ADDENDUM NO. 1

TO: All Plan Holders and Prospective Bidders

FROM: City of Capitola Public Works

DATE: April 10, 2020

RE: **ADDENDUM NO. 1**
RECONSTRUCT STORM DAMAGED BIKE PATH AND SHOULDER ON PARK AVENUE

ADDENDUM NO. 1

City of Capitola, California

This Addendum shall be considered as a part of the bid documents for the subject project as though it had been issued at the same time and shall be incorporated integrally therewith. Where provisions of the following supplementary data differ from those of the original documents, this Addendum shall govern and take precedence.

Contractors are hereby notified that they shall make any necessary adjustments in their proposals on account of this Addendum. It will be construed that each proposal is submitted with full knowledge of all modifications and supplemental data specified herein.

Receipt of this Addendum must be acknowledged on the Addendum Acknowledgement form. Signature on said Bid Form indicates acknowledgement of receipt of Addendum No. 1, and that said Addendum No. 1 was properly evaluated in bidder's proposal. Any proposal not in compliance with this requirement may be rejected.

Steven E. Jesberg, Public Works Director

The following is hereby added and/or amended:

The attached Geotechnical Design Alternatives Memorandum, prepared by Cal Engineering & Geology is provided for informational purposes. The information in this memorandum was used in the preparation of the design drawings and specifications. This document shall be made an exhibit to the specifications and made part of the contract documents.

Cal Engineering & Geology
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TECHNICAL MEMORANDUM

To: Jim Bui, P.E.
Nichols Consulting Engineers (NCE)
501 Canal Boulevard, Suite I
Richmond, California 94804

From: Paul Sorci, P.E., G.E. and Mehal Vitthal, E.I.T.
Cal Engineering & Geology, Inc.
6455 Almaden Expressway, Suite 100
San Jose, California 95120

Date: February 11, 2019

RE: Design Alternatives Memorandum - Revised
Park Avenue Slope Repair
City of Capitola, California
CE&G Document 180920.001

INTRODUCTION

Cal Engineering & Geology (CE&G) has provided Nichols Consulting Engineers (NCE) with geotechnical engineering services in support of the Park Avenue Slope Repair Project. In February of 2017, several large Eucalyptus trees on the eastern side of Park Avenue in the City of Capitola fell across the road during a severe wind storm, causing damage to the slope below the roadway. The damage included over steepening the slope and damaging the roadway shoulder along the north bound lane. The damaged area measures approximately 150 feet along the roadway. The location of the Project is shown on Figure 1, Site Location Map.

The slope repair is intended to restore cross-sectional width of the roadway, including the shoulder and bike lane, for the damaged section of Park Avenue. The geotechnical engineering design services to be provided as part of this contract have included the production of this memorandum. Civil design of the selected repair are to incorporate the design recommendations within this memorandum.

CE&G's work included compiling and reviewing available pertinent geotechnical and geologic data; performing a field reconnaissance, a field exploration and laboratory testing program, and geotechnical engineering analyses; assessing geotechnical design alternatives for the proposed improvements; and preparing this memorandum.

SITE DESCRIPTION

This site is located on the eastern side of Park Avenue in the City of Capitola, California, within the segment between Coronado Street and Kennedy Drive. The dormant Santa Cruz Branch Rail Line (SCBRL) corridor runs parallel to Park Avenue, about 45 feet downslope of the roadway. On the western side of Park Avenue is a debris catchment wall to prevent soil and vegetation from flowing onto Park Avenue. Park Avenue consists of a two-lane asphalt paved roadway with a bike lane on the west side of the road and a bike lane on the east side that is currently inoperable due to the damaged slope within the Project area. The Project area is relatively open and bounded by Park Avenue at the top of slope and raised SCBRL corridor at the slope toe. Shrubs and bushes are located within the damaged slope, while the adjacent areas contain large Eucalyptus trees.

The damaged slope is currently covered with visquine and sandbags to protect the uplifted and loose surficial soils from surface runoff and reduce potential for additional damage. Temporary concrete "K-rail" barricades are placed along the edge of roadway pavement within the limits of the damaged slope. Photo 1 below shows the current condition of the slope along Park Avenue.

Photo 1. Slope Damage Along Park Avenue, taken July 7, 2018

SITE INVESTIGATION

SITE RECONNAISSANCE

CE&G performed field reconnaissance of the site in advance of and on the day of our subsurface investigation. The reconnaissance included photographic documentation of the project site, identifying and marking safe locations for subsurface explorations, and contacting USA (Underground Service Alert) for utility markings.

