundwater Not Encour	ntered			50/1"	140	15	 	

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I: Geotechnical Reports

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Date Drille	(s) ed	9/1:	2/2018	Logge By	ed WD			Checked Byhis set of p	lans a	and spe	MF	is mus	t be ke	pt c
Drillii Meth	ng Iod	Hol	low Stem Auger	Drillin Contra	g actor 2R Dril	ling		Total Dept of Drill Hol	es. It thes Nic V	t is unla se plane Vorks, C	5 feet	ake ar writter opmer	ny char i permi nt Servi	nge: ssic ices
Drill Type	Rig	СМ	E 75	Diame of Hol	e, inches 8			Approx Si Elevation;	urfac ft MS	ALL NO	tamping 2 Be hel of any pr	of the d to pr ovision	se plar ermit or ns of ar	be ny C
Grou Elev	ndwa	ater De], feet	epth NA []	Samp Metho	ling Cal-mo	d sampler wit SPT, and bull	h 6-inch (Drill Hole Backfill	Na	tive a	nd Qu	ickre	ete	
Rem	arks							Driving Me	thoo	UILDIN	itohan			_
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lon,	feet	р П		c	RIENTATION	L CLAS	SIFICATION	a AND		NS/6	sql	RE IT, %	, pcf	
EVA	PTH	HAPH	DESCRIPTION		DATA	D	ESCRIPTION	1	MPLE	MBEF BLO	IVING	NTEN		
<u></u>	ä	G				DAsphalt Cone	roto (Approvima		₽S S	NN NN	DB	90 80	БЯ	
			ARTIFICIAL FILL (Qaf)			Inches)								
						inches)			[
	-					yellowish brow	wn, moist, loose,	ine	-				ĺ	
10-	-		Scattered gravel up to 1", possibly highly weathered bedrock (inconclusive)	У		grained				5 2	140			
									111111111111	4				
									Π					
	-5		Gravel up to 4"			SAND (SP), p	ale yellowish bro	own, moist,		15	140			
	-		·			dense, tine to	medium grained			8				
					·	Total Depth =	6.5 feet		┍					
						Groundwater	Not Encountered	3						
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9/12/2018	Logged		I Checked	1000	CONTRACTOR OF A		100	and the second s	
•	Ву WD		Byhis set of p	lans a	K and spe	MF	is mus	t be ke	pt c
Hollow Stem Auger	Drilling Contractor 2R Drill	ing	Total Dept	thes Ric W	e plane	5 feet	written	permi t Servi	ssio ces
CME 75	Diameter(s) 8 of Hole, inches		Approx SL Elevation,	irfac ft MS	ALL NO	ž h e hel of any pr	d to pe ovision	mit of ar	be iy C
er Depth NA [] feet	Sampling Cal-mod Method(s) Sleeve,	d sampler with 6-inch SPT, and bulk	Drill Hole Backfill	Na	Aive a	nd Qu	ickre	te	
			Driving Me and Drop	thoo	At	tohan			_
				SA	MPLE	DATA	Т	EST I	DA
GEOLOGICAL		ENGINEERING	£		6"		é		
CLASSIFICATION AND	ORIENTATION	CLASSIFICATION	AND	щ	ER DWS /	lG ∏, Ibs	URE ENT, 9	NIT IT, pcf	
DESCRIPTION	DATA	DESCRIPTION	1	SAMPL	IUMB8	VEIGH	ONTE	NEIGH	
		Asphalt Concrete (Approxima	tely 3.5		20		20		
ARTIFICIAL FILL (Qaf)		Aggregate Base (Approximate	əly 3.5	ħ/					
		CLAYEY SAND (SC), brown a	and grayish	$\left \right\rangle $					
Scattered gravel up to 2"		grained	dense, fine		7	140			
					12 12				
				A					
Possibly highly weathered bedrook		nale vellowich brown and gray	deb brown		,	140	10	107	
(inconclusive)		fine to medium grained	Jish Drown,		6 8	140	19	107	
		Total Depth - 6.5 feet		┛┤					
		Groundwater Not Encountere	d						

1

Drilling Jethod Drill Rig ype Aroundy Elevatic Remark	g (dwater ion], fe ks	Iollow Stem Auger CME 75 Depth NA []	Dy Dy Dy Drilling Contractor 2R Dri Diameter(s) of Hole, inches Sampling Cal-me	lling B	Bylis set of p Total Dept of Drill Hol	lans a es. It Sthes Gic V	and spe is unlate plane Vorks	vification of to m .5 feet	ake ar written	t be ke ny char i permi	pt on iges
Aroundy Elevation	g (lwater ion], fe	Depth NA []	Diameter(s) of Hole, inches Sampling Cal-me	B	of Orange C	MIC V	VOIKS C	T DESCRIPTION D	COLUMN TWO IS NOT	the second se	000
Aroundy Elevation	lwater ion], fe ks	Depth NA [] eet	Sampling Cal-me		Envotion	urfac ft M		tamping Be hel	of the d to pe	e piar ermit or	be a
Remark	ks		Method(s) sleeve	od sampler with 6-inch	Drill Hole	Na	tive a	nd Qu	ickre	te	,, .
TION, feet			Modified(6)		Driving Me	thor		offic itohan			
TION, feet						e A			т	Eeti	
	DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERIN CLASSIFICATION DESCRIPTIO	G AND N	SAMPLE SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
10-		ARTIFICIAL FILL (Qaf) Orange brown mottles		Asphalt Concrete (approxima inches) Aggregate Base (approximat CLAYEY SAND (SC), brown brown, moist, loose, fine grai	itely 4.5 ely 2 inches) and grayish ned		334	140			
-5	5	Orange brown mottles, gravel up to 2" Possibly highly weathered bedrock (inconclusive)		grayish brown, medium dens medium grained, some grave Total Depth = 6.5 feet Groundwater Not Encountered	e, fine to I		9 6 9	140	15	111	

	(p)			1.00	and			OC Chooling	De	velop	ent ROVE	Sen D	vices	
Drille Drille	d d 10	9/12	2/2018	By Drill	yeu WD		·	By is set of pl Tob at Plane	ans a s. It	and spe is unlay	MF cification wful to m	s mus ake ar	t be ke iy char	pt o iges
Aeth Drill F	od Rig	Hol	Iow Stem Auger	Con	tractor 2R Drill	ing		of Dridd-fole	thes lic W	orks, O	5 Develo	opmen of the	t Servi se plan	ces
iype àrou	ndwa	ter De	epth NA T	of H Sarr	ole, inches ⁸ ppling Cal-mo	d sampler v	with 6-inch	Drill Hole	teMS Stat	e law.	of any pro	ovision	is of an	ıy C
Eleva Iema	ation arks	, feet		Meti	hod(š) sleeve,	SPT, and b	ulk	Backfill Driving Met	INA Bl thod	IIME TA	ndagaa S OFFIC	ICKre	te	
						r		and Drop						
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	à AND I	SAMPLE		DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
10			ARTIFICIAL FILL (Qaf)			Asphalt Co Inches)	ncrete (approxima	tely 3						
.0-	-		a			CLAYEY S and orange fine graine	AND (SC), pale ye brown, moist, me d, some gravel	bllowish gray dium dense,						
	-		Gravel up to 2". Possibly highly weather bedrock (inconclusive)	ed					Hereford and a statistical and a statistical and a statistic and a statistic and a statistic and a statistical and a sta	5 6 7	140			
5	-5		Scattered rounded gravel up to 2"			pale yellow dense, fine	rish gray and browr grained	n, moist,		8 9 20	140	12	118	
						Total Depti Groundwat	n = 6.5 feet er Not Encountered	d						
				ļ										

Pro	ojec	t: E	Dana Point Harbor, Commercia cation: Dana Point Harbor Dri	l Co ive	mpone	ent		Log	of Dril	20-0	021 1016	e Dł	1-2	25	
Pro	ojec	t Nu	mber: 17-206-02						Countly		rango welo	e - OC	: Pu Ser	blic \	Works
Date Drill Drill Met	e(s) ed ing hod	9/1 Ho	2/2018 Ilow Stem Auger	Logg By Drillin Cont	ged ng ractor	WD 2R Drill	ing		Checked By _{lis set of p} Total Dep of Dritt-Dep	olans les. I Othe Olic V	APPI and spe t is unla se plan Vorks, C	COVE CMF Scification wful to m C Deve	D ns mus nake a pritter lopmer	at be ke ny char n permi nt Servi	pt on the iges or ssion ces
Typ Gro [Ele	Rig e undw vatior	CN ater D n], fee	IE 75 Pepth NA []	Diam of Ho Sam Meth	neter(s) ble, inche pling iod(s)	s 8 Cal-mo sleeve,	d sampler SPT, and b	with 6-inch bulk	Drill Hole Backfill	nfac ft M Na	Station te law.	0.8° he of any pr net Qu	ickre	ermit or ns of ar ete	be an ly County
Hen	narks								and Drop		A	ntohan			
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENT DA	TATION	CL	ENGINEERING ASSIFICATION DESCRIPTION	G AND N	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
10			ARTIFICIAL FILL (Qaf) Gravel up to 3"				Asphalt Co Inches) Aggregata CLAYEY S brownish g to medium	oncrete (approxima Base (approximat SAND (SC), brown gray, moist, mediun a grained, some gra	tely 2 ely 3 inches) and n dense, fine vel	The second secon	4 7 11	140			
5	-5						dark brown grained	n, moist, dense, m	ədium to fine		24 15 11	140			
	-		Possibly highly weathered bedrock (inconclusive)				SANDY FA gray, mois	AT CLAY (CH), dari t, medium dense, fi	∢gray and ne grained		4 5 5	140	13		
0-	- 10		Scattered rounded gravel up to 2", minor fine grained sand							Annual and a state of the second seco	2 4 4	140	18	109	
			bedrock fragment in sampler Weakly bedded				Fragment (SILTSTON SANDSTO gray and p fine graine Total Dept Groundwat	of bedrock compos IE, CLAYEY SILTS INE with GRAVEL (ale brown, slightly i d h = 13 feet ter Not Encountere	ed of TONE and ML), dark noist, hard, d		50/5"	140			



Drill Hole DH-25

wal: Geotechnical Report

ate((s)	9/	12/2018	Logg	ged wo			Checked	Ż	APP		P		
rille	a ig	H	ollow Stem Auger	Drilli	ng 2R Drill	ing		Byhis set of p Total Dept	es. It thes	and spe t is unla se plane	cification wful to m	ake an writter	at be ke ny chai n permi	nges ssio
rill F	Rig	C	ME 75	Diam	neter(s) 8	•		Approx SI	Hic V Urfac	Vorks C	tamping	opmer of the d to p	nt Servi se plar ermit o	r be
rou	ndw	ater i	Depth 10.0 [1.8]	Sam	pling Cal-mo	d sampler w	ith 6-inch	Drill Hole Backfill	n Star Na	te law.	ndaGu	ickre	ete	iy C
ema	arks	. <u>j</u> , .e.		1.1104	100(0) 010010j			Driving Me	tho		s offic Itohan	IAL		
				T				· · ·	SA	MPLE	DATA	Т	ESTI	DA'
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	. 1	ORIENTATION DATA	CLA	ENGINEERING	à AND I	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
10-	_		ARTIFICIAL FILL (Qaf)			Asphalt Cor Inches) Aggregate I CLAYEY S/ moist, medi	ncrete (approximat Base (approximate AND (SC), pale bro um dense, fine gra	ely 1.5 ly 4 inches) ownish gray, lined						
	-		Scattered gravel and cobbles up to 6". R orange brown mottles.	Rare						5 8 16	140			
5-	5		Rounded gravel up to 4", interbeds of clayey siltstone with gravel, dark gray			very dense, some grave	coarse to medium I	grained,		8 16 25	140	10	128	
	-		Minor fine sand, rare orange brown staining, scattered gravel			loose				2 3 4	140			
	-10					olive brown,	wet, dense, fine (grained ⊻		5 9 12	140	14	113	_
0-			MANINE DEPUSITS (QIII)			very stiff	T (OL), very dark	yray, wei,						
			Minor fine to medium grained sand, grave is sub-rounded up to 1"	vel					11111111111111111111111111111111111111	4 9 15	140			
	-15		CAPISTRANO FORMATION (Tc) Gravel is sub-rounded to rounded up to 4	4"		SILTSTONE gray, moist,	with SAND (ML), hard, some clay a	very dark nd gravel		30 50/4"	140			
						Total Depth Groundwate	= 16 feet er at 10'							

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Drill Hole DH-26

ate((s)	9/1	3/2018	Logg	jed WD			Checked	1	APPI	ROVE	P	12	
rillir Ieth	ng ng	Hol	llow Stem Auger	Drillin	ng 2R Drill	ing		Dynis set of p Total Deptr	es. I the	and spe t is unla se plan	cification with to m	ake a	ny cha ny cha n perm	ept o nges issio
rill f	Rig	СМ	E 75	Diam	neter(s) 8			ApproxaSu Flewationof		ALL NG	tamping be hel	opmer of the d to p ovision	ermit of a	r be
irou Ieva	ndwa	ter De], feet	^{epth} 10.3 [-1.0]	Sam	pling Cal-mod	sampler with 6-inch SPT, and bulk		Drill Hole Backfill	Na	tive a	nd Qui	ckre	te	.,
ema	arks							Driving Met	thod	AL	itohan	iner		
						· · · · · · · · · · · · · · · · · · ·			SA	MPLE	DATA	Т	EST	DA'
ELEVALIUN, Teet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	ENGINEEF CLASSIFICATI DESCRIPT	ring On A Ton	AND	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
						Asphalt Concrete (approx Aggregate Base (approxin	imate nately	ly 3 inches), 7 inches)	-					
	-		ARTIFICIAL FILL (Qaf)			CLAYEY SAND (SC), pal moist, medium dense, fin	e brov e grai	wnish gray, ned	-					
5-	-		Scattered gravel to 1".						Induding and statistics	5 6 5	140			
	-5					pale brown and brown, modense, fine grained	oist, n	nedium		9 11 6	140	14	113	
0	-		Rare siltstone interbeds. Highly weather	red.		pale grayish brown and pa medium dense, fine to me	ale gra edium	ay, wet, grained	In the second se	11 6 5	140			
	-10		Sub rounded gravel up to 2"			brownish gray, moist to w fine to medium grained	et, ve	ry dense, ⊻		7 19 21	140	14	121	
- 5 -			CAPISTRANO FORMATION (Tc)			SANDSTONE with Grave brown and brown, moist to dense	(SP) o wet,	, orange very	111111111111111111111111111111111111111	14 30 50/3"	140			
	-15		Sub rounded gravel and cobbles up to 4'	11					-	50/1"	140	10	122	
									-					

Building&Safety: Ryan Rose Approval: Geotechnical Reports 1/8/2021

Pro Pro	ject ject	: D Loc	ana Point Harbor, Commercial Co ation: Dana Point Harbor Drive	omponent		Log	of Dril	20-0	021 1016	• D⊦	I-2	8	
Pro	ject	Nu	nber: 17-206-02	·····			Countified		Rafngo evelop	e + OC oment ≷OVE	: Pu Ser B	blic vice	Works
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL SANDSTC	ENGINEERING ASSIFICATION DESCRIPTION DNE (SP), pale yello ray, wet, medium de	This set of p job at all tim alterations to of Orange C specification approval of Ordinance of vish gray nse, fine to	SA othe blic \ blic \\blic \ blic \ blic \ b	MPLE Bug AsMOIB JO 21 50/6"	DATA cification with to make in the set of the set	A MOSTARE Search	DRY UN THO AND	DATA pt on the nges or sside toppoon toppoo
-15-					medium g	rained							
	-		Pale gray		Total Dept Groundwa	h = 26 feet ter encountered at 1	0.3 feet		50/4.5'	140	9	124	
		-											
		,						; ;					
	_					·							
		41	J				D)ri		ole	DH	1-28	3

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Pro	ject	Nu	mber: 17-206-02					County	10	ahge	9. 0 0	Pu	blic	Wo			
Date	(s) ad	9/1	3/2018	iged WD			Checked		APPI	ROVE	D						
Drilli	ng	Ho	llow Stem Auger	Dril	ling 2R Drill	ina		Total Dept	et of plans and specifications must be kept on bleines. It is unlawful to make any changes of								
vietr Drill	ioa Rig	CM	F 75	Dia	meter(s)			Approx Si	Aic v Irfac	Vorks, C	C Devel tamping	opmer of the	nt Servi se plar	ices i r be			
i ype Grou	ndwa	ter D		of H Sar	hole, inches	d sampler	with 6-inch	Drill Hole	fteM r Sta	blation of the law.	of any pr	ovisio	ns of ar	iy C			
Elev	ation]	, feet		Met	thod(š) sleeve,	SPT, and b	oulk	Backfill Driving Me	ina Bloc	HINGE TH JIL DING	Balasida S OFFIC	ICKTE					
-tern	arks							and Drop	, anoc	- At	itohan	inci		_			
									SA	MPLE	DATA	Т	EST I	DA.			
ELEVATION, fee	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	à AND I	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf				
		<u> </u>				Asphalt C	oncrete (approxima	tely 3									
15-	-		AH fIFICIAL FILL (Qaf) Subrounded gravel up to 4"			Aggregate SILTY SA brown, sliq medium g	Base (approximate ND (SM), brown gra ghtly moist, medium rained, some grave	y, yellowish dense,		5 10 12	140						
10-	-5		Subrounded gravel 1 to 6"			SANDY C hard, fine gravel	LAY (CL), dark brow to medium grained,	vn, moist, some		50/0.5	140	6	108				
	-		Rounded to subrounded gravel and col up to 7"	obles		brownish ç	gray, moist, stiff		- Internet and a state of the second state of	3 4 5	140						
5-	-10		Minor fine grained sand							4 6 7	140	29	92				
	-		Scattered gravel	ſ		gray and o fine graine	range brown, moist d sand	, firm to stiff,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 4 4	140						
			MARINE DEPOSITS (Qm)			SANDY CI medium ar	AY (CL); gray, moi ained sand	st, firm,	\square								
0-	- 15 - -		Rounded to subrounded gravel up to 3"			-		<u>⊽</u>	-	2 3 4	140	23	100				
			CAPISTRANO FORMATION (Tc)			SILTSTON overlying S brown and	IE (ML), gray, mois ANDSTONE (SP), dark orange brown	t, hard orange , wet, very	-								



Drill Hole DH-29



ato/	(e)			1.0000	d			Chooked	: De	veloj APPI	oment ROVE	Sen D	vices	i
rille	d d	9/14	1/2018	By	wD			Byhis set of p	lans a	and spe is unla	MF wful to m	is mus lake al	st be ke	pt o
eth	od	Hol	low Stem Auger	Contra	actor 2R Drill	ing		of Drill Hel	b thes Blic W ounty	vorks, C	6:0 fee oc Devel stamping	writter opmer of the	n permi nt Servi se plar	ssio ices
ype		CM	E 75	of Hole	e, inches 8		· · · · · · · · · · · · · · · · · · ·	Elevation (Itac ft Ma	ALL NC Station	of any pr	d to pr ovision	ermit or hs of ar	/ be ny C
leva	ndwa ation]	ter De , feet	^{epth} 15.0 [0.4]	Metho	d(s) sleeve,	d sampler v SPT, and b	with 6-inch bulk	Backfill	Na	tive a	nd:Qu	ickre IAL	ete	
ema	arks							and Drop	thoo	At	itohan	mer		_
									SA	MPLE	DATA	Т	EST I	DAT
ELEVALION, Teet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	0	PRIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	à AND I	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
15 -						Asphalt Co	oncrete (approxima	tely 4.5						
	-		ARTIFICIAL FILL (Qaf)			Aggregate SILTY SAI moist, med	Base (approximate ND with GRAVEL (lium dense, fine gra	ely 4 inches)/ SM), brown, ained		300	140			
10-	-5					SANDY CI very stiff	ĂY (CL), grayish b	rown, moist,		20 26 12	140	19		
-	-		Scattered gravel up to 4"			brown, mo sand	ist, fine to medium	grained	100000 allologues and allologues	3 8 9	140			
5-	-10	لائے ریے ہیں۔ 	MARINE DEPOSITS (Qm) orange brown staining			SANDY CL stiff to very	AY (CL); gray, slig stiff, medium grain	htly moist, ed sand		8 11 14	140	13		
						moist, very	stiff, fine grained s	and	10000000000000000000000000000000000000	6 8 10	140			
0-	-15		CAPISTRANO FORMATION (Tc) Scattered subrounded gravel up to 4"			SANDSTO dense, me	NE (SP), gray, wet dium to fine grained	v medium I	-	3 6 8	140			
-									-					

Building&Safety: Ryan Rose

roje	ct:	Da Loc	ana Point Harbor, Commercial Con	Log of Drill Hole DH-34										
roje	ct	Nun	nber: 17-206-02	Countyest Stange - OC Public										
;							SAMPLE DATA TEST DAT							
	UEPTH, Teet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	DRIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	This set of pl job at all time alterations to AND MOC Put of Orange C specification approval of t Ordinance of	ans s. li the: lic V out dyna South	OF BLOWS/ 6		MOISTURE -	DRY BNIESC	nges or ssievoltiggev by gev	
5-			Gray and yellowish gray						JII24 50	s dffic	IAL			
-								-						
-2 0-	25		Sand is fine grained		Tetel Deel				30 50/4"	140	23	101		
					Total Dept Groundwa	th = 26 feet Iter at 15 feet								
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	. I	₋₋₋└₋ ₄₿					D	ril	I H	ole	DF	 _34	1	

ate/	s)				ned			Checked		velop APPI	oment ROVE	Ser D	lices	
rille	а, д	9/14	4/2018	By		Checked KMF Bynis set of plans and specifications must be kept on 1 tok at pluyes. It is unlawful to make any changes of								
etho rill F	od Nia	Hol	llow Stem Auger	Cont	tractor 2R Drill	ing		of Drill Hol	o thes Blic V	se plans Vorks, C / The s	6:01fet C Deve stamping	opme of the	t permi nt Servi se plar	ssion ices
/pe	ndwa	CM	E 75	of Ho	pling Cal-mo	d sampler	with 6-inch	Elevation;	fteM Stat	dation of the law.	6.8° ne of any pr	ovisio	ns of ar	ny Co
leva	ation]	, feet	²⁰¹¹ 12.5 [4.3]	Meth	iod(s) sleeve,	SPT, and b	bulk	Backfill Driving Me	Na Bl	NING 18	nd:Qu 3 offic	ickre Hal	ete	
ema	Irks		<u> </u>		<u>.</u>			and Drop		At	itohar	nine 		
									SA	MPLE	DATA	T	EST	DAT
	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	i AND	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL
						Asphalt Co Inches)	oncrete (approximat	ely 4						
15-			ARTIFICIAL FILL (Qaf)			Aggregate Inches) SANDY C brown, mc gravel	Base (approximate LAY (CL), brown an- ist, stiff, fine grained	ly 4.5 d grayish I, some	International Contraction of the second seco	3 5 12	140			
10-	-5		Gravel up to 4"			brownish g	gray, moist, stiff			3 6 9	140	27	92	
-			Orange brown staining, sand is fine grain	ned		gray			10101010100 and	3 4 6	140			
5-	-10					gray and b	rown, moist, fine gra	ained sand	-	5 7 11	140	22	102	
-						gray, wet,	soft to firm, fine grai	ned sand ^又	ALARAHAR STATES	1 2 2	140			
0	-15		MARINE DEPOSITS (Qm)			SAND (SP dense, coa overlying S), gray and pale gra Irse to medium grain BLT (ML), dark gray	y, wet, ied very stiff		5 11 16	140	13	113	
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oval: Geotechnical Reports

Proj Proj	ject ject	: D Loc	ana Point Harbor, Commercial Co ation: Dana Point Harbor Drive	omponent		Log	of Drill	20-01		e Dł	1-3	5	
Proj	ject	Nu	nber: 17-206-02				Couନିi)୧୫ ୦୦	t Øi _De	Apg Ango Ango	e - OC oment	Pu Sen	blic \ vices	Work
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION CAPISTRANO FORMATION (Tc)	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION ed SILTSTONE and	This set of pl job at all time atterations to Or Orange C specification approval of t Ordinance of		FOF BLOWS BE		CONTENT PAGE 1	DRY BARES STREET	
-5-	-				SANDST(dark gray, grained	DNE (SP and ML), g moist, very dense/f	rav and hard, fine		22 22				
	-25		Thinly bedded, rare white mottles		SILTSTOI dense/har	NE (ML), dark gray, d	moist, very		17 50/4"	140	21	105	
					Groundwa	n = 26 feet iter encountered at	12.5 feet						
								:					
	ŗ												
		F											
			8				D	ril		ole	Dŀ	I-3	5

ro	ject	NU	mper: 17-206-02					00umty-0		velo	oment	Ser	vices	-
ate(rille	(s) d	9/1	8/2018	Logo By	ged WD			Checked By _{his set of p}	lans	APPI k	MF	ns mu	st be ke	ept o
rillir eth	ig od	Ho	low Stem Auger	Drilli Cont	ng 2R Drill	ing		Total Dept of Drill Hol	elic V	se plare Vorks, C	6:0 fet	lopme	ny cha n perm nt Serv	issio ices
rill F /pe	Rig	CM	E 75	Dian of He	neter(s) 8 ole, inches			Approx St Elevation,	irfao ft MS	RLL NC	3 e he of any pr	ld to p ovisio	ermit o ns of a	r be ny C
leva	ation	iter D], feet	^{epth} 15.0 [-2.0]	Sam Meth	pling Cal-mod nod(s) sleeve ,	d sampler wi SPT, and bu	th 6-inch lk	Backfill	Na	tixe a	nd Qu	ickre	ete	
əma	arks							and Drop	thee	At	itohan	imei		
ដ				i					SA	MPLE	DATA	Т	EST I	DAT
	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CLA	ENGINEERING SSIFICATION DESCRIPTION) AND I	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
			ARTIFICIAL FILL (Qaf)			Asphalt Con Inches)	crete (approximat	ely 3	H					
	-		Cobbles up to 8" in spoils pile			Aggregate E SILTY SAND	ase (approximate 0 (SM), brown and	ly 3 inches)/ pale	$\left\ \right\ $					
	-					prown, mois	r, mealum aense,	tine grained	Ľ					
10-	-		Scattered gravel							5 7 11	140			
	-								H					
	-5								Ц	_				
	-					CLAYEY SA	ND (SC), brown, i	noist,	-	5 -14 20	140	11	118	
	-					dense, fine t	o medium grained	1						
	-		Pore gravel up to 1"			brown and a	range brown mai	at madium			140			
5-	-		nale gravel up to 1			dense, fine g	rained	si, meulum	International State	9 9	140			
	-								11111111111					
	-10					brownich ar	w wat danaa fin	e grained		7	140	14	114	
						brownish gra	iy, wei, dense, iin	e graineu		11 17	140	14	114	
ł	-		MARINE DEPOSITS (Om)			SAND (SP)	gray brownish gr	av and	-	4	140			
0+						orange brow grained	n, moist, very den	se, fine	11111111111111111111111111111111111111	23 35	.+0			
╞									100					
╞	-15		CAPISTRANO FORMATION (Tc)			SANDSTON	E (SP), gravish br	 own, wet.		33	140	16	116	
			Minor siltstone, subtle bedding			very dense, i	medium to fine gra	ained		50/4"				
Ī									[]					
5+														
╞														



Drill Hole DH-46

Proj	ect	Num	nber:	17-206-02					County	ahgo	9+ 0 0	Pul	olic V	Vo
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG		GEOLOC CLASSIFICA DESCRIF	BICAL TION AND PTION	ORIENTATION DATA	CL SANDSTC yellowish (ENGINEERING ASSIFICATION DESCRIPTION DNE (SP), pale gray gray, wet, very dens	This set of 1 job at all tin alterations to ANDM OC Pt of Orange (specification approval of Ordinance (vand pale se, fine to	APPER SALES	DATA DITIONAL DITIONI	P WOISTURE	DRS DRIE Port	
-10-	- - -						meaium g	raineo						
-	-25						Total Dept	h = 26 feet		50/5"	140			
							Cioundwa							
													}	
										1				

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

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.

1/8/2021

Hadi Tabatabaee BUILDING OFFICIAL

GMU Project 17-206-03



)ate(s)	0/17	2/2010	Load	ed wo		Checked		APPI		D	uces //	
)rille)rillin	dí g	Hol	low Stem Auger	By Drillin		ina	By _{lis set of p} Total Dept	lans : es. It	and spe t is unla se plans	will to m	is mus ake ar	t be ke hy char i permi	nges ssio
rill F	ig	СМ	E 75	Diam	eter(s) 8		Approx Si	Aic V Infac	Vorks, C The s ALL NC	C Devel stamping	opmer of the d to pr	nt Servi se plar ermit o	ices r be
irour Eleva	ndwa	ter De	^{epth} NA []	Samp	oling Cal-mo	d sampler with 6-inch SPT, and bulk	Drill Hole Backfill	Na Na	te law.	ndaQu	ickre	ete	ny C
lema	ırks			1			Driving Me and Drop	thoc	JILDIN	s of fic itohan	IAL IMCI		
								SA	MPLE	DATA	Т	EST I	DA'
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	c	DRIENTATION DATA	ENGINEERING CLASSIFICATION DESCRIPTIO	G AND N	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
						Asphalt Concrete (approxima Tinches)	tely 5						
		-	ARTIFICIAL FILL (Qaf)			Aggregate Base (approximate CLAYEY SAND (SC), brown moist, loose, fine grained.	ely 6 inches)/ and gray,	$\left \right\rangle$					
-			Orange brown mottles, rootlets						3 4 4	140			
5	-5					CLAYEY SAND (SC), grayish moist, loose, fine grained.	brown,		3 4 5	140	22	104	
						Total Depth = 6.5 feet Groundwater not encountered	1						