SUBSURFACE INVESTIGATION

Scope of Explorations

Two geotechnical borings were drilled near the endpoints of the damaged slope, along the outboard edge of the roadway. The locations of the completed borings were marked in the field and recorded by measuring with a tape from established points of reference. The approximate locations of the borings are shown on Figure 2, Site Exploration Plan.

The geotechnical borings were drilled by Cenozoic Exploration on July 19, 2017, using a truck-mounted Simco 2400 drill rig. Surface conditions at both borings were similar, consisting of approximately 2 feet of aggregate base of the roadway. The drill rig used a 6-inch-diameter solid stem auger. Boring B-1 was drilled to a total depth of 31.5 feet below ground surface (bgs). Boring B-2 was drilled to a total depth of 41.5 feet bgs.

Logging and Sampling

The materials encountered in the borings were logged in the field by a CE&G engineer. The soils were visually classified in the field, office, and laboratory according to the Unified Soil Classification System (USCS) in general accordance with ASTM D2487 and D2488.

During the drilling operations, soil samples were obtained using one of the following sampling methods:

- California Modified (CM) Sampler; 3.0 inch outer diameter (O.D.), 2.5 inch inner diameter (I.D.) (ASTM D1586)
- Standard Penetration Test (SPT) Split Spoon Sampler; 2.0 inch O.D., 1.375 inch I.D. (ASTM D1586)

The samplers were driven 18 inches (unless otherwise noted on the boring logs) with a 140-pound hammer, manila line, and cathead; dropping 30 inches in general conformance with ASTM D6066 procedures. The number of blows required to drive the SPT or CM sampler for each 6-inch interval was recorded for each sample. The results are included on the boring logs. The blow counts included on the boring logs are uncorrected and represent field values.

Soil samples obtained from the borings were packaged and sealed in the field to reduce the potential for moisture loss and disturbance. The samples were taken to CE&G's Hayward office for laboratory testing and storage.

Soil Conditions Encountered

Soil conditions encountered at both ends of the Project area were similar. Borings B-1 and B-2 encountered pavement sections of approximately 5 inches of asphalt concrete pavement underlain by about 15 inches of aggregate base. Fill soils beneath the pavement section generally consist of poorly graded sands of medium dense consistency underlain by fine-grain sandy silts and lean clays to depths of about 15 feet bgs. Below the fill soils, dense medium sands were encountered to approximately 27 feet bgs. Firm fat clay and very dense clayey sands extended to the maximum depths explored in Borings B-1 and B-2 at 31.5 feet and 41.5 feet bgs, respectively. Additional details of the soils encountered may be found on the boring provided in Attachment A.

Groundwater Conditions Encountered

The groundwater elevation may vary depending on the time of year, storm events, and tidal influences. The groundwater elevation was observed in Boring B-2 to be approximately 33 feet below the ground surface at the time of exploration. The groundwater elevation selected for design should consider the effects of the seasons, storm events, and tidal influences.

GEOTECHNICAL LABORATORY TESTING

Laboratory testing was performed to obtain information regarding the physical and index properties of selected samples recovered from the exploratory borings. Tests performed included natural moisture content, dry unit weight, and grain size distribution. Tests were completed in general conformance with applicable ASTM standards. The results of the laboratory tests are included in Attachment B.

DISCUSSION AND ALTERNATIVES

The eastern slope along Park Avenue was damaged due to the toppling of trees, leading to uplift of the tree root balls causing movement along the slope. Based on site reconnaissance and our subsurface investigation, the damage appears to be shallow and only extend within the upper portions of the slope. Soils within the limits of the damaged slope are likely to be loose and susceptible to erosion. Damaged areas include segments of bike lane where the roadway pavement lost support and failed, leaving the bike lane inoperable.

Based on the results of our investigation, it is our opinion the site is geologically and geotechnically suitable for reconstructing the damaged roadway embankment. Potential repair alternatives include reconstructing the damaged areas with an engineered slope, constructing a retaining structure such as soldier pile and lagging retaining wall or mechanically stabilized earth wall (i.e. segmental block wall), and a combination of engineered slope with retaining structure at the top or toe of slope.

ENGINEERED SLOPE REPAIR

An engineered slope repair would reconstruct the damaged slope to a stable configuration. The benefit of an engineered slope repair is being able to restore the slope to its previous inclination and provide a natural looking repair.