Date(s)	9/1	3/2018	Logg	ed WD		Checked	SP	APP		Đ	12	
Drillin Aetho	u Ig od	Но	llow Stem Auger	Drillin	ng 2R Drill	ing	Hynis set of Total Dep	olans les. I o the	and spe t is unla se plane	will to m	ake a writter	ny cha ny cha n perm	nge issid
prill F	Rig	CM	IE 75	Diam	leter(s) 8		Approx		CLL NC	stamping	of the d to p ovision	ermit of a	r be
Grour Eleva	ndwa ation]	ter D , feet	^{epth} 12.5 [4.1]	Sam	pling Cal-mod od(s) sleeve.	d sampler with 6-inch SPT, and bulk	Drill Hole	Na	te iaw. Nive a	nd:Qu	ickre	ete	
lema	arks					,	Driving Me	ethor		s offic itohan		_	
								SA	MPLE	DATA	Т	EST	DA
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	¢	ORIENTATION DATA	ENGINEERIN CLASSIFICATIO DESCRIPTIC	ig N and DN	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
		-	ARTIFICIAL FILL (Qaf)			Asphalt Concrete (approxim inches)	nately 3						
15-	-		Scattered gravel			Aggregate Base (approxima SILTY SAND (SM), brown, dense, fine grained	ately 3 inches)/ dry, medium		7 7 11	140			
10-	-5		Scattered gravel up to 1". Orange brown and white mottles.	'n		SILTY SAND to CLAYEY S SC), brown and gray, moist, dense, fine grained	AND (SM to medium		7 11 13	140	10	117	
F			Possibly highly weathered bedrock (inconclusive)			brownish gray, moist, loose,	fine grained	Annual Anternation and a second second	3 4 5	140			
5-	-10					SILTY SAND, CLAYEY SAN (SM, SC, and SP), gray and gray, wet, medium dense, fir grained.	ID, and SAND brownish he to medium		6 7 8	140	19	106	
			CAPISTRANO FORMATION (Tc)			SANDSTONE (SW), gray, w dense, fine to coarse graine	ret, medium d		5 7 9	140			
0-	15		Thinly bedded, white mottles on bedding planes			SILTSTONE (ML), very dark moist, hard	gray, slightly		11 23 40	140	29	93	

Project: Dana Point Harbor Partners, LLC Dry Stack Storage

Proj Proj	ject ject	: D Loc	ana Po ation:	oint Harbor Pa Dana Point	artners, LLC [Harbor, City c	Ory Stack Stor of Dana Point	age	Log	of Drill	20-0	01 01	e Dł	1-3	3	
Proj	ect	Nur	nber:	17-206-03					Coustgee	t Øi De	ahge velop	e - OC oment	: Pul Sen	blic \ /ices	Works
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG		GEOLOG CLASSIFICAT DESCRIP	ICAL ION AND TION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	This set of p job at all time alterations to of Orange C specification approval of t Ordinance o	SA s. It s.		DATA iniciality with Contraction with Contrac	MOISTURE -	MEICH POR POR	DATA pressor presso
-5-	-		brown	is of the grained s	sandstone, orange		GLAYEY S gray, sligh	SILTSTONE (ML), v tly moist, hard	əry dark		18 18 40	s dAQc			
	- 25									-	12 26 45	140	30	92	
							Total Dept Groundwa	h = 26 feet ter not encountered							
												-			
									D	ril	l He	ole	DH	-33	3

Log of Drill Hole DH-49 Project: Dana Point Harbor Partners, LLC Dry Stack Storage Project Location: Dana Point Harbor, City of Dana Point Countyeet Orange - OC Public Works Project Number: 17-206-03 OC Development Services Date(s) Drilled Checked Byhis set of pl Logged By 4/5/2019 MTF DA at on the nd ations must Drilling Contractor Total Cepto these plaras for the plaras of the permission of doning the planas, or play the permission of doning the planas, oc peveropment Services Drilling **Hollow Stem Auger** 2R Drilling Method Diameter(s) of Hole, inches of Orange County. The stamping of these plan ApproxatSurfaceLL Not be held to permit or be an Elevation ft MStation of any provisions of any County Drill Rig **CME 75** 8 Type Drill Hole Native and Quickrete Groundwater Depth [Elevation], feet 8.2 [2.8] Cal-mod sampler with 6-inch sleeve, SPT, and bulk Sampling Method(s Backfill BUILDING OFFICI Driving Method Remarks Autohammer and Drop SAMPLE DATA TEST DATA feet GRAPHIC LOG ٥ GEOLOGICAL ENGINEERING ELEVATION, feet ADDITIONAL TESTS NUMBER OF BLOWS / å bg MOISTURE CONTENT, DRY UNIT WEIGHT, pr CLASSIFICATION AND ORIENTATION CLASSIFICATION AND Driving Weight, I DEPTH, SAMPLE DESCRIPTION DATA DESCRIPTION **ARTIFICIAL FILL (Qaf)** 3" Section of Asphalt NΔ -NA SILTY SAND (SM); light brown, moist, 10 medium dense, fine to coarse grained sand CLAYEY SAND (SC); light gray and white 11 140 17 102 14 with orange staining, moist, medium 14 dense, fine to coarse grained sand -5 becomes light gray and greenish gray, 140 14 114 DS 7 with fine to coarse grained gravel. fine to 11 15 medium grained sand, free water on 5 sampler ⊻ -10 140 111 AL, PS 4 5 14 12 0 **CAPISTRANO FORMATION (Tc)** SILTSTONE (ML); dark gray, very moist, stiff, fine to medium grained sand 15 SANDSTONE (SM); light gray and light 140 21 107 6 30 brown with grayish orange staining, very 50/4 moist to saturated, very dense -5 Drill Hole DH-49

17-206-03 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 **REV3** 占

Proj Proj	ect:	: Dar	na Point Harbor Partners, LLC tion: Dana Point Harbor City	Dry Stack Stor of Dana Point	age	Log	of Dril	20-0		e DI	 -4	9	
Proj	ect	Numb	per: 17-206-03				Countyee	10 2 De	rang velo	e - OC	C Pu Ser	blic vices	Wor
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION gray, orange, and da	This set of p job at all tim alterations t NTOM OC Pu of Orange C specification approval of Ordinance c ark gray	SA es. 1 bic V bic	MPLE MPLE	DATA DATA DAME DAME DAME DAME DAME DAME DAME DAM	MOISTON A	EST Stand The Stand	PS
-10-	-								16 50/5"				_
-	-25				SANDSTC staining, s medium gr grained sa	NE (SM); light gray aturated, very dense ained sand, with tra nd	with yellow ə, fine to ice coarse		50/5"	140	21	105	
					becomes <u>c</u>	ıray		11111111111111111111111111111111111111	27 50/6"	140			
					becomes d	ark gray, strong org	janic smell	hand a start a	33 50/4"	140			
								ANNO BANK	46 50/5"	140			
							D	ril	I H	ole	DH	-49	•

Pro Pro	ject iect	: D	ana Point Harbor Partners, LLC Dry ation: Dana Point Harbor City of I	y Stack Stora Dana Point	age	Log	of Drill	20-0		e Dł	1-4	9	
Pro	ject	Nur	nber: 17-206-03	Dana i Oint	i		Coustee	ŧð	nahigo	e)+ O C	Pul		Norks
und the second s								SA	APPE	DATA	Рт	EST D	DATA
ELEVATION, fee	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	DRIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	This set of p job at all tim alterations to MOM OC Pui of Orange C specification approval of f Ordinance o	the state of the s	FOF BLOWSY 6	WEIGHT HOLEN	MOISTURE # 5	WEIGHE Det of	TESTS CONACT
					SANDSTC yellow, sat	DNE (SW); light gray turated, very dense,	, with with fine to		33 50/5"	s depic	IAL		
					Total Dept GWT @ 8 No Caving	h = 50.0' -2"			35 50/5"	140			
G		4]				D	ril			DH	-49	

Log of Drill Hole HA-1 Project Location: Dana Point Harbor, City of Dana Point Coustled Orange - OC Public Works **Project Number:** 17-206-03 OC Development Servi Checked Byhis set of p Date(s) Drilled Logged By 9/11/2018 MTE DA on the Drilling Contractor Total Depth thes of Drill Helesic W se plans with to make any changes of vorks, OC Development Scrussion Drilling Hand Auger Mikes Excavation Method Drill Rig Diameter(s) of Hole, inches of Orange County. The stamping of these plan Approx SuffaceALL Not be held to permit or be an Elevation of MSUation of any provisions of any County NA 4" Туре Drill Hole Native Tabatabaee Groundwater Depth **Bulk and California Modified** Sampling NA 🛛 Method(s) [Elevation], feet Sampler DING OFFICIA Driving Method Remarks Hand Sampler and Drop SAMPLE DATA **TEST DATA** feet **GRAPHIC LOG** GEOLOGICAL ENGINEERING ٥ **ELEVATION**, DEPTH, feet MOISTURE CONTENT, % DRY UNIT WEIGHT, pcf NUMBER OF BLOWS / ADDITIONAL TESTS å CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRIVING WEIGHT, I SAMPLE DESCRIPTION DESCRIPTION DATA **ARTIFICIAL FILL (Qaf)** SILTY SAND (SM); with numerous roots 25 upper 6", and some DG, light brown, dry to damp, medium grained sand with some fine gravel CLAYEY SAND (SC); light yellowish 10 100 Ć 40/6' brown, damp, fine to medium grained sand POORLY GRADED SAND (SP); light gray, dry, fine grained sand -5 55/6" 6 112 20 CLAYEY SAND (SC); light brown, dry to damp, fine to medium grained sand with some fine grained gravel ٠, ۰, : ; . 1 SILTY SAND (SM); light yellowish brown, 92/6" 4 117 damp, fine to coarse grained sand 10 • ; 15-17-206-03 (UPDATED ELEV.).GPJ GMULAB.GPJ 12/3/19 ۰*.*, -۰*ب* with numerous coarse gravel · ; . SANDY CLAY (CL); grayish brown, moist, with some medium grained sand 6 114 15 Total Depth = 15 feet Groundwater Not Encountered REV3 Ξ **Drill Hole HA-1**

Project: Dana Point Harbor Partners, LLC Dry Stack Storage

Log of Drill Hole DH-33 Project Location: Dana Point Harbor, City of Dana Point Coustled Onlinge - OC Public Works **Project Number:** 17-206-03 OC Development Services Date(s) Checked Byhis set of pl Logged By 9/13/2018 WD KMF Drilled ons must nt on the ane and Drilling Tob at all times. It is unlawful to make any changes of Tabela Deption these plarage on releving the permission of Drib clotellic Works, OC Development Services Drilling Hollow Stem Auger 2R Drilling Method Contractor Drill Rig Diameter(s) of Hole, inches of Orange County. The stamping of these plan ApproxaSuffaceALL NG as held to permit or be an Elevation of MStation of any provisions of any County **CME 75** 8 Туре Drill Hole Native and Quickrete Groundwater Depth Cal-mod sampler with 6-inch sleeve, SPT, and bulk Sampling 12.5 [4.1] [Elevation], feet Method(s Backfill HEDING OFFICIA Driving Method Remarks Autohammer and Drop SAMPLE DATA TEST DATA feet g GEOLOGICAL ENGINEERING ELEVATION, ö feet MOISTURE CONTENT, % DRY UNIT WEIGHT, pcf NUMBER OF BLOWS / DRIVING WEIGHT, Ibs ADDITIONAL TESTS GRAPHIC CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DEPTH, 1 SAMPLE DESCRIPTION DATA DESCRIPTION Asphalt Concrete (approximately 3 inches) **ARTIFICIAL FILL (Qaf)** Aggregate Base (approximately 3 inches) SILTY SAND (SM), brown, dry, medium dense, fine grained 15· Scattered gravel 7 7 11 140 -5 Scattered gravel up to 1". Orange brown SILTY SAND to CLAYEY SAND (SM to 140 10 117 and white mottles. SC), brown and gray, moist, medium 11 13 dense, fine grained 10-17 1.2 $\mathcal{D}_{\mathcal{F}}$ Possibly highly weathered bedrock 3 4 5 brownish gray, moist, loose, fine grained 140 (inconclusive) ÷.;- \mathbb{Q}_{p}^{1} ٠,-10 ٠, SILTY SAND, CLAYEY SAND, and SAND (SM, SC, and SP), gray and brownish 140 6 19 106 12/3/19 7 ÷.;-8 gray, wet, medium dense, fine to medium ÷ 17-206-03 (UPDATED ELEV.).GPJ GMULAB.GPJ grained. 5 (\cdot, \cdot) $\frac{1}{2}$ **CAPISTRANO FORMATION (Tc)** SANDSTONE (SW), gray, wet, medium 140 5 dense, fine to coarse grained ģ 15 SILTSTONE (ML), very dark gray, slightly 140 29 93 11 23 moist, hard 40 Thinly bedded, white mottles on bedding 0planes REV3 占

Project: Dana Point Harbor Partners, LLC Dry Stack Storage

Drill Hole DH-33

al: Geotechnical Report

Proj	ect	: D Loc	ana Point Harbor Partners, LLC ation: Dana Point Harbor, City	Dry Stack Stor	age	Log	of Drill	0-00	ole	DH	 -3	3	
Proj	ect	Nur	nber: 17-206-03	····			Coundly Con	Or De	ahge velop	er- OC	Pul Sen	olic vices	Work
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CLAVEY	ENGINEERING ASSIFICATION DESCRIPTION	This set of pla job at all time alterations to ANDM OC Pub of Orange Co specifications approval of th Ordinance or	SAUPLE SAUPLE	TOF BLOWSY BY	C DATA withost C DATA withost C DATA MANA MANA MANA MANA MANA MANA MANA M	MOISTURE A	DRY BNIFER S	
-5-	-		brown	e	GLAYEY Sigh	SILISIONE (ML), v tly moist, hard	əry dark	AND	40	a dAAc	AL		
-	-25							-	12 26 45	140	30	92	
					Total Depti Groundwa	h = 26 feet ter not encountered							
		:											
							ہم 	 ril					2

Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

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.