Lose materials in the damaged areas would be excavated and suitable on-site material would be recompacted to rebuild the slope. The reconstructed slope would be benched and keyed into competent material underlying the loose surficial and subsurface material. Geosynthetics such as geotextile fabric and/or geogrid reinforcement will be required to be incorporated to provide additional resistance for slope stability and/or to provide slope face stability along steepened slopes. The rebuilt slope would conform to the adjacent slopes at each lateral margin. Erosion protection would be incorporated to prevent surficial sluffs and materials from migrating downward. The top of the rebuilt slope will likely extend laterally into the roadway shoulder/bike lane, as segments of pavement have been damaged and will need to be repaved. An Engineer from CE&G should be present during excavation operations to verify depth and limit of disturbed and loose material. A typical section schematic of a reinforced earth repair is shown on Figure 3.

RETAINING WALL REPAIR

A retaining wall repair would consist of constructing a soldier pile and lagging wall or a mechanically stabilized earth (MSE) wall. The benefit of a retaining wall structure is it would allow for a gentler slope within the existing slope area along Park Avenue when compared to the previously described engineered slope repair.

Soldier pile and lagging wall would generally consist of drilling cast-in-drilled-hole (CIDH) piles offset from the edge of pavement, installing lagging (i.e. timber or precast concrete lagging), and regrading and recompacting loose material below the wall. Based on our site reconnaissance, it is judged that overhead clearance would not pose a challenge for constructing CIDH piles from the roadway. It is likely that the east bound lane will need to be closed during construction of CIDH piles. Constructing an MSE wall offset from the edge of pavement will require large excavations well into the roadway to place geogrid reinforced compacted fill, resulting in costlier construction and greater impact to traffic operation along Park Avenue. A typical section schematic of a retaining wall repair is shown on Figure 3.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on the understanding that the SCBRL will be fully cooperative with the repair efforts and that a stable slope can be constructed within the existing right-of-way, the likely preferred alternative would include rebuilding the damaged slope with an engineered reinforced-earth slope repair. The dormant SCBRL corridor can potentially be used for construction staging and temporary stockpiling of excavated soils. Constructing an engineered slope repair for this project is relatively cost effective and can be constructed using conventional construction equipment. The repair is also likely to blend with slopes adjacent to the project area when compared to a retaining wall alternative.

RECOMMENDATIONS

Cal Engineering & Geology is providing the following geotechnical design recommendations based on the data collected as part of our exploration and presented in this memorandum.

Prior to commencement of the earthwork operation, the site should be cleared and grubbed of existing vegetation. Prior to placement of fill materials, loose soil and vegetation should be removed from the areas to receive fill. All depressions created by tree and stump removal and demolition of existing structures should be excavated to firm soil. All fills shall be founded on firm competent soil.

Temporary Construction Slopes

In preparation of bank remediation, excavation of the over steepened slopes created by the bank slope failure should have temporary construction slopes no steeper than 1h:1v. Temporary construction slopes being completed to 1h:1v or flatter should be completed before keyway excavation is performed. This is to ensure global slope stability.

Consideration should be given to the sequence of construction activities. We currently anticipate the following sequence of activities:

1) Excavate existing slope and layback to maximum 1h:1v with intermediate benches;
2) Excavate and compact keyway foundation;
3) Build reinforced-earth slope by placing successive layers of fabric and compacted soil.

Staging of construction materials should be located a safe distance from the top of the slope failure, as the additional loads may decrease the stability of the slope. Stockpiles should be located along the bottom of slope, adjacent to the SCBRL corridor to ensure stability of the embankment slopes during construction.

Permanent Slope Repair

Permanent engineered slope repair is to consist of a reinforced-earth repair slope with a keyway at the toe of the bank slope. The embankment keyway footing should extend a minimum of 3 feet into competent native materials.

The reinforced slope is to be constructed using on-site materials generally consisting of sands, sandy silts, and lean clays. The material removed during excavation is anticipated to consist of these soils. Imported soil for use in construction of the reinforced slope should be primarily granular and should meet the following requirements:

- Free of organic matter, deleterious substances, debris and rocks or lumps larger than 3 inches in greatest dimension; no more than 15 percent of the rocks or lumps should be larger than 1-½ inches;
- At least 20 percent finer than No. 200 U.S. Standard Sieve.
- Plasticity index less than 20 percent;

Materials shall be compacted to a relative compaction of 90 percent of ASTM D1557. Materials shall be spread evenly and compacted in uniform lifts not exceeding 8 inches in un-compacted thickness. Engineered fill shall be reinforced with a high-density polyethylene (HDPE) uniaxial geogrid, consisting of Tensar UX1100 or equivalent. Geogrid shall be placed such that the strength direction of the geogrid is oriented into the embankment.