1/8/2021

Hadi Tabatabaee BUILDING OFFICIAL

GMU Project 11-161-00



Log of Drill Hole C-3 Project: Dana Point Harbor Revitalization Project Location: Dana Point, CA Coustled Orange - OC Public Works **Project Number:** 11-161-00 OC Development Servi Date(s) Drilled Logged By Checked Bithis set of pl 8-28-12 LLB DH on the Drilling Method Drilling Contractor Total Dept9 these plars, Offeet written permission of dentitid Totel works, OC Development Services Hand Auger **Earthworks Techniques** Drill Rig Approval SurfaceLL N2 be held to permit or be an Elevation, field/Station of any provisions of any County Diameter(s) of Hole, inches N/A 5 Туре Groundwater Depth [Elevation], feet Drill Hole Native Tabatabaee Sampling Method(s) **Bulk samples only** Driving Method and Drop Remarks SAMPLE DATA **TEST DATA** feet **GRAPHIC LOG** GEOLOGICAL å ENGINEERING ELEVATION, feet DRIVING WEIGHT, Ibs \$ ADDITIONAL TESTS NUMBER OF BLOWS / bc MOISTURE CONTENT, % DRY UNIT WEIGHT, pcf CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DEPTH, 1 SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) 4 inches AC over 12 inches AB Sandy Clay (CL), brown, damp to moist, firm to very firm CP EI RV 20 Total depth 3 feet. No groundwater. DH_REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 **Drill Hole C-3**

Project: Dana Point Harbor Revitalization Log of Drill Hole DH- 1 Project Location: Dana Point, CA Coustled on ange - OC Public Works **Project Number:** 11-161-00 Logged By Checked Byhis set of p Date(s) 8-29-12 DH LLB Drilled Drilling Method Drilling Contractor Total Depth these plar43.0 feet of data depth these plar43.0 feet **Hollow Stem Auger** 2R Drilling, Inc tten permission Drill Rig Approvation from the stamping of these plan Approvations from the stamping of these plan Elevation from Station of any provisions of any County Diameter(s) of Hole, inches **CME 75** 8 Туре Groundwater Depth [Elevation], feet 12.0 [5.3] Sampling Method(s) Drill Hole Backfill Native Tabatabaee Open drive sampler with 6-inch sleeve/SPT Driving Method and Drop Remarks Auto Hammer SAMPLE DATA TEST DATA feet LOG GEOLOGICAL φ **ENGINEERING** ELEVATION, DEPTH, feet DRY UNIT WEIGHT, pcf DRIVING WEIGHT, Ibs ADDITIONAL TESTS NUMBER OF BLOWS / GRAPHIC I MOISTURE CONTENT, ' CLASSIFICATION AND ORIENTATION CLASSIFICATION AND SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) 2 inches AC over 4 inches AB SANDY CLAY (CL), brown to dark brown, Εĺ moist, firm 5 140 14 112 15 6 ã CLAYEY SAND (SC), brown to dark 140 16 115 CN 3 5 brown, moist, medium dense ġ -5 10 SANDY CLAY (CL), brown to gray brown, 140 PS AL 5 5 21 damp to moist, firm 8 10 ₽ Groundwater at 12 feet. 5-SAND (SP), gray, wet, dense, coarse grained 107 6 140 16 9 23 -15 CAPISTRANO FORMATION (Tc) Massively bedded sandstone with some SAND (SP), gray, wet, very dense, 0 medium to coarse grained claystone interbeds, hard to very hard 8 140 18 28

DH_REV3 11-161-00 (UPDATED ELEV.).GPJ_GMULAB.GPJ_11/21/19

Drill Hole DH-1

Project: Dana Point Harbor Revitalization Log of Drill Hole DH- 1 Project Location: Dana Point, CA County of Grange - OC Public Works **Project Number:** 11-161-00 SAMPLE DATA TEST DATA feet ENGINEERING CLASSIFICATION **GRAPHIC LOG** GEOLOGICAL ELEVATION, 1 ADDITIONA DEPTH, feet SAMPLE SAMPLE CLASSIFICATION AND ORIENTATION MOISTURE CONTENT. DRY BNIT of Orange C specification approval of t Ordinance of DESCRIPTION DATA DESCRIPTION Sample is unoxidized claystone at 20 feet CLAY (CL), very dark gray, moist, very JILDING OFFIC AL firm -5 Becomes very hard below 24 feet SAND (SP), gray, wet, very dense, 50/6" 140 22 107 medium grained, some clay -25 -10 35 50/3" Becomes coarse to very coarse grained 140 ·30 -15-50/5" 140 REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 35 -20 Becomes very coarse grained with some 19 140 pebbles 50/4" 40 Refusal at 43 feet on very hard bedrock, -25 unable to make forward progress Total Depth 43 feet Groundwater at 12 feet Drill Hole DH- 1

P

Proj	ect	Num	ber: 11-161-00						County	1 0 2 De	rang welo	e - OC pment	: Pu Sen	blic	Wo
Date(s Drilleo	s) d	8-29-	12	Logg By	ged LLB	- ·· ··-			Checked Byhis set of	plans	APP and spe		D Is mus	t be ke	ept or
Drilling Metho	g od	Hollo	w Stem Auger	Drilli Con	ng tractor 2R Drill	ing, Inc			Total Dep of Drill Ho	o the O the O lic V	t is unla se plan Vorks, C	Wful to m 0/5 fet DC Devel	ake an writter opmer	ny cha 1 perm nt Serv	nges ission vices
Drill R Type	lig	CME	75	Dian of H	neter(s) 8 ole, inches				Approx S Elevation,	urfac ft M	CLL NO	stamping 5 ge he of any pr	of the Id to provision	se plai ermit o hs of a	n r be a ny Co
Groun Eleva	idwat ition],	er Dep feet	^{5th} 8.5 [6.8]	Sam Meth	pling Open di nod(s) sleeve/s	rive sampl SPT	er with 6-incl	h	Drill Hole Backfill	Na	UILDIN	abatabae G OFFIC	e IAL	2	
Rema	rks								and Drop	thoo	A	ato Ha	mme	ï	
et										SA	MPLE	DATA	Т	ESTI	DAT
ELEVATION, fe	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CL	ENGINEE ASSIFICAT DESCRIP	RING TON A TION	AND	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	
15-		1	ARTIFICIAL FILL (Qaf) .5 inches AC over 5 inches AB			CLAYEY S moist, me	SAND (SC), bi dium dense to	rown to dense	gray,	_	7 7 23	140	15	115	
10-	-5					SANDY C firm	LAY (CL), brov	wn to g	ray, moist,		9 9 16	140	20	106	
-	·10	v	'ery rocky at 8 feet			Groundwa CLAYEY S gray, wet,	ter at 8.5 feet. SAND (SC), br dense, scatter	ownish red peb	Ţ gray to bles	-	5 18 25	140	8	128	
5-						Total Dept Groundwa	h 10.5 feet. ter at 8.5 feet.								
			· · · ·						r	Dri	<u> </u> Н П	ole	 Dŀ	2	2

Project: Dana Point Harbor Revitalization Log of Drill Hole DH- 6 Project Location: Dana Point, CA County of Orange - OC Public Works Project Number: 11-161-00 Checked Byhis set of plans Date(s) Logged By 8-29-12 DH LLB Drilled Drilling Method Drilling Contractor Total Depth of Drill Hole.c it is unawing the plan 50 Onfelet **Hollow Stem Auger** 2R Drilling, Inc tten permission Drill Rig Diameter(s) of Hole, inches Approx Surface Elevation, ft MSL **CME 75** 8 permit or be an ions of any Count NP3.8 Туре Drill Hole Native Tabatabase Groundwater Depth Sampling Method(s) Open drive sampler with 6-inch sleeve/SPT 12.0 [1.8] [Elevation], feet Driving Method Auto Ham Remarks Auto Hammer SAMPLE DATA TEST DATA feet **GRAPHIC LOG** GEOLOGICAL 6 ENGINEERING ELEVATION, DEPTH, feet ADDITIONAL TESTS Driving Weight, Ibs Б NUMBER OF BLOWS / MOISTURE CONTENT, CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRY UNIT WEIGHT, p SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) 2 inches AC over 5 inches AB SAND (SM), brown, moist, medium dense, medium to coarse grained, minor silt 5 140 9 102 13 15 10. SANDY CLAY (CL), brown to dark brown, 20 101 DS 5 8 140 moist, firm, medium grained 18 -5 5 Scattered pebbles at 9 feet 13 | 114 | CN 14 8 140 11 10 REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 ₽ Groundwater at 12 feet. 0 PS AL Some black and orange staining, wet at 140 26 4 5 4 14 feet 15 Groundwater at 12 feet. 님 -5-**CAPISTRANO FORMATION (Tc)** SILTY SAND (SM), light brown to brown, 21 50 140 23 103 Massively bedded sandstone and silty wet, fine to medium grained **Drill Hole DH-6**

1/8/2021

TEST DATA

Line of

ADDITIONAL

Building&Safety: Ryan Rose **Project: Dana Point Harbor Revitalization** Log of Drill Hole DH- 6 Counter of the owner of the country 11-161-00 SAMPLE DATA feet ENGINEERING CLASSIFICATION AND CP **GRAPHIC LOG** GEOLOGICAL ELEVATION, DEPTH, feet NUMBER OF BLOWS/ CLASSIFICATION AND ORIENTATION WEIGHE SAMPLE STOR of Orange C specification approval of Ordinance c DESCRIPTION DATA DESCRIPTION MON VEN sandstone with some claystone interbeds, BUILDING OFFICIAL hard to very hard -10 Some bedding within unoxidized claystone, dipping 0 to 10 degrees at 24 feet CLAY (CL/CH), dark gray, moist, very firm 17 22 27 140 to hard -25 -15· Interbedded claystone and sandstone at 29 CLAY (CL/CH), and SAND (SP), dark 20 50/3" 17 118 DS 140 feet gray and brown, moist, hard, medium to coarse grained -30 -20 SAND (SP), light gray to gray, wet, very 20 30 40 140 dense, medium to very coarse grained 35 -25-50/5" 140 20 40 -30 SILTY SAND (SM), gray to dark gray, wet, very dense, fine to medium grained 16 27 50 140

Drill Hole DH-6

113

Project Location: Dana Point, CA **Project Number:**

DH_REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19

Proj Proj	ect ect	: Da Loca	ana Point Harbor Revitalization ation: Dana Point, CA			Log	of Dril	20-0		e DI	-1 -	6	
Proj	ect	Nun	nber: 11-161-00				Countyes	18 De	rahgo veloj	e - OC	Pu Sen	blic vices	Works
ELEVATION, feet	DEPTH, feet	::: GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	This set of p job at all tim alterations to ANON OC Pul of Orange C specification approval of Ordinance o			DATA Diction with the the with the the the the the the the the the the the the the	P WOISTURE	DRY BN FOR	DATA pt on the ges or ssiev cestor build y Ogus y Ogus y Ogus y
-35 -	-				SAND (SF	²). grav. wet. verv de	ense, coarse		37	140	20	112	
	-50				grained Total Dept Groundwa	ter at 12 feet.			50/6"				
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			, ,									ŗ	
								Dri	11 H	ole	D		5

val: Geotechnical Report

Log of Drill Hole DH-10 **Project: Dana Point Harbor Revitalization** Project Location: Dana Point, CA County Orling - OC Public Works **Project Number:** 11-161-00 OC Develo Date(s) Drilled Checked Bylis set of plans Logged By 8-27-12 LLB DH Total Depth lise of Drill Hole wor Drilling Drilling ese planto, Orfeet 2R Drilling, Inc **Hollow Stem Auger** permission Contractor Method Approxi Surface L NP2 is held to Elevation; iteMS atom of any provis Drill Rig Diameter(s) of Hole, inches **CME 75** 8 permit or be an ions of any County Туре Drill Hole Natiwe Tabatabaee Open drive sampler with 6-inch sleeve/SPT Groundwater Depth [Elevation], feet Sampling Method(s) BUILDING OFFICE Driving Method and Drop Remarks Auto Hammer SAMPLE DATA TEST DATA feet **GRAPHIC LOG** ە" GEOLOGICAL ENGINEERING ELEVATION, feet * ADDITIONAL TESTS NUMBER OF BLOWS / ß ğ MOISTURE CONTENT, CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRY UNIT WEIGHT, p Driving Weight, 1 DEPTH, f SAMPLE DESCRIPTION DATA DESCRIPTION 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 140 13 107 7 10 10 15 14 140 13 114 18 22 -5 5 Abundant rock fragments below 8 feet 34 50/3 140 \supset -10 REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 Total Depth 10 feet. No groundwater. **Drill Hole DH-10**

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al: Geotechnical Report

Project: Dana Point Harbor Revitalization Log of Drill Hole DH-12 Project Location: Dana Point, CA Coustle of Orange - OC Public Works Project Number: 11-161-00 OC Develo Logged By Date(s) Drilled Checked 8-27-12 LLB DH Byhis set of plans Drilling Contractor Total Depth these of Dritte Depth these of Dritte Depth wor Drilling ese plan49/5 feet **Hollow Stem Auger** 2R Drilling, Inc permission Method Drill Rig Approx Surface Elevation, ft MSL Diameter(s) of Hole, inches **CME 75** L NP3 be held to permit or be an ions of any County 8 Туре Drill Hole Native Tabatabaee Groundwater Depth [Elevation], feet 9.0 [4.3] Open drive sampler with 6-inch sleeve/SPT Sampling Method(s) Driving Method Remarks Auto Hammer and Drop SAMPLE DATA TEST DATA feet **GRAPHIC LOG** GEOLOGICAL ە ENGINEERING ELEVATION, feet DRY UNIT WEIGHT, pcf ADDITIONAL TESTS NUMBER OF BLOWS / å MOISTURE CONTENT, CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRIVING WEIGHT, II DEPTH, 1 SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) SANDY GRAVEL (GP), light brown to 4 inches AC over 4 inches AB brown, damp to moist, medium dense Difficult drilling, probable boulders and cobbles below 0 feet Some clay at 2 feet 14 109 8 140 8 11 10 Very poorly consolidated material, falling SANDY CLAY (CL), dark gray, damp, 17 105 PS AL 9 140 21 21 out of sampler, appears very loose with loose, abundant rock fragments, organics abundant mechanically fractured rock -5 fragments 5 Groundwater at 9 feet. CLAYEY SAND (SC), dark gray, wet, 140 CN PS 17 4 AL loose to medium dense, abundant rock 4 fragments -10 0-Unconsolidated material, falling out of Sample contains rock fragments, black 19 22 140 13 sampler, appears extremely loose with unoxidized shale, in dense, very wet, 21 abundant mechanically fractured rock clayey sand, very little fines 15 fragments **CAPISTRANO FORMATION (Tc)** SAND (SP), yellow brown to gray, wet, -5 Massively bedded sandstone, hard to very dense to very dense, medium to coarse hard grained 18 140 30 38

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REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19

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Drill Hole DH-12



Proj Proj	ect ect	: Da Loc	ana Point Harbor Revitalization ation: Dana Point, CA			Log	of Dril	20-0	021 1016	e Dł	1-1	2	
Proj	ect	Nun	nber: 11-161-00				Countyee	1 0 . De	Ang velop	e)+ OC oment	: Pul Sen	olic vices	Wor
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	This set of p job at all tim atterations to ANOM OC Pu of Orange C specification approval of Ordinance o	SA es. Interes. Inter		DATA Will to Million of the second the second secon	MOISTORE S	MEIGH BAR State	
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					Becomes n Total Depth Groundwat	nedium to coarse g n 49.5 feet. ier at 9 feet.	rained		(50/5")	140			
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			•				D	ril	I He	ole	DH	-12	2

1/8/2021

Project: Dana Point Harbor Revitalization Log of Drill Hole DH-17 Project Location: Dana Point, CA Coustie or angle - OC Public Works **Project Number:** 11-161-00 OC Develo Checked Byhis set of plans Logged By Date(s) 8-28-12 LLB DH Drilled Drilling Drilling Contractor Total Depths It of Drill Folaic w ase plar49/5 veet Hollow Stem Auger 2R Drilling, Inc tten permission Method Drill Rig of Orange County. The stamping of these plan Approvat Surface L NOT be held to permit or be an Elevation; fteMS ation of any provisions of any County Diameter(s) of Hole, inches **CME 75** 8 Type Drill Hole Native Tabatabase Groundwater Depth [Elevation], feet 13.0 [-1.7] Sampling Method(s Open drive sampler with 6-inch sleeve/SPT DING OFFICE Driving Method and Drop Remarks Auto Hammer SAMPLE DATA TEST DATA feet **GRAPHIC LOG** GEOLOGICAL ō ENGINEERING ELEVATION, DEPTH, feet DRY UNIT WEIGHT, pcf ADDITIONAL TESTS NUMBER OF BLOWS / å MOISTURE CONTENT, CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRIVING WEIGHT, I SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) CLAYEY SAND (SC), brown, dark brown, 3 inches AC over 4 inches AB and orange brown, damp to moist, dense 10 140 9 12 14 Becomes rocky at 3 feet 11 | 113 CN Scattered rock fragments at 4 feet 5 140 10 16 -5 5 Sample not recovered. 6 7 140 8 -10 REV3 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 0-Becomes rocky at 12 feet Groundwater at 13 feet. ₽ SAND (SP), brown, light gray, dark gray 50/5" 140 11 128 mottled, moist to wet, loose, abundant rock fragments and gravels, scattered ·15 Very difficult drilling due to rocks between clayey sand pockets 15 and 18 feet -5 님 CAPISTRANO FORMATION (Tc) Massively bedded sandstone, hard to very SAND (SP), brown to light brown, wet, 25 140 . 45 46 very dense, coarse grained **Drill Hole DH-17**