Surface drainage along the roadway is to be incorporated into the project plans where appropriate. A curb is recommended to reduce the potential for runoff to reach the slope face along the slope repair. Surface runoff should be collected and routed along the outboard shoulder of roadway to new or existing drop inlets that discharge away from the repair area.

LIMITATIONS

We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all other warranties, either expressed or implied.

Paul Sorci, P.E., G.E.
Senior Engineer

Mehal Vitthal, E.I.T.
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
PAUL J. SORCI
GE 3132
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments

Attachment A – Exploration Boring Logs

Attachment B – Laboratory Testing Results

BASEMAP REFERENCE

1. BASEMAP FROM ESRI (SANTA CRUZ ORTHO 2016 3IN, 7/23/2016).
2. STREET CENTERLINES FROM CALTRANS CALIFORNIA ROAD SYSTEM, DOWNLOADED ON 05/21/2018.

0 0.25 0.5 1
MILES

N

M:\2018\180920 NCE - Capitola Park Ave Slope Repair\GIS\180920_Fig1_Site_Location.mxd; 9/24/2018; jlindeman

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PARK AVENUE SLOPE REPAIR
BETWEEN CORONADO ST. AND KENNEDY DR.
CAPITOLA, CALIFORNIA

SITE LOCATION MAP

180920	FEBRUARY 2019	FIGURE 1

BASEMAP REFERENCE

1. ORTHOIMAGERY FROM ESRI, (SANTA CRUZ ORTHO 2016 3IN, 7/23/2016).
2. PARCELS FROM COUNTY OF SANTA CRUZ GIS DATABASE, ACCESSED ONLINE 08/03/2018.