Building&Safety: Ryan Rose

1/8/2021



Proj	ject	Loc	ana Point Harbor Revitalization ation: Dana Point, CA			Log	of Dril		Óle) Dł	1-1	7	
Proj	ject	Nur	nber: 11-161-00				Countyee	1 8 . De	Qhgo veloj	e) - OC	: Pul Sen	olic \ vices	Nor
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	CL	ENGINEERIN ASSIFICATION DESCRIPTIO	This set of p job at all tim alterations to ANDM OC Pul of Orange C specification approval of Ordinance o	SA sheet of the second	LOF BLOWS/55	DATA DATA MULTORICAL M	MOISTONE T	EST C CLARKER AND	
-35 -	-							В	JILDIN	S OFFIC	AL		
	-				SAND (SM grained), brown, wet, very	dense, fine	1000	(50/5")	140			
		;			Total Depth Groundwat Caving at 3	a 49.5 feet. er at 13 feet. feet.							
												1	

val: Geotechnical Reports

Project: Dana Point Harbor Revitalization Log of Drill Hole DH-18 Project Location: Dana Point, CA Coustle of Orenge - OC Public Works 11-161-00 Project Number: OC Developm Date(s) Drilled Checked Byhis set of plans Logged 8-27-12 LLB DH By Drilling Method Drilling Contractor Total Depth hese planto, 5 feet of Britle Tolaic Works, OC Develop **Hollow Stem Auger** 2R Drilling, Inc tten permission ervices Drill Rig Diameter(s) of Hole, inches of Orange County The stamping of these plan ApprovatiSurface L NOT be held to permit or be an Elevation; fteMS brion of any provisions of any County **CME 75** 8 Туре Drill Hole Native Tabatabase Groundwater Depth [Elevation], feet Sampling Method(s Open drive sampler with 6-inch sleeve/SPT N/A [] DING OFFICIA Driving Method and Drop Remarks Auto Hammer SAMPLE DATA **TEST DATA** feet g GEOLOGICAL ъ ENGINEERING ELEVATION, DEPTH, feet DRY UNIT WEIGHT, pcf ADDITIONAL TESTS NUMBER OF BLOWS / g **GRAPHIC** MOISTURE CONTENT, CLASSIFICATION AND ORIENTATION CLASSIFICATION AND DRIVING WEIGHT, I SAMPLE DESCRIPTION DATA DESCRIPTION **ARTIFICIAL FILL (Qaf)** CLAYEY SAND (SC), light brown to gray, CP EI DS(R) SU CH 3 inches of AC, no AB moist, dense, fine grained pH MR 10 7 140 12 112 SAND (SM), light brown to gray, moist, 14 dense, coarse grained CLAYEY SAND (SC), gray to dark gray, 20 27 140 15 101 moist, dense to very dense, medium to 50/2" -5 coarse grained Difficult drilling, probable boulders at 5 feet 5 Fragments of unoxidized bedrock within the 14 140 11 121 20 22 fill at 9 feet -10 11-161-00 (UPDATED ELEV.) GPJ GMULAB.GPJ 11/21/19 Total depth 10.5 feet. No groundwater. Drill Hole DH-18

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Project: Dana Point Harbor Revitalization Log of Drill Hole DH-19 Project Location: Dana Point, CA Countyeof Orange - OC Public Works **Project Number:** 11-161-00 Date(s) Drilled Checked Byhis set of p Logged By 8-27-12 LLB DH Drilling Method Drilling Contractor Total Depth of Drill Hole c ese plar49/5 feet **Hollow Stem Auger** 2R Drilling, Inc permission Drill Rig Diameter(s) of Hole, inches Approx Surface L NO 3e held to Elevation; ft MStation of any provis **CME 75** 8 permit or be an ions of any County Type Groundwater Depth Sampling Method(s) Drill Hole Backfill Open drive sampler with 6-inch sleeve/SPT 9.0 [1.3] [Elevation], feet Driving Method and Drop Auto Ham Remarks Auto Hammer SAMPLE DATA TEST DATA feet g GEOLOGICAL φ **ENGINEERING** ELEVATION, DEPTH, feet Driving Weight, Ibs ADDITIONAL TESTS NUMBER OF BLOWS / ğ GRAPHIC MOISTURE CONTENT, DRY UNIT WEIGHT, po CLASSIFICATION AND ORIENTATION CLASSIFICATION AND SAMPLE DESCRIPTION DATA DESCRIPTION ARTIFICIAL FILL (Qaf) 2.5 inches AC CLAYEY SAND (SC), brown to dark 10 brown, moist, dense, fine to medium grained 6 140 14 17 SAND (SM), brown to dark brown, moist, medium dense, fine to coarse grained 9 140 13 112 10 11 5 5 Groundwater at 9 feet. CLAYEY SAND (SC), brown to light gray, 140 25 95 CN 3 4 moist to wet, loose, medium to coarse 5 10 grained 11-161-00 (UPDATED ELEV.).GPJ GMULAB.GPJ 11/21/19 0 SILTY SAND (SM), brown to light gray, 2 140 33 wet, loose, coarse grained 15 -5 Difficult drilling, probable boulders, at 17 REV3 feet Б **CAPISTRANO FORMATION (Tc)** SAND (SP), brown to gray, wet, very 50/5' 140 15 116 Massively bedded sandstone, hard to very dense, coarse grained **Drill Hole DH-19**



²roj Proj	roject: Dana Point Harbor Revitalization roject Location: Dana Point, CA						Log of Drill Hole DH-19								
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	-				Total Dept	th 49.5 feet.			50/4"	140	18	117			
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Project: Dana Point Harbor Revitalization Project Location: Dana Point, CA						Log of Driff Hole DH-22									
Pro	Project Number: 11-161-00							County	i o	rang	e + O C	Pu	blic	Works	
Date Drille Drillir	(s) d ng	4-8-	-15 nd Auger	Logged DRW By DRW				Checked APPROVED By is set of plans and specifications must be kept on the Total Deptins. It is unlawful to make any changes or							
Meth Drill I	od Rig	N/A		Con Diar	tractor JES En	gmeening	of Drill Hal	Pic v	Vorks, C Vorks, C V The RLL N	Stamping	opme of the ld to p	nt Servese plan	ices r be an		
Grou	ndwa	iter De	^{epth} N/A []	Sam	ole, incres		Elevation; ft.MSLation of any provisions of any County Drill Hole Native Tabatabase								
Rem	arks	Infil	Itration Test Hole					Driving Me	etho	UILDIN	o orric	HAL			
									SA	MPI F	ΠΑΤΑ	Т	ESTI	ΠΔΤΔ	
ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION		ORIENTATION DATA	CL	ENGINEERING ASSIFICATION DESCRIPTION	G AND N	SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, Ibs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS	
		य न्यू व	ASPHALT ABTIFICIAL FILL (Oaf)			2" of AC ~4" of AB			<u> </u>						
15-	-					SILTY SA fine to coa	ND (SM); brown, m arse grained sand, r	oist, dense, are cobble							
	-					SILTY CL some larg	AY (CL); brown, mo e rounded cobble	ist, dense,	-						
10-	- 5					CLAYEY S dense, so	SILT (ML); tannish t me large rounded c	orown, moist, obble	-						
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G			J					D)ril		ole	Dŀ	I-22	2	

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Building&Safety: Ryan Rose Approval: Geotechnical Reports Permits: GRD20-0021

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 the law. Hadi Tabatabase BUILDING OFFICIAL

APPENDIX A-2 GMU CPT Logs





Kehoe Testing and Engineering 714-901-7270 steve@kehoetesting.com www.kehoetesting.com

Project: GMU Geotechnical Location: 34571 Golden Lantern, Dana Point, CA







Kehoe Testing and Engineering steve@kehoetesting.com 714-901-7270

www.kehoetesting.com

Location: 34571 Golden Lantern, Dana Point, CA **GMU Geotechnical** Project:

CPT-4A




Kehoe Testing and Engineering steve@kehoetesting.com 714-901-7270

www.kehoetesting.com

Location: 34571 Golden Lantern, Dana Point, CA **GMU Geotechnical** Project:







(ff) dfqaG



(ff) dfqsG



Building&Safety: Ryan Rose

(ft) dtqaG



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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.

APPENDIX A-3

Previous Boring Logs by Others





LOG OF BORING B-2

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

emplate: DYLG1; Prj ID: 2005-022.GPJ





LOG OF BORING B-3

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

PLATE



LOG OF BORING B-4

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022 PLATE A5

1/8/2021

PLATE

A2



LOG OF BORING B-1

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

Template: DYLG1; Prj ID: 2005-022.GPJ



LOG OF BORING B-1

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

PLATE Α2



LOG OF BORING B-2

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

Template: DYLG1; Prj ID: 2005-022.GPJ

1/8/2021



PLATE



LOG OF BORING B-3

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

emplate: DYLG1: Prj ID: 2005-022,GPJ

1/8/2021



LOG OF BORING B-4

Page 1 of 1 Dana Point Boat Launch Project No. 2005-022

Template: DYLG1; Prj ID: 2005-022.GPJ

1/8/2021

PLATE

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 the law. Hadi Tabatabase BUILDING OFFICIAL

APPENDIX A-4 Previous CPT Logs by Others



Leighton Const. .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



Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021

**** * * Si * D. * D. *	***** OUNDII ROJECT ATE/TT	******** NG : CP1 I : WR1 IME: 11- ********	****** (C-01 C/Dana -15-02	**************************************	PRETATIC	PROJ CONE	**** ECT /RIG	County * This set job at all alteration of Orang specifica approval Ordinanc • • • • • • • •	of Ora OC Deve All of parts the inness. It is is to these Public Wore e County. tions SHAL of the volastic 6000 Hall 8/BHL	nge - OC Pul elopment Serv PROVED Astechicators Aus unlawful to make ar olans without written ks. OC Developmen The stamping of these NO be held to pet tion of any provision 2017 - 0.01 di Tabar Dave wWO - RHB	blic Works ices bekept on the y changes or permission Services le plan mit or be an s of any County * * *
DBPTH (m)	DBPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR	R TYPE N(60) I	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)	
$\begin{array}{c} .150\\ .450\\ .450\\ .9050\\ 1.250\\ 1.3500\\$		$\begin{array}{c} 69.68\\ 25.85\\ 58.64\\ 80.67\\ 64.03\\ 53.11\\ 48.65\\ 21.10\\ 68.77\\ 87.40\\ 54.62\\ 85.98\\ 135.24\\ 214\\ 200.72\\ 29.06\\ 17.19\\ 43.89\\ 39.24\\ 62.35\\ 53.71\\ 30.02\\ 32.29\\ 26.45\\ 15.21\\ 14.77\\ 13.40\\ 11.45\\ 19.77\\ 150.77\\ 150.77\\ \end{array}$	$\begin{array}{c} .69\\ 4.76\\ 1.41\\ 1.07\\ 1.59\\ 1.94\\ 1.66\\ 2.33\\ 2.29\\ 3.04\\ 2.58\\ 4.59\\ 4.59\\ 4.59\\ 4.59\\ 4.74\\ 4.94\\ 3.73\\ 4.77\\ 3.62\\ 0\end{array}$	SAND to SILTY SA CLAY SILTY SAND to SA SILTY SAND to SA CLAY SILTY SAND to SA SANDY SILT to CL SILTY SAND to SA SANDY SILT to CL SILTY SAND to SA SANDY SILT to CL SILTY SAND to SA SANDY SILT to S CLAYEY SILT CLAY CLAY CLAY CLAY CLAY CLAY CLAY to SILTY CLA CLAY to SILTY CLA SAND	ND NDY SILT NDY SILT NDY SILT NDY SILT NDY SILT NDY SILT NDY SILT NDY SILT AYBY SILT NDY SILT AYBY SILT NDY SILT AY ILTY CLAY ILTY CLAY ILTY CLAY ILTY CLAY AY AY AY AY AY AY AY AY AY	176 220 2218 16 222 222 18 16 222 222 222 222 222 222 222 222 222	28 41 31 32 34 26 34 26 34 35 46 100 51 29 25 28 44 29 35 20 11 14 16 37	66 61 70 64 58 56 72 72 98 77	1.5 1.2 3.6 7.9 1.7 1.1 2.6 2.6 3.6 3.1 1.7 1.9 1.5 1.0 1.0 1.0 2.8 7 1.3	48.5 48.5 46.5 45.5 44.5 44.5 44.5 44.5 47.5 44.5 44	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL ASSUMED TOTAL UNIT WT = 120 pcf ASSUMED DEPTH OF WATER TABLE = 7.0 ft N(60) = EQUIVALENT SPT VALUE (60% Energy) N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy) Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

HOLGUIN, FAHAN & ASSOCIATES, INC.

1/8/2021

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



Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021

**** * * S * P * D * *	SOUNDII PROJECT PATE/TT	******** NG : CP1 F : WR1 IME: 11-	****** (C-02 C/Dana -15-02 ******	**************************************	***** TION PRC CON	S JECT E/RIG	County * This set job at all alteratio from OC of Oran specifica approva Ordinan NO : : : 4 (y of Ora OC Dev A toppane and times. It is not to these Public Woo e County. ations SHAIA of the viola control of	nge - OC Public V elopment Services PPROVED d'spedifications must be kel unlawful to make any chan plans without written permit ks. OC Development Servi tho of any provisions of all "7-001 without any provisions any provisions of all "7-001 without any provisions any pr	Vorks
DBPTH (m)	DBPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N (60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)	
$\begin{array}{c} .150\\ .300\\ .450\\ .900\\ 1.050\\ 1.200\\ 1.350\\ 1.500\\ 1.500\\ 1.500\\ 1.500\\ 1.500\\ 1.500\\ 2.250\\ 2.250\\ 2.400\\ 2.250\\ 2.550\\ 2.7850\\ 3.150\\ 3.450\\ 3.650\\ 3.450\\ 3.650\\ 4.200\\ 4.550\\ 4.800\\ 4.550\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.400\\ 5.250\\ 5.250\\ 5.400\\ 5.250$	$\begin{array}{c} .49\\ .98\\ 1.48\\ 1.97\\ 2.465\\ 3.94\\ 4.92\\ 3.944\\ 4.921\\ 5.91\\ 6.89\\ 7.38\\ 7.87\\ 7.87\\ 8.865\\ 10.832\\ 10.832\\ 10.832\\ 10.832\\ 11.80\\ 13.77\\ 14.726\\ 15.75\\ 16.72\\ 17.72\\ 16.722\\ 17.72\\ 17$	$\begin{array}{c} 140.58\\ 68.92\\ 62.97\\ 88.17\\ 220.35\\ 149.35\\ 122.24\\ 106.35\\ 163.84\\ 114.89\\ 213.72\\ 108.58\\ 78.63\\ 47.44\\ 18.48\\ 24.58\\ 54.79\\ 54.37\\ 22.84\\ 10.96\\ 6.31\\ 10.96\\ 6.31\\ 10.52\\ 78.54\\ 4.38\\ 2.12\\ 6.12\\ 10.52\\ 78.54\\ 4.38\\ 2.12\\ 10.52\\ 78.58\\ 10.52\\ $	$\begin{array}{c} 1.06\\ 2.11\\ 1.34\\ 2.28\\ 1.33\\ 2.28\\ 2.32\\ 2.32\\ 2.32\\ 2.33\\$	SAND tO SILTY SAND SILTY SAND tO SANDY SILT SILTY SAND tO SANDY SILT SILTY SAND tO SANDY SILT SAND SAND tO SILTY SAND SAND tO SILTY SAND SILTY SAND tO SANDY SILT SANDY SILT tO CLAYEY SILT SANDY SILT tO CLAYEY SILT SLTY SAND tO SANDY SILT CLAYEY SILT tO SILTY CLAY CLAYEY SILT tO SILTY CLAY CLAYEY SILT tO SILTY CLAY CLAYEY SILT tO SILTY CLAY CLAY CLAY CLAY CLAY CLAY CLAY CLAY	$\begin{array}{c} 35\\ 23\\ 21\\ 29\\ 44\\ 37\\ 315\\ 666\\ 71\\ 539\\ 248\\ 155\\ 238\\ 16\\ 64\\ 4\\ 26\\ 11\\ 700\\ 100\\ 100\\ 100\\ 100\\ \end{array}$	$\begin{array}{c} 56\\ 37\\ 34\\ 47\\ 70\\ 69\\ 57\\ 100\\ 87\\ 100\\ 87\\ 337\\ 287\\ 81\\ 79\\ 330\\ 238\\ 11\\ 54\\ 8\\ 56\\ 3\\ 8\\ 13\\ 950\\ 100\\ 100\\ 100\\ 100\\ 100\\ \end{array}$	86 66 63 73 99 88 82 78 98 98	9.6 6.7 6.4 1.6 2.2 1.8 1.3 3.1 1.8 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	48.5 49.0 49.5 48.0 47.0 48.5	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL ASSUMED TOTAL UNIT WT = 120 pcf ASSUMED DEPTH OF WATER TABLE = 7.0 ft N(60) = EQUIVALENT SPT VALUE (60% Energy) N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy) Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