LEGEND

B-2 BORING LOCATION BY CE&G, DRILLED 7/17/2018

0 25 50 100
FEET

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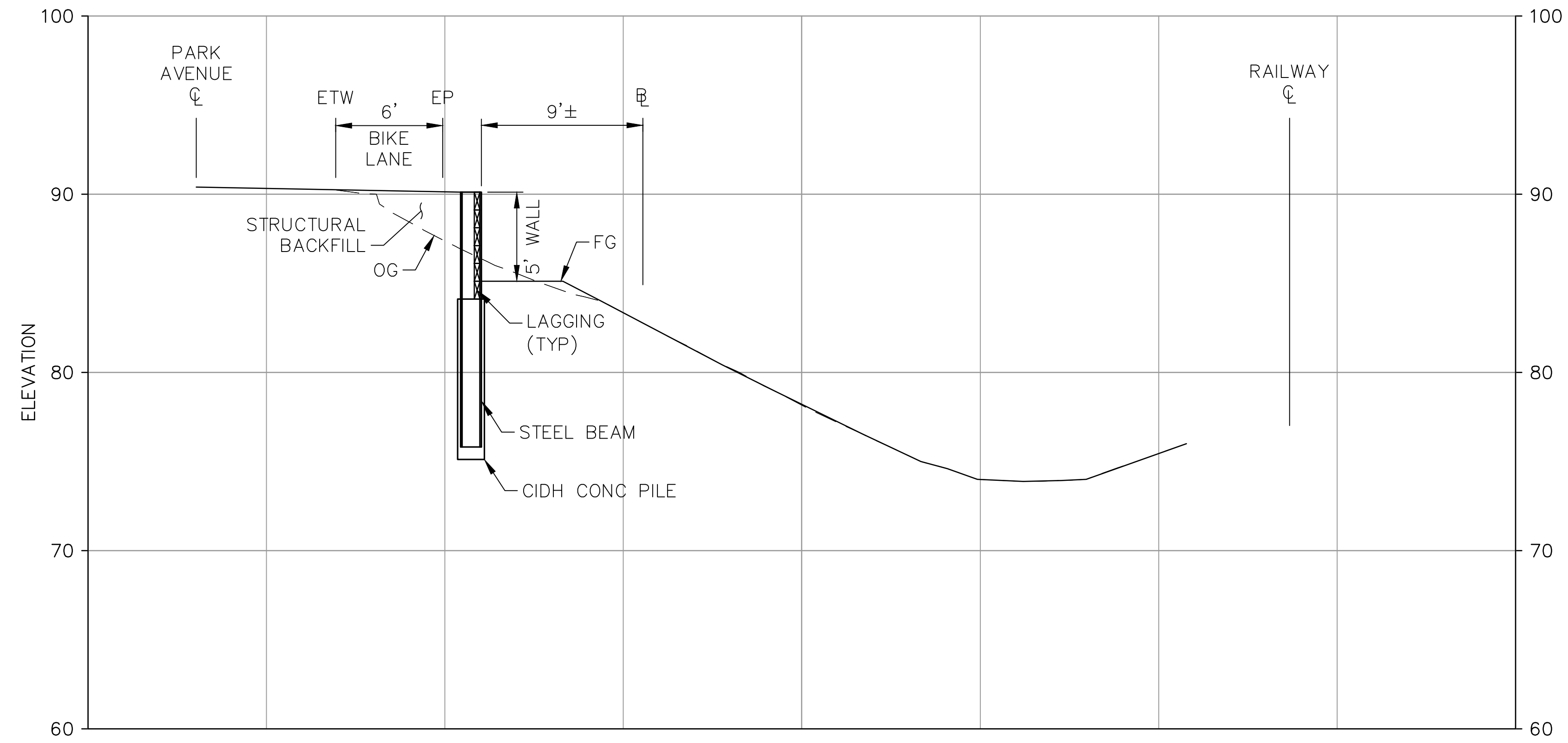
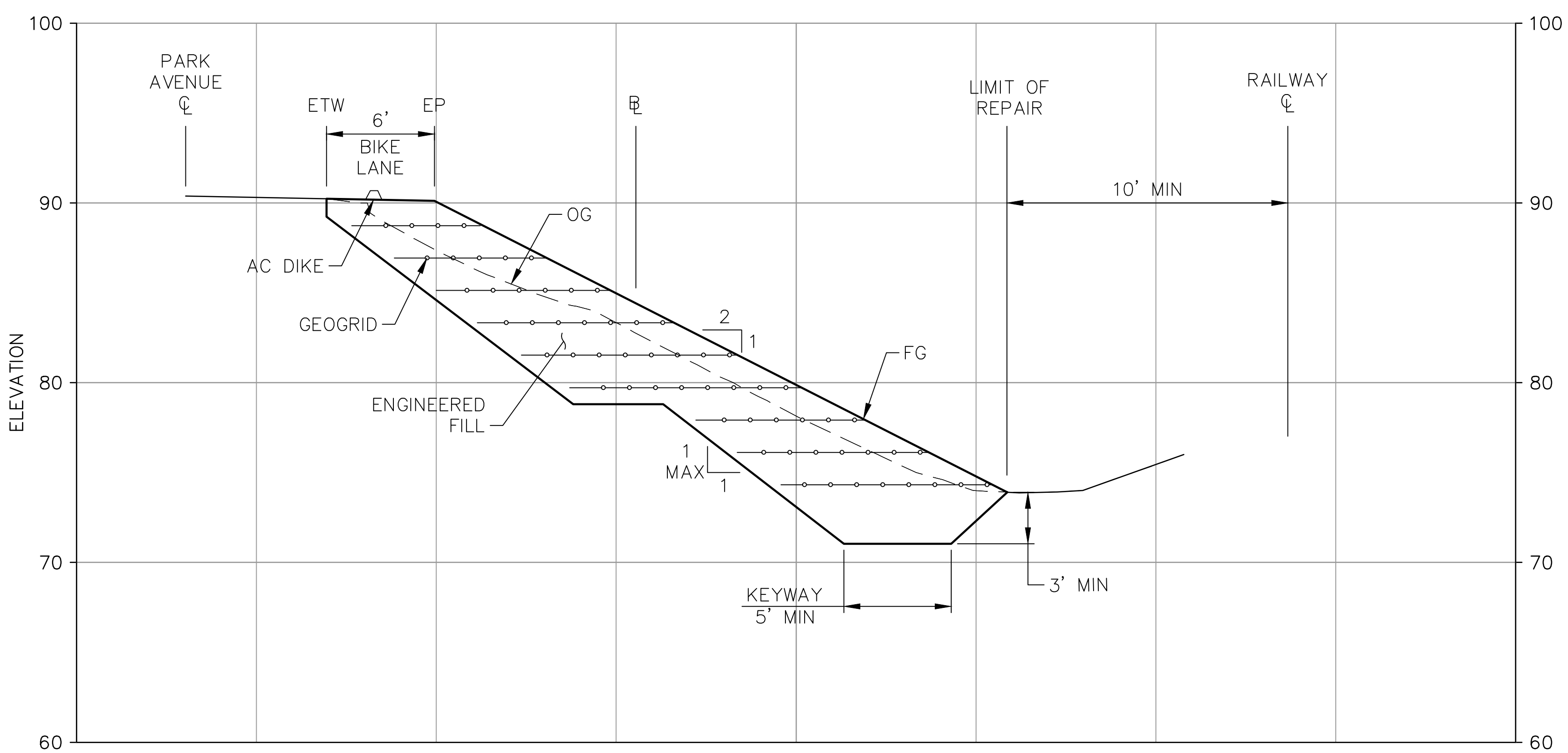
PARK AVENUE SLOPE REPAIR
BETWEEN CORONADO ST. AND KENNEDY DR.
CAPITOLA, CALIFORNIA