HOLGUIN, FAHAN & ASSOCIATES, INC.

vil behavior type and SPT t 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



Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021

County of Orange - OC Public Works OC Development Services APPROVED ********* This set of plans and specifications must be kept or job at all times. It is unlawful to make any changes alterations to these plans without written permission from OC Public Works, OC Development Services * nanges or mission **CPT INTERPRETATIONS** * of Orange County. The stamping of these plan specifications SHALL NOT be held to permit or approval of the violation of any provisions of an * r be an ny Cou County * PROJECT North 600027-001 CONE/RIG : 468/BHD VO/R#3 SOUNDING : CPT-03 * * : WRT/Dana Point PROJECT * * DATE/TIME: 11-15-02 09:35 * * DEPTH DEPTH TIP FRICTION SOIL BEHAVIOR TYPE N(60) N1(60) Dr Su PHI RESISTANCE RATIO (ft) (}) (m) (tsf) (}) (tsf) (Degrees) ----SAND tO SILTY SAND SAND tO SILTY SAND SAND tO SILTY SAND .150 .49 109.92 1.43 27 44 79 109.92 115.47 212.00 260.31 276.73 267.41 99.96 95.79 47.99 47.99 822.65 .300 .98 1.42 80 98 29 46 1.48 1.97 2.46 2.95 3.44 1.35 2.16 .450 53 85 .600 .750 .900 SILTY SAND to SANDY SILT SAND to SILTY SAND 87 100 100 1.44 2.02 Ğ9 100 100 SAND to SILTY SAND SAND to SILTY SAND SILTY SAND to SANDY SILT *VERY STIFF FINE GRAINED CLAY to SILTY CLAY *VERY STIFF FINE GRAINED 67 100 100 1.050 2.52 33 53 76 47.0 1.200 1.350 3.94 6.27 4.94 96 32 100 51 2.8 1.500 4.92 8.34 81 100 22.65 1.650 5.41 5.91 6.40 6.89 7.38 7.38 7.87 8.37 8.86 8.32 CLAY $\overline{2}\overline{3}$ 36 1.5 1.800 1.950 2.100 1.88 2.78 2.18 7.37 SILTY SAND to SANDY SILT SANDY SILT to CLAYEY SILT SANDY SILT to CLAYEY SILT 25 25 41 68 44.0 61.33 39.39 39 25 4.1 16 24 32 35 2.6 23.67 31.93 104.38 2.250 CLAY 36 1.4 2.400 6.74 CLAY SILTY SAND tO SANDY SILT CLAYEY SILT tO SILTY CLAY SILTY SAND tO SANDY SILT SILTY SAND tO SANDY SILT SANDY SILT tO CLAYEY SILT CLAYEY SILT tO CLAYEY SILT SANDY SILT tO CLAYEY SILT SANDY SILT tO CLAYEY SILT SANDY SILT tO CLAYEY SILT CLAY TO SILTY CLAY SANDY SILT TO CLAYEY SILT CLAY TO SILTY CLAY SANDY SILT TO CLAYEY SILT CLAY CLAY 48 1.9 51 82 78 44.0 3.95 2.58 2.15 3.09 2.68 3.97 2.700 113.49 57 6.6 9.35 9.84 10.33 106.82 114.47 2.850 36 51 42 47 21 43 21 43 325 47 78 44.0 3.000 38 30 80 44.0 74.87 3.150 4.4 10.83 11.32 3.300 84.66 34 23 16 5.62.7 3.450 46.93 11.81 12.30 12.80 3.600 3.750 2.18 3.09 3.37 39.69 63.61 25 3.900 82.22 33 4.8 13.29 13.78 61.93 64.07 4.58 3.20 4.050 41 3.6 4.200 26 20 37 $13.76 \\ 14.27 \\ 14.76 \\ 15.26 \\ 15.75 \\ 16.24 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 16.73 \\ 10.7$ 4.350 49.63 3.00 3.3 37.43 85.49 100.57 6.74 CLAY *VERY STIFF FINE GRAINED 4.500 2.1 4.650 85 100 6.94 6.20 5.61 4.800 100 100 4.950 5.100 104.48 100 100 103.48 100 100 17.22 5.250 105.86 7.52 100 100 *VERY STIFF FINE GRAINED *VERY STIFF FINE GRAINED *VERY STIFF FINE GRAINED 153.09 5.01 100 100 158.61 293.07 18.21 5.550 6.85 100 100 5.700 18,70 4.33 100 100 5.850 19.19 453.64 2.80 *SAND to CLAYBY SAND 100 100

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL ASSUMED TOTAL UNIT WT = 120 pcf ASSUMED DEPTH OF WATER TABLE = 7.0 ft N(60) = EQUIVALENT SPT VALUE (60% Energy) N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy) Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

1/8/2021

it behavior type and SPT br 1 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



Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021

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*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL ASSUMED TOTAL UNIT WT = 120 pcf ASSUMED DEPTH OF WATER TABLE = 7.0 ft N(60) = EQUIVALENT SPT VALUE (60% Energy) N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy) Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

HOLGUIN, FAHAN & ASSOCIATES, INC.

ioil behavior type and SPT + on data from UBC-1983

Leighton Consuing, 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



Building&Safety: Ryan Rose

Approval: Geotechnical Reports Permits: GRD20-0021 1/8/2021

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DEPTH	DEPTH	RESISTANCE	RATIO	SULL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI	
(m)	(IC)	(CSI)	(8)				(%)	(tsf)	(Degrees)	
.150 .300	.49 .98	243.76 145.80	1.52 4.42	SAND tO SILTY SAND *VERY STIFF FINE GRAINED	61 100	97 100	100			
.450 .600	1.48 1.97	199.15 163.88	1,33 2,43	SAND to SILTY SAND SILTY SAND to SANDY SILT	-50 55	80	96 90			
.750 .900	2,46 2,95	113.81 164.07	4.32 2.86	*VERY STIFF FINE GRAINED SILTY SAND to SANDY SILT	100 55	100 87	91			
1.050 1.200	3.44 3.94	$219.03 \\ 215.85$	1.65 1.74	SAND to SILTY SAND SAND to SILTY SAND	55 54	88 86	99 98			
1.350 1.500	4.43 4.92	175.63 138.32	3.20 4.52	SANDY SILT to CLAYBY SILT *VERY STIFF FINE GRAINED	70 100	100 100	50	10.3		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL ASSUMED TOTAL UNIT WT = 120 pcf ASSUMED DEPTH OF WATER TABLE = 7.0 ft N(60) = EQUIVALENT SPT VALUE (60% Energy) N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy) Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

Interpretations based on: Robertson and Campanella, 1989.

HOLGUIN, FAHAN & ASSOCIATES, INC.

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 Tabatabase BULDING OFFICIAL

APPENDIX B-1

Geotechnical Laboratory Procedures and Test Results



Building&Safety: Ryan Rose	
Approval: Geotechnical Reports	
Permits: GRD20-0021	

Mr. Bryon Ward, DANA POINT HARBOR PARTNERS, LLC, c/o BURNHAM-WA	County of Orange - OC Public Works RD PROPERTIES ment Services
Geotechnical Foundation Investigation Report, Dana Point Harbor Revitalization:	APPROVED
Parking Structure and Boater Services Building – Commercial Component, City of Dana Point, California APPENDIX B-1	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

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

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 writen 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

1/8/2021

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.

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.

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

GMU Project 17-206-02



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CINSTIL TOD. TOD. LAD. (UPDATED ELEV.). GPJ FNC AB GWGN01. TABLE SOIL LAD. AND CONCLUST 11/26/19

Building&Safety: Ryan Rose Approval: Geotechnical Reports 1/8/2021

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Building&Safety: Ryan Rose



PARTICLE SIZE DISTRIBUTION

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

GMU_GRAIN_SIZE 17-206-02 (UPDATED ELEV.).GPJ 11/26/19



LIMITS 17-206-02 (UPDATED ELEV.).GPJ 11/26/19

ATTERBERG LIMITS





DVTCOMP 17-206-02 (UPDATED ELEV.).GPJ 11/26/19

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)

COMPACTION TEST DATA





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
 Undisturbed

	STRENGTH PARAMETERS							
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)						
 Peak Strength 	18	34.0						
Ultimate Strength	0	30.0						
U	-							

SHEAR TEST DATA





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




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





GMU_DIRECT_SHEAR 17-206-02 (UPDATED ELEV.).GPJ GM&U.GDT 11/25/19



 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





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





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



Building&Safety: Ryan Rose Approval: Geotechnical Reports

ermits: GRD20-0021



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GMU Project 17-206-03



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		Min. Resistivity (ohm/cm)													
	st Result	Chloride (ppm)													
	emical Te	Sulfate (ppm)													
	ភ 	Æ				-									
		R-Value													
	┢	<u>5</u>	╉						-				-		-
		Expansi Index						32							
	action	Optimum Water Content,													
DATA	Comp	Maximum Dry Unit Weight, pcf													
≿	nits	ā									9				
TOF	erg Lir	ᆋ									21				
DRA	Atterb	Н									27				
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Ы	Sie	"ravel,													
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		Geologic Unit	Af	Af	Af	Tc	Tc	Qaf	Qaf	Qaf	Qaf	Tc	Tc	Tc	
	tion	Elevation, feet	5.0	11.6	6.6	1.6	-8.4	11.0	9.0	6.0	1.0	4.0	0.6-	-14.0	
,	ole Informa	Depth, feet	5	5	10	15	25	0	2	5	10	15	20	25	
	Sam	Boring Number	DH-31	DH-33	DH-33	DH-33	DH-33	DH-49							

ł	Permits: GRD20-0021	
	County of Orange - OC Public Wo OC Development Services APPROVED	rks
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Building&Safety: Ryan Rose Approval: Geotechnical Reports

> Project: Dana Point Harbor Partners, LLC Dry Stack Sto Project No. 17-206-03

GNU_TABLE_SOIL_LAB_DATA 17-206-03 (UPDATED ELEV.) GP1 FNC AB GWGN01.GDT 11/26/19



LIMITS 17-206-03 (UPDATED ELEV.).GPJ 11/26/19

ATTERBERG LIMITS



Project: Dana Point Harbor Partners, LLC Dry Stack Storage Project No. 17-206-03



SAMPLE AND TEST DESCRIPTION

 Sample Location: DH-33 @ 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

FRICTION ANGLE (degrees)
29.0
28.0

SHEAR TEST DATA

Project: Dana Point Harbor Partners, LLC Dry Stack Storage Project No. 17-206-03



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GMU Project 11-161-00



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	mical	Sulfate (ppm)					Í													ĺ			from (of Ora specif	DC Puinge (ublic V Count ns SH	Works	e sta NOT	Development Services mping of these plan be held to permit or be	an
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	uo	levation, feet	20.8	17.3	15.3	13.3	8.3	3.3	-6.7	13.3	11.3	6.3	11.8	9.8	4.8	-0.2	-5.2	-15.2	-25.2	-35.2	10.3	8.3	11.3	9.3	4.3	-0.7	-10.7		
	Informati	Depth, E feet	1.5	0	2	4	6	14	24	2	4	6	7	4	6	14	19	29	39	49	2	4	2	4	6	4	24		
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		-2]									_		_		_	_			

1/8/2021

Building&Safety: Ryan Rose

Approval: Geotechnical Reports

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Building&Safety: Ryan Rose

Approval: Geotechnical Reports



PARTICLE SIZE DISTRIBUTION

Project: Dana Point Harbor Revitalization Project No. 11-161-00

11/26/19 GMU_GRAIN_SIZE 11-161-00 (UPDATED ELEV.).GPJ



Boring Number	Depth (feet)	Geologic Unit	Test Symbol	Insitu Water Content (%)	LL	PL	PI	Classification
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)

LIMITS 11-161-00 (UPDATED ELEV.).GPJ 11/26/19

ATTERBERG LIMITS



Project: Dana Point Harbor Revitalization Project No. 11-161-00



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-18	0.0	Qaf		127.5	10	Clayey Sand (SC)

COMPACTION TEST DATA

Project: Dana Point Harbor Revitalization Project No. 11-161-00



DVTCOMP 11-161-00 (UPDATED ELEV.).GPJ 11/26/19

1/8/2021



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:
 Output
 Undisturbed

	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





	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





 Sample Location: DH-12 @ 24.0 ft Geologic Unit: Tc
 Classification: Poorly Graded Sand with some Clay (\$P)

 Strain Rate (in/min): 0.01
 Sample Preparation: Undisturbed

 Notes:
 Vertical Strain Rate (in/min): 0.01

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 Project No. 11-161-00

GMU

1/8/2021



SAMPLE AND TEST DESCRIPTION

 Sample Location: DH-18 @ 0.0 ft
 Geologic Unit: Qaf
 Classification: Clayey Sand (SC)

 Strain Rate (in/min): 0.005
 Sample Preparation:
 Remolded

 Notes: 90 % Compaction at Optimum
 Sample Preparation:
 Remolded

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







Project: Dana Point Harbor Revitalization Project No. 11-161-00

GMU_CONSOL 11-161-00 (UPDATED ELEV.).GPJ GM&U.GDT 11/26/19







Project: Dana Point Harbor Revitalization Project No. 11-161-00

GMU_CONSOL 11-161-00 (UPDATED ELEV.).GPJ GM&U.GDT 11/26/19





Project: Dana Point Harbor Revitalization Project No. 11-161-00

GMU_CONSOL 11-161-00 (UPDATED ELEV.).GPJ GM&U.GDT 11/26/19





Project: Dana Point Harbor Revitalization Project No. 11-161-00

GMU_CONSOL 11-161-00 (UPDATED ELEV.).GPJ GM&U.GDT 11/26/19

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APPENDIX B-2

Previous Laboratory Test Results by Others



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APPENDIX B - LABORATORY TESTING

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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 Chiorides	CTM 422	Corrosion potential	Plates B11 through B14 and Table B2

Table B1 - LABORATORY TESTING SUMMARY

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

County

PLATE

B'



PARTICLE SIZE ANALYSIS

Dana Point Boat Launch Project No. 2005-022



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











Building&Safety: Ryan Rose Approval: Geotechnical Reports

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R-VALUE DATA SHEET

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Hadi Tabatabaee BUILDING OFFICIAL

state law.

PROJECT NUMBER 32230

Boat Launch BORING NUMBER: B-2 Dana Point

SAMPLE DESCRIPTION: Brown Clayey Sand

ltem		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, ps	si	150		285	350
Exudation Pressure, psi		216		351	484
Height Sample, Inches		2.54	1	2.56	2.49
Gross Weight Mold, grams		319	9	3209	3185
Tare Weight Mold, grams		208	9	2080	2076
Sample Wet Weight, grams		111	0	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
		D.	DESIGN CALCULATION D		I 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
		48	Exami	ned & Checked:	8 /26/ 05
Equilibrium R-Value		by			
	EXU				
			1		` .,
Gf = 1.25			T .:		
1.1%	d on the		- Apping		
REMARKS: 3/4" si		7 7	Steven R. Marvin, RCE 30659		
] '	S. C. S.	
The data above is based upon processing an				g samples as reco	eived from the
field. Test procedures in acc	ordance	e with late	st revis	ions to Departme	ent of
Transportation, State of Calif	ornia, N	laterials &	Resea	arch Test Method	No. 301.

LaBelle • Marvin



PROFESSIONAL PAVEMENT ENGINEERING

R-VALUE DATA SHEET.

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County of Orange - OC Public Works OC Development Services

P.N. 2005-022

PROJECT NUMBER 32230 BORING

Boat Laurch BORING NUMBER: <u>B-3&4 Dana Point</u>

SAMPLE DESCRIPTION: Brown Slightly Clayey Sand

ltem	em			SPECIMEN			
		а		b	c		
Mold Number	10		11	12			
Water added, grams		42		50	33		
Initial Test Water, %		10.6		11.3	9.8		
Compact Gage Pressure, page 10 Compact Gage Pressure, page 10 Compact Cage Pressure, page 10 Compact Pressure, page 10 Com	si	350		160	350		
Exudation Pressure, psi		283		168	548		
Height Sample, Inches		2.55		2.63	2.55		
Gross Weight Mold, grams		326	5	3269	3255		
Tare Weight Mold, grams		2123	3	2101	2117		
Sample Wet Weight, grams	5	1142	2	1168	1138		
Expansion, Inches x 10exp-	4	7		2	17		
Stability 2,000 lbs (160psi)		20 /	39	26 / 51	17 / 33		
Tums 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		
	<u>.</u>	DE	ESIGN	CALCULATION	I DATA		
Traffic Index Given:		12.0		12.0	12,0		
G.E. by Stability	_	1.08		1.29	0.92		
G. E. by Expansion	G. E. by Expansion			0.07	0.57		
		66	Exami	ned & Checked:	8 /26/ 05		
Equilibrium R-Value		by					
	EXU			- TO LAND			
Gf =	Gf = 1.25						
0.0%	d on the	ho man all					
REMARKS: <u>3/4" s</u>] _					
		·		Steven R. Marvin, RCE 30659			
		<u> </u>	- Xalant	88.11			
i ne data above is based upo	he data above is based upon processing				fived from the		
leid. Test procedures in acc	ordance	e with lates	st revis	ions to Departme	nt of		
ransportation, State of California, Materials & Research Test Method No. 301.					No. 301.		

LaBelle • Marvin



LAISCIC ANDIVIN PROFESSIONAL PAVEMENT ENGINEERING

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179	290	•	•						
179	l								
	UT CA Te	st 532/643 2 1	3.6	UOT CA Test 47	417 Par II	2420	7.41	21.8	
Min. Resistiv (ohm-cm)	vity	Molstur (e Content %)	Sulfate C (ppn	ontent 1)	Chloride Content (ppm)	pH	oil pH Temp. (·C)	
4 4 5	400	41.59	28	189		[MC≍(((1+Mci/100)×(V	/a/Wt+1))-1)x	100	
3	200 300	24.93 33.26	28	189		Box Constant	9	6.746	
1	100	16.60	42	283		Container No.		1200.00	
Specimen Add No. (vater led (ml) Wa)	Adjusted Molsture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)		Wet WT. of Soll + Co Dry Wt. of Soll + Co Wt. of Container (n)	nt. (g) nt. (g) nt. (g)	0.28 108.62 105.31 65.31	
			<u></u>						
Depth: Soil Descripti	ion:	 Light Brow	vn, Clayey S	and (SC)					
Boring No.: Sample No.:		B 4 Bulk				-	Date:	6/15/2005	
Client : Project Name Project No.:) :	Diaz Your Dana Poir 2005-022	man & Asso nt Boat Laun	ciates ch		HA <mark>.</mark> F	Project No. hecked by:	3-04 17	*
	ieolechni	cal and Earth	quake Enginoo	 rs	DOT	CA TEST 53	alterations to the from OC Rublic 21 Grandel Gur Specifications S approval of the Ordinance or St	ese plans without wi Works. OC Develop ity. The stamping of HALL NOT be held violation of any prov late law. Hadi Tabatabaee BUL DING OFFICIA	nten permission oment Services f nese plan té permit or be an visions of any Cou

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HA	<u>HUSHM</u> Geolechin	AND ASS(Ical and Earl	OCIATES, ING hquake Enginee	<u>C.</u> rrg	SOIL	. RESISTIVI CA TEST 5	County of C OC D T the states of terror of the states of the states of the of the states of the states	Drange - OC I revelopment S APPROVED sand specifications It is unlawful to make see plans without wr Works, OC Develop ty. The stamping of HALL NOT be held th violation of any provi ate law.	Public Wor ervices must be kept on te any changes or than permission mant Services it lese plan oppermit or be ar isons of any Cou
Client : Project M Project M Boring N Sample I Depth: Soil Desc	lame: lo.: lo.: vo.: viption:	Diaz You Dana Poi 2005-022 B 2 Buik Light Brov	rman & Asso nt Boat Laun : wn, Clayey S	ociates ch and (SC)		НА	<u>Project No.</u> Checked by Date	Hadi Tabatabaee BUL BING GEFICIA OS-0417 : JT : 6/15/2005	
Specimen No.	Water Added (mi) (Wa)	Adjusted Moisture Content	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)		Moisture Content Wet WT. of Soll + 1 Dry Wt. of Soil + C	(%) (MCl) Cont. (g) ont. (g)	13.49 168.04 152.52	
1	100	(MC) 22.22	56	378		Wt. of Container (g	3)	37.51	
2	200	30.96	51	344		initial Soll Wt. (g) (Wt)	1300.00	Į
3	300	36.69	51	344		Box Constant	(Ma 664 - 41) - 41	6.746	
5							(100 111 1) 1) A		
Min. Re	sistivity	Moistur	e Content	Sulfate C	ontent	Chloride Conter	nt S	Halic	
(óhn	1-cm)	(%)	(ррп	n)	(ppm)	рH	Temp. (C)	
		\$1 5327 643	14	DOT CA 1051	417 Part II	001 CA Test 422		Test 532 / 643	
34	1 1								
34	380								
34	380	•							
3/	380 375 375 370								
32	380 375 375 370 40 365								
32	380 375 370 365 365 365								
32	380 375 370 370 370 365 365 360								
3	Resistivity (ohm-cm) 380 340 340 380 380 380 380 380 380 380 380 380 38								
32	0 Resistivity (ohm-cm) 340 340 350 350 350 350								
3	Soil Resistivity (ohm-cm) 342 342 352 352 352 352 352 352 352 352 352 35								
32	Soil Resistivity (ohm-cm) 342 355 355 355 355 355 355 355 355 355 35								
32	Soil Resistivity (ohm-cm) 340 340 355 340 340 340 340 340 340 340 340 340 340	25	30	35		40 45	50		
32	Soit Resistivity (ohm-cm) 380 375 375 365 365 365 365 345 340 340 20	25	30	35 Moisture Co	ontent (%	40 45	50		



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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 the law. Hadi Tabatabase BUILDING OFFICIAL

APPENDIX C

Infiltration Test Results



				Falling Head	Borehole Inf	iltration Test		Coun	ty of O OC De	velopm	OC Public ent Service	Works s
Project Nam	ie:	Dana Point Har	bor Revitalizat	ion				Date		9/12/2		1
Project Num	iber:	17-206-02				Collection of the second		Tested By	t of plans	and specific	ations must be k	ept on the
Test Hole Ni	umber:	DH-17				USC	CS Soil Cla	sification	all times. It	is unlaw a	to make any cha	inges or
Total Depth		5.00		feet	10. Aug 10. 10. 10.		Water Ter	nperature	C Public V	se plans wit Vorks, OC [evelopitBnt Ser	lices
Test Hole Di	ameter:	8.00	inches	radius=	4	inches			inge Count	The stan	ping of these pla	Cho an
STATE NO.	State State State	Second States	and the state of the state			Sector Statements		approv	val of the vi	olation of a	ny provisions of a	ny County
Trial	Start Time	End Time	ΔТ	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Greine Hr	ΔH BI	e las Hadi Taba Jugi Ng O	Unfactored Percolation Rate	
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	(in)	(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	1
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	1
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	1

soils (sands)

Multiple soil

borings/test pits

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	1.19
FACTORED INFILTRATION RATE (IN/HR):	0.53

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA):	2.25

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	Finer sandy soils with some loam	Clean, granular

significant fines

Highly variable

soils indicated

from site

content

Soil borings/test pits indicate

assessment or indicate moderately Site soil variablity limited soil relatively homogeneous borings homogeneous soils. collected during soils. site assessment. Seasonal high Groundwater Seasonal high conditions or GW at least 10 ft GW at least 15 ft Depth to groundwater movement not below facility below facility well understood. bottom. 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 Inf	iltration Test		Coun	ty of O OC De	range - velopm	OC Public ent Services	Works
Project Name		Dana Point Har	bor Revitalizati	on				Date:		APPRO	VED	1
Project Numb	ber:	17-206-02						Tested By:	t of plans	and spelvite	ations must be ke	ot on the
Test Hole Nu	mber:	DH-18				USC	S Soil Clas	ification	il times. I	is unlawfu	to make any cha	nges or
Total Depth :		5.00		feet	Marshall .		Water Ten	nperature:	C Public V	te plans wit	hout written perm	ssion
Test Hole Dia	meter:	8.00	inches	radius=	4	inches		of Ora	nge Count	The star	ping of these pla	
ST. ONTON	and the second	South States	IST CHERRY	CONTRACTOR OF	State State State	Contractor and the		approv	al of the vi	olation of a	ny provisions of a	ny County
Trial	Start Time	End Time	ΔΤ	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Ordina Hr	ΔH B	etav Hadi Tabat Hild Tabat	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	1
4	9:51	10:21	30.0	170.0	2.16	2.41	34.08	31.08	3.00	32.58	0.35	1
5	10:21	10:51	30.0	200.0	2.16	2.41	34.08	31.08	3.00	32.58	0.35	1
6	10:51	11:21	30.0	230.0	1.98	2.29	36.24	32.52	3.72	34.38	0.41	1
7	11:21	11:51	30.0	260.0	1.91	2.29	37.08	32.52	4.56	34.80	0.50	1
8	11:51	12:21	30.0	290.0	1.99	2.37	36.12	31.56	4.56	33.84	0.51	1
9	12:21	12:51	30.0	320.0	1.99	2.25	36.12	33.00	3.12	34.56	0.34	1
10	12:51	13:21	30.0	350.0	1.99	2.29	36.12	32.52	3.60	34.32	0.40	1
11	13:21	13:51	30.0	380.0	1.91	2.14	37.08	34.32	2.76	35.70	0.29	1
12	13:51	14:21	30.0	410.0	1.91	2.14	37.08	34.32	2.76	35.70	0.29	1

WATER TEMPERATURE CORRECTION FACTOR:	0.85
SAFETY FACTOR*:	2.25
UNFACTORED INFILTRATION RATE (IN/HR):	0.28
FACTORED INFILTRATION RATE (IN/HR):	0.12

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA)	2.25

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.



Falling Head Borehole Infiltration Test						Coun	ty of O OC De	velopm	OC Public ent Services	Works S		
Project Name	·	Dana Point Har	bor Revitalizatio	n			The second second	Date:	SP	9/12/20	018	1
Project Numb	er:	17-206-02				THE REAL PROPERTY OF		ested By:	t of plans	and speMic	ations must be ke	pt on the
Test Hole Nur	nber:	DH-19				USC	CS Soil Clas	ification:	ill times. It	t is unlawed	to make any cha	nges or
Total Depth :		4.00		feet		Contraction of	Water Ten	perature:	C Public V	Vorks, OC D	evelopn%Ent Serv	ces
Test Hole Dia	meter:	8.00	inches	radius=	4	inches				ALL NOT be	ping of these plai beld to permit o	r be an
		Constant State		WE GOOD TO THE			Spine 24	approv	al of the vi	olation of an	ny provisions of a	ny County
Trial	Start Time	End Time	ΔТ	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Hr		Hadi, Tabati Gildi, Tabati Gildi, NG Ol	Unfactored Percolation Rate	
			(min)	(min)	(ft)	(<i>ft</i>)	<i>(in)</i>	(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	
		_

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA)	2.25

Geotechnical	Factor	of Safety	(SA)	:
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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.



1/8/2021

					Falling Head	Borehole Inf	iltration Test		Coun	ty of O OC De	range - evelopm	OC Public ent Service	Works s
Projec	t Name:		Dana Point Har	bor Revitalizati	on				Date:	SP	9/12/20	018	1
Projec	t Numbe	er:	17-206-02				State States		lested By:	t of plans	and specific	ations must be k	ept on the
Test H	lole Num	ber:	DH-20				USC	CS Soil Clas	sification:	all times. I	t is unlawful	to make any cha	nges or
Total l	Depth :		5.00		feet		State in the second	Water Ten	n perature:	C Public V	Vorks, OC E	evelopitiont Sen	ices
Test H	lole Dian	neter:	8.00	inches	radius=	4	inches			nge County Institute SH	ALL NOT N	ping of these pla	r he an
The second	Sector State	SA STATISTICS	State Property and	and the second	Real Property in the local division of the	NUT THE R. SHORE	and the other	OF CAR	approv	val of the vi	olation of a	ny provisions of a	ny County
Т	rial	Start Time	End Time	ΔΤ	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Hr		Had Tabat Had Tabat ULUNA O	Unfactored Percolation Rate	
1993				(min)	(min)	(ft)	(ft)	(in)	<i>(in)</i>	(in)	(in)	(in/hour)	
C ····	1	7:20	7:45	25.0	25.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00	1
Se Sele	2	7:46	8:11	25.0	50.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00]
]
Sala in	1	8:11	8:41	30.0	80.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00	1
	2	8:41	9:11	30.0	110.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00	1
10.55	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	
17 15 1 3	5	10:11	10:41	30.0	200.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00	
De la seconda	6	10:41	11:11	30.0	230.0	2.67	2.67	27.96	27.96	0.00	27.96	0.00	1
The second	7	11:11	11:41	30.0	260.0	2.67	2.92	27.96	24.96	3.00	26.46	0.42	1
$2 \ge \ell_{11}$	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	1
	12	13:41	14:11	30.0	410.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12	1

WATER TEMPERATURE CORRECTION FACTOR:	0.85	
SAFETY FACTOR*:	2.25	
UNFACTORED INFILTRATION RATE (IN/HR):	0.16	
FACTORED INFILTRATION RATE (IN/HR):	0.07	
		_

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA)	2.25

Geotechnical	Factor	of Safety	(SA):
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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.