SITE EXPLORATION PLAN

180920	FEBRUARY 2019	FIGURE 2



SOLDIER PILE & LAGGING WALL REPAIR



ENGINEERED SLOPE REPAIR

ABBREVIATIONS:

B/L – APPROXIMATE BOUNDARY LINE (RECORD BOUNDARY DATA BY MPS)
EP – EDGE OF PAVEMENT
ETW – EDGE OF TRAVELED WAY (STRIPING)
FG – FINISHED GRADE
OG – ORIGINAL GRADE

REFERENCE:

TOPOGRAPHIC SURVEY COMPLETED BY MOUNTAIN PACIFIC SURVEYS (MPS) ON AUGUST 28, 2018.

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PARK AVENUE SLOPE REPAIR
BETWEEN CORONADO ST. AND KENNEDY DR.
CAPITOLA, CALIFORNIA

CONCEPTUAL TYPICAL SECTIONS

180920	FEBRUARY 2019	FIGURE 3

Attachment A. Exploration Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

Field Identification			Group Symbols	Typical Names	Laboratory Classification Criteria	
Coarse-Grained Soils More than 50% of material is retained on the No. 200 sieve.	**Gravels** More than 50% coarse fraction retained on the No. 4 sieve	**Clean Gravels** < 5% Fines	**GW**	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U = D_{60} \div D_{10} \geq 4$ and $C_C = (D_{30})^2 \div (D_{10} \times D_{60}) \geq 1$ & ≤ 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	$C_U = D_{60} \div D_{10} < 4$ and/or $C_C = (D_{30})^2 \div (D_{10} \times D_{60}) < 1$ & > 3	
		Gravels with Fines >12% Fines	**GM**	Silty gravels, poorly graded gravel-sand-silt mixtures	Fines classify as ML or MH	If fines classify as CL-ML, use dual symbol GC/GM
			GC	Clayey gravels, poorly graded gravel-sand-clay mixtures	Fines classify as CL or CH	
	Sands More than 50% coarse fraction passes the No. 4 sieve	**Clean Sands** < 5% Fines	**SW**	Well-graded sands, gravelly sands, little or no fines	$C_U = D_{60} \div D_{10} \geq 6$ and $C_C = (D_{30})^2 \div (D_{10} \times D_{60}) \geq 1$ & ≤ 3	
			SP	Poorly graded sands, gravelly sands, little or no fines	$C_U = D_{60} \div D_{10} < 6$ and/or $C_C = (D_{30})^2 \div (D_{10} \times D_{60}) < 1$ & > 3	
		Sands with Fines >12% Fines	**SM**	Silty sands, poorly graded sand-silt mixtures	Fines classify as ML or MH	If fines classify as CL-ML, use dual symbol SC/SM
			SC	Clayey sands, poorly graded sand-clay mixtures	Fines classify as CL or CH	

CLASSIFICATION OF GRAVELS & SANDS WITH 5% TO 12% FINES REQUIRES DUAL SYMBOLS

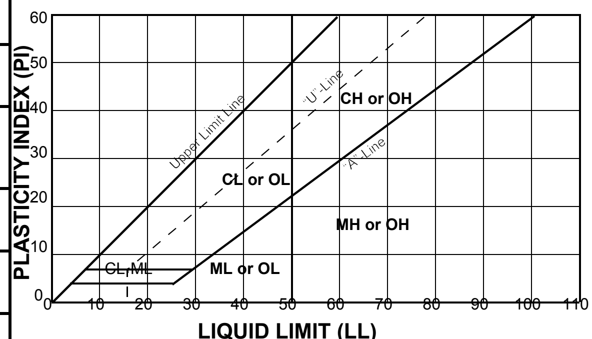
GW/GM or GP/GM: Gravel/Silty Gravel
GW/GC or GP/GC: Gravel/Clayey Gravel
SW/SM or SP/SM: Sand/Silty Sand
SW/SC or SP/SC: Sand/Clayey Sand

Field Identification		Group Symbols	Typical Names
Fine-Grained Soils More than 50% of material passes the No. 200 sieve.	**Identification Procedures on Percentage Passing the No. 40 Sieve**		
	Silts & Clays Liquid Limit less than 50%	**ML**	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly, sandy, and/or silty clays, lean clays
		OL	Organic silts, organic silty clays of low plasticity
	Silts & Clays Liquid Limit greater than 50%	**MH**	Inorganic silts, micaceous or diatomaceous fine sandy/-silty soil, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		**PT**	Peat and other highly organic soils

PLASTICITY CHART

For Classification of Fine-Grained Soils and Fine-Grained Fraction of Coarse-Grained Soils

Equation of "A"-Line: PI = 4 @ LL = 4 to 25.5, then PI = 0.73 × (LL − 20)
Equation of "U"-Line: LL = 16 @ PI = 0 to 7, then PI = 0.9 × (LL − 8)



KEY TO SAMPLER TYPES AND OTHER LOG SYMBOLS

CS	California Standard Sampler	▽	Depth at which Groundwater was Encountered During Drilling
CM	California Modified Sampler	▼	Depth at which Groundwater was Measured After Drilling
SPT	Standard Penetration Test Sampler	**PP**	Pocket Penetrometer Test
SHL	Shelby Tube Sampler	**PTV**	Pocket Torvane Test
BU	Bulk Sample	**-#200**	% of Material Passing the No. 200 Sieve Test (ASTM D-1140)
LL	Liquid Limit of Sample (ASTM D-4318)	**PSA**	Particle-Size Analysis (ASTM D-422 & D-1140)
PI	Plasticity Index of Sample (ASTM D-4318)	**C**	Consolidation Test (ASTM D-2435)
Q_U	Unconfined Compression Test (ASTM D-2166)	**TXUU**	Unconsolidated Undrained Compression Test (ASTM D-2850)

KEY TO SAMPLE INTERVALS

CS	Length of Sampler Interval with a CS Sampler	BU	Bulk Sample Recovered for Interval Shown (i.e., cuttings)
⊠	Length of Sampler Interval with a CM Sampler	I	Length of Coring Run with Core Barrel Type Sampler
▯	Length of Sampler Interval with a SPT Sampler	NR	No Sample Recovered for Interval Shown
SHL	Length of Sampler Interval with a SHL Sampler		

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UNIFIED SOIL CLASSIFICATION SYSTEM AND KEY TO BORING LOG

Cal Engineering & Geology

KEY TO SYMBOLS

CLIENT NCE

PROJECT NUMBER 180920

PROJECT NAME Capitola Park Avenue Slope Repair

PROJECT LOCATION Capitola, CA

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

- ASPHALT: Asphalt
- CH: USCS High Plasticity Clay
- CL: USCS Low Plasticity Clay
- GM: USCS Silty Gravel
- GP: USCS Poorly-graded Gravel
- GW: USCS Well-graded Gravel
- GW-GC: USCS Well-graded Gravel with Clay
- GW-GM: USCS Well-graded Gravel with Silt
- MH: USCS Elastic Silt
- ML: USCS Silt
- OH: USCS High Plasticity Organic silt or clay
- SC: USCS Clayey Sand
- SM: USCS Silty Sand
- SP: USCS Poorly-graded Sand
- SW: USCS Well-graded Sand
- SW-SC: USCS Well-graded Sand with Clay

SAMPLER SYMBOLS

- California Modified Sampler
- Shelby Tube
- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