Project Name: Dana Point Harbor Revitalizat Project Number: 17-206-02 Test Hole Number: DH-21				Falling Head	Borehole Inf	<u>iltration Test</u>	, CS Soil Clas	Coun Date: Lested By: sification:	ty of O OC De et of plans	range - evelopm 9/12/20 and spewire t is unlawful	OC Public ent Services DIS ations must be kind of make any cha	Works s ept on the nges or
Total Depth :		5.00		feet	Service States		Water Ten	oerature	C Public V	Vorks. OC E	evelopment Serv	ices
Test Hole Dia	meter:	8.00	inches	radius=	4	inches			nge Count	y. The shot	ping of these pla	
State State		State of the	and the second second				Contraction of the	approv	val of the vi	iolation of a	ny provisions of a	ny County
Trial	Start Time	End Time	Δ T	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Ordine Hr	ΔH	Hadu Tabat Hadu Tabat UKUNA Q	Unfactored Percolation Rate	
			(min)	(min)	(ft)	(ft)	(in)	(in)	<i>(in)</i>	(in)	(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	1
2	7:49	8:14	25.0	50.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00	1
												1
1	8:14	8:44	30.0	80.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00	1
2	8:44	9:14	30.0	110.0	2.50	2.58	30.00	29.04	0.96	29.52	0.12	1
3	9:14	9:44	30.0	140.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00	1
4	9:44	10:14	30.0	170.0	2.50	2.50	30.00	30.00	0.00	30.00	0.00	1
5	10:14	10:44	30.0	200.0	2.50	2.54	30.00	29.52	0.48	29.76	0.06	1
6	10:44	11:14	30.0	230.0	2.50	2.54	30.00	29.52	0.48	29.76	0.06	1
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	1
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

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA)	2.25

Geotechnical	Factor of	Safety	(SA):	

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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				Falling Head	Borehole Inf	iltration Test		Coun	ty of O OC De	range - velopm	OC Public ent Service	Works s
Project Name	2	Dana Point Har	bor Revitalization	on				Date		APPRO	YED	1
Project Num	ber:	17-206-02	oor no manzan					Tested Ry	t of plane	and snelvite	ations must be k	ent on the
Test Hole Nu	mber:	DH-22				US	CS Soil Cla	sification	all times. It	is unlaw u	to make any cha	nges or
Total Depth :		5.00		feet			Water Ter	nersture	ons to thes C Public V	se plans wit /6rks_OC_F	hout written perm	ices
Test Hole Dia	meter:	8.00	inches	radius=	4	inches	indici Ici	ofOra	inge County	The stan	iping of these pla	
	11 A 12 FM	State State State			Constanting of the	inches		approv	val of the vi	olation of a	ny provisions of a	r be an nv Countv
Trial	Start Time	End Time	ΔΤ	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Ordina Hr	ΔH BI	e los Hadi Tabat Jilong O	Unfactored Percolation Rate	, ,
			(min)	(min)	(ft)	(<i>ft</i>)	(in)	(in)	(in)	(in)	(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
												1
1	8:34	9:04	30.0	80.0	2.42	3.08	30.96	23.04	7.92	27.00	1.09	1
2	9:04	9:34	30.0	110.0	2.42	3.17	30.96	21.96	9.00	26.46	1.26	1
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	1
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	
0.1.1.11	Soil assessment methods	0.25	3	0.75	
Suitability	Predominant soil texture	0.25	2	0.5	
Assessment	Site soil variablity	0.25	2	0.5	
	Depth to groundwater	0.25	2	0.5	
Geotechnical Factor of Safety (SA):				2.25	

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.

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3



		Falling Head Borehole Infiltration Test							County of Orange - OC Public Works OC Development Services				
Project Name	Part Mark	Dana Point Har	bor Revitalizatio	n			1.1	Date:		APPRO	ED.	1	
Project Numb	er:	11-161-00						rested By:	et of plans	and soet/A	ations must be k	ept on the	
Test Hole Nu	nber:	DH-10				US	CS Soil Clas	sification:	all times. I	t is unlawed	to make any cha	inges or	
Total Depth :		3.25		feet			Water Ten	perature:	C Public V	se plans wit Morks, OC E	revelopment Ser	ices	
Test Hole Dia	meter:	8.00	inches	radius=	4	inches			nge Count	y. The stan	ping of these pla	2	
H SENTER STREET	ALC: NO DECLE	ALC: NOT STREET	ALL STREET, SALES	STORE STORES	A COMPANY AND A COMPANY			appro	val of the vi	iolation of a	ny provisions of a	r be an ny County	
Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Ordina Hr		te bø Had Tabat ULDING O	Unfactored Percolation Rate		
			(min)	(min)	(ft)	(ft)	<i>(in)</i>	(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	1	
3	10:09	10:38	29.0	148.0	1.27	1.63	23.76	19.44	4.32	21.60	0.76	1	
4	10:40	11:08	28.0	176.0	1.26	1.56	23.88	20.28	3.60	22.08	0.64	1	
5	11:10	11:39	29.0	205.0	1.27	1.55	23.76	20.40	3.36	22.08	0.58	1	
6	11:41	12:22	41.0	246.0	1.25	1.53	24.00	20.64	3.36	22.32	0.40	1	
7	12:25	12:59	34.0	280.0	1.16	1.41	25.08	22.08	3.00	23.58	0.41	1	
8	13:01	13:40	39.0	#REF!	1.10	1.42	25.80	21.96	3.84	23.88	0.46		
9	13:42	14:34	52.0	#REF!	1.05	1.42	26.40	21.96	4.44	24.18	0.39		
10	14:34	15:09	35.0	#REF!	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	

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

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	0.25 2	
		Geotechnical Fa	2.25	

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.		



Falling Head Borehole Infiltration Test County of Orange - OC Public OC Development Service OC Development Service								OC Public ent Services	Works			
Project Name:		Dana Point Har	bor Revitalizatio	n				Date:	SP	4/8/20	is Contraction	
Project Number	er:	11-161-03					1	ested By:	t of plans a	and speN/A	ations must be ke	pt on the
Test Hole Nun	nber:	DH-22				US	CS Soil Clas	ification:	Il times. It	is unlawfol	to make any cha	nges or ssion
Total Depth :		7.00		feet			Water Ten	perature:	perature: C Public Works, OC Development Service			ces
Test Hole Diar	neter:	8.00	inches	radius=	4	inches			nge County nations SH	ALL NOT be	plog of these play beld to be mit o	r be an
and the second second	nes and the	and the second second	State Stranger	a constant	Sector and the		a share in the	approv	al of the vi	olation of an	y provisions of a	ny County
Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	Ho	Hr		Had Mabata Sulping Of	Unfactored Percolation Rate	
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	<i>(in)</i>	(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

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
	Soil assessment methods	0.25	3	0.75
Suitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variablity	0.25	2	0.5
	Depth to groundwater	0.25	2	0.5
		Geotechnical Fa	actor of Safety (SA):	2.25

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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APPENDIX D

CPT Liquefaction, Vertical Seismic Settlement, and Liquefied Soil Strength Analyses









1/8/2021







Depth (ft)

CLiq v.2.1.6.11 - CPT Liquefaction Assessment Software - Report created on: 11/27/2019, 11:58:10 AM Project file: U:\2017\17-206-02 DPHP, LLC Commercial Component\Analyses\Liquefaction\CPT\17-206-02 CLIQ (CBC 2016).clq

1/8/2021

ust be kept on the any changes or en permission ent Services hese plan permit or be an ons of any County

2

Building&Safety: Ryan Rose































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APPENDIX D-1

SPT Liquefaction, Vertical Seismic Settlement, and Liquefied Soil Strength Analyses















	Riverside/Orange County - Infiltration Test in a Boring												
Project Na	ime:	DP Harbor Revitalization							County of Orange - OC Public Works				
Project Nu	imber:	11-161-00							OC Development Services				
,									S	APPROVE	Prizz		
Test Hole I Total Dept Test Hole I	Test Hole Number: DH-10 Total Depth : 3.25 feet Test Hole Diameter: 10.00 inches			39 5	inches inches			This set of pla job at all times alterations to t from OC Publi of Orange Co specifications approval of th Ordinance or :	ns and specification . It is unlawful to m hese plans without to c Works, OC Develu- unty. The stamping SHALL NOT be hele e violation of any pro- State law. Hadi Tabatabae BUIL DING OFFIC	s must be kept on the ake any changes or written perwission opment Services of these plan d to permit or be an ovisions of any County			
					Initial	Final				Infiltration			
Trial	Start Time	End Time	$\Delta \mathbf{T}$	Total Time	Depth of	Depth of	$ riangle \mathbf{D}$	$\Sigma \triangle \mathbf{D}$	∆Havg	Bata			
indi					Water	Water				Rate			
			(min)	(min)	(ft)	(ft)	(in)	(in)	(in)	(in/hour)			
1	8:54	9:35	41.0	41.0	1.19	1.82	7.62	7.62	20.93	1.19			
2	9:38	10:06	28.0	69.0	1.23	1.65	5.00	12.62	21.75	1.11			
3	10:09	10:38	29.0	98.0	1.27	1.63	4.25	16.87	21.62	0.91			
4	10:40	11:08	28.0	126.0	1.26	1.56	3.64	20.51	22.06	0.79			
5	11:10	11:39	29.0	155.0	1.27	1.55	3.37	23.88	22.06	0.71			
6	11:41	12:22	41.0	196.0	1.25	1.53	3.37	27.25	22.31	0.50			
7	12:25	12:59	34.0	230.0	1.16	1.41	3.00	30.25	23.63	0.51			
8	13:01	13:40	39.0	269.0	1.19	1.42	2.75	33.00	23.37	0.41			
9	13:42	14:34	52.0	321.0	1.05	1.42	4.38	37.38	24.19	0.47			
10	14:34	15:09	35.0	356.0	1.00	1.25	3.00	40.38	25.50	0.46			

Average Infiltration Rate (in/hour) 0.45





1/8/2021











1/8/2021

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APPENDIX E

Lateral Spread Analysis



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 Name: Concrete

> Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 °

Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17

Name: Liquefied 2 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.5

Project No. 17-206-02 Section A-A' November, 2019

50

Static Analysis, Run 1.1 Post Earthquake Condition Liquefied Layer 1 Horz Seismic Coef.: 0 Entry and Exit



PROPOSED PARKING STRUCTURE Af/Qm (Ultimate) 640 690 740 790 840



Project No. 17-206-02 Section A-A' November, 2019

Static Analysis, Run 1.1 Post Earthquake Condition Liquefied Layer 1 Horz Seismic Coef.: 0 Block Search Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17

Name: Liquefied 2 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.5




Project No. 17-206-02 Section A-A' November, 2019

50

Pseudo-Static Analysis, Run 1.2 Liquefied Layer 1 Horz Seismic Coef.: 0.15 Entry and Exit Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17



ARKING STI	RUCTURE	Af/Q	m (Ultimate)	<u> </u>
640	690	740	790	840

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Project No. 17-206-02 Section A-A' November, 2019

Pseudo-Static Analysis, Run 1.2 Liquefied Layer 1 Horz Seismic Coef.: 0.15 Block Search Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17



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Project No. 17-206-02 Section A-A' November, 2019

Deformation Analysis, Run 1.3 Liquefied Layer 1 Horz Seismic Coef.: 0.28 Deformation Due to MCE < 6 inches Entry and Exit Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17





Project No. 17-206-02 Section A-A' November, 2019

Deformation Analysis, Run 1.3 Liquefied Layer 1 Horz Seismic Coef.: 0.28 Deformation Due to MCE < 6 inches Block Search Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 °

1/8/2021

Name: Af/Qm (Ultimate) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 80 psf Phi': 30 °

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.17





Project No. 17-206-02 Section B-B' November, 2019

Static Analysis, Run 1.1 Post Earthquake Condition Liquefied Layer 1 Horz Seismic Coef.: 0 Entry and Exit Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Piezometric Line: 1

Name: Tc Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 695 psf Phi': 34 ° Piezometric Line: 1

Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 ° Piezometric Line: 1 Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.45 Minimum Strength: 0 Piezometric Line: 1



Project No. 17-206-02 Section B-B' November, 2019

Static Analysis, Run 1.1 Post Earthquake Condition Liquefied Layer 1 Horz Seismic Coef.: 0 Block Search 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 Tabatabase.

Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Piezometric Line: 1

Name: Tc Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 695 psf Phi': 34 ° Piezometric Line: 1

Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 ° Piezometric Line: 1



Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.45 Minimum Strength: 0 Piezometric Line: 1



Project No. 17-206-02 Section B-B' November, 2019

Pseudo-Static Analysis, Run 1.2 Liquefied Layer 1 Horz Seismic Coef.: 0.15 Entry and Exit Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Piezometric Line: 1

Name: Tc Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 695 psf Phi': 34 ° Piezometric Line: 1

Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 ° Piezometric Line: 1



Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.45 Minimum Strength: 0 Piezometric Line: 1



Project No. 17-206-02 Section B-B' November, 2019

Pseudo-Static Analysis, Run 1.2 Liquefied Layer 1 Horz Seismic Coef.: 0.15 Block Search Name: Af/Qm (Peak) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 395 psf Phi': 31 ° Piezometric Line: 1

Name: Tc Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 695 psf Phi': 34 ° Piezometric Line: 1

Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 ° Piezometric Line: 1



Name: Liquefied 1 Model: S=f(overburden) Unit Weight: 125 pcf Tau/Sigma Ratio: 0.45 Minimum Strength: 0 Piezometric Line: 1

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1/8/2021



Project No. 17-206-02 Section B-B' November, 2019

Deformation Analysis, Run 1.3 Liquefied Layer 1 Horz Seismic Coef.: 0.6 Deformation Due to MCE < 1.5 inches Entry and Exit



Project No. 17-206-02 Section B-B' November, 2019

Pseudo-Static Analysis, Run 1.3 Liquefied Layer 1 Horz Seismic Coef.: 0.45 Deformation Due to MCE < 2.5 inches Block Search

Name: Liquefied 1 Name: Af/Qm (Peak) Model: S=f(overburden) Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Weight: 125 pcf Tau/Sigma Ratio: 0.45 Cohesion': 395 psf Minimum Strength: 0 Phi': 31 ° Piezometric Line: 1 **Piezometric Line: 1** Name: Liquefied 2 Name: Tc Model: S=f(overburden) Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Weight: 125 pcf Tau/Sigma Ratio: 0.35 Cohesion': 695 psf Minimum Strength: 0 Phi': 34 ° Piezometric Line: 1 **Piezometric Line: 1** Name: Concrete

Name: Concrete Model: Mohr-Coulomb Unit Weight: 150 pcf Cohesion': 14,400 psf Phi': 50 ° Piezometric Line: 1