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BORING NUMBER B-1

CLIENT NCE
PROJECT NAME Capitola Park Avenue Slope Repair
PROJECT NUMBER 180920
PROJECT LOCATION Capitola, CA
DATE STARTED 7/19/2018 **COMPLETED** 7/19/2018
GROUND ELEVATION 90 ft **DATUM** NAVD 88 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Drilling
COORDINATES: LATITUDE 36.9807 **LONGITUDE** -121.9383
DRILLING RIG/METHOD 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY A. Landivar **CHECKED BY** K. Loeb
GROUNDWATER AT END OF DRILLING ---
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	FINES CONTENT (%)
0	Asphalt Pavement									
	Poorly graded SAND (SP): brown, moist, dense, medium coarse, trace fines, trace gravel up to 0.5" [Fill?]									
	Well graded SAND (SW): brown, moist, medium dense, fine sand, cementation	CM	9-11-27							
	SILT w/ sand (ML): yellow, dry, very hard, low plasticity									
5		CM	10-13-11		101	11				
	Sandy SILT (ML): yellow, dry, very hard, low plasticity, fine sand	CM	10-24-46		72	28				
10	becomes moist, hard, fine to medium sand	CM	21-44-50/3"		73	26				56
15	Poorly graded SAND w/ Silt (SP-SM): olive yellow, very dense, moist, medium sand, trace of fines									
	becomes yellowish brown, dense	CM	18-30-40		98	7				13
20		SPT	12-13-14							
25	1.5" greenish black sand lens	SPT	12-9-14							
	Fat CLAY (CH): dark blueyish gray, moist, firm, high plasticity									
30	2" Sand lens at the bottom of the sample	SPT	12-11-19							

Bottom of borehole at 31.5 ft. Borehole backfilled with cement grout.

BORING NUMBER B-2

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CAL ENGINEERING & GEOLOGY

CLIENT NCE
PROJECT NAME Capitola Park Avenue Slope Repair
PROJECT NUMBER 180920
PROJECT LOCATION Capitola, CA
DATE STARTED 7/19/2018 **COMPLETED** 7/19/2018
GROUND ELEVATION 90 ft **DATUM** NAVD 88 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Drilling
COORDINATES: LATITUDE 36.9809 **LONGITUDE** -121.9383
DRILLING RIG/METHOD 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING 33.0 ft
LOGGED BY A. Landivar **CHECKED BY** K. Loeb
GROUNDWATER AT END OF DRILLING ---
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0		Asphalt Pavement									
		Poorly graded SAND (SP): brown, moist, medium dense, medium coarse, trace fines, trace gravel up to 0.5" [Fill?]									
			CM	7-5-9							
		Poorly graded SAND w/ gravel (SP): yellow, dry, medium dense, medium to fine sand, gravel up to 0.5"									
5		Lean CLAY (CL): brown, moist, firm, low plasticity, some roots	CM	30-26-15		101	7				
			CM	8-11-16		103	7				
		Poorly graded SAND (SP): yellowish brown,dry to moist, medium dense, very fine sand									
10		SILT w/ sand (ML): yellow, dry to moist, hard, low plasticity, very fine sand	CM	8-12-18							
15		Poorly graded SAND w/ Silt (SP-SM): olive yellow, moist to dry, very dense, medium sand									
			CM	18-33-50/5"		99	10				15
20			CM	24-32-50/5"							
25		Poorly graded SAND w/ clay (SP): olive yellow, moist, dense, fine sand, low plasticity clay									
			SPT	13-17-25							
		Fat CLAY (CH): dark blueyish gray, moist, firm, high plasticity									
30			SPT	16-23-41							
		∇									
35											

(Continued Next Page)

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BORING NUMBER B-2

CLIENT NCE

PROJECT NAME Capitola Park Avenue Slope Repair

PROJECT NUMBER 180920

PROJECT LOCATION Capitola, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
35		Fat CLAY (CH): dark blueyish gray, moist, firm, high plasticity *(continued)* increase in moisture	SPT	15-50/5"							
		Clayey SAND (SC): dark blueyish gray, moist, very dense, fine to medium sand, high plasticity clay									
40			SPT	22-27-46							

Bottom of borehole at 41.5 ft. Borehole backfilled with cement grout.

Attachment B. Laboratory Testing Results

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SUMMARY OF LABORATORY RESULTS

CLIENT NCE

PROJECT NAME Capitola Park Avenue Slope Repair

PROJECT NUMBER 180920

PROJECT LOCATION Capitola, CA

Borehole	Depth	Date Tested	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Screen Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-1	6.0	7/30/2018						ML	10.9	101.1		
B-1	8.0	7/30/2018						ML	28.0	71.8		
B-1	11.0	7/30/2018				9.5	56	ML	25.8	72.9		
B-1	16.0	7/30/2018				0.106	13	SP-SM	6.9	98.0		
B-2	6.0	7/30/2018						CL	6.6	101.3		
B-2	8.0	7/30/2018						SP	6.6	103.3		
B-2	10.0	7/30/2018						ML				
B-2	16.0	7/30/2018				0.106	15	SP-SM	10.4	99.2		

GRAIN SIZE DISTRIBUTION

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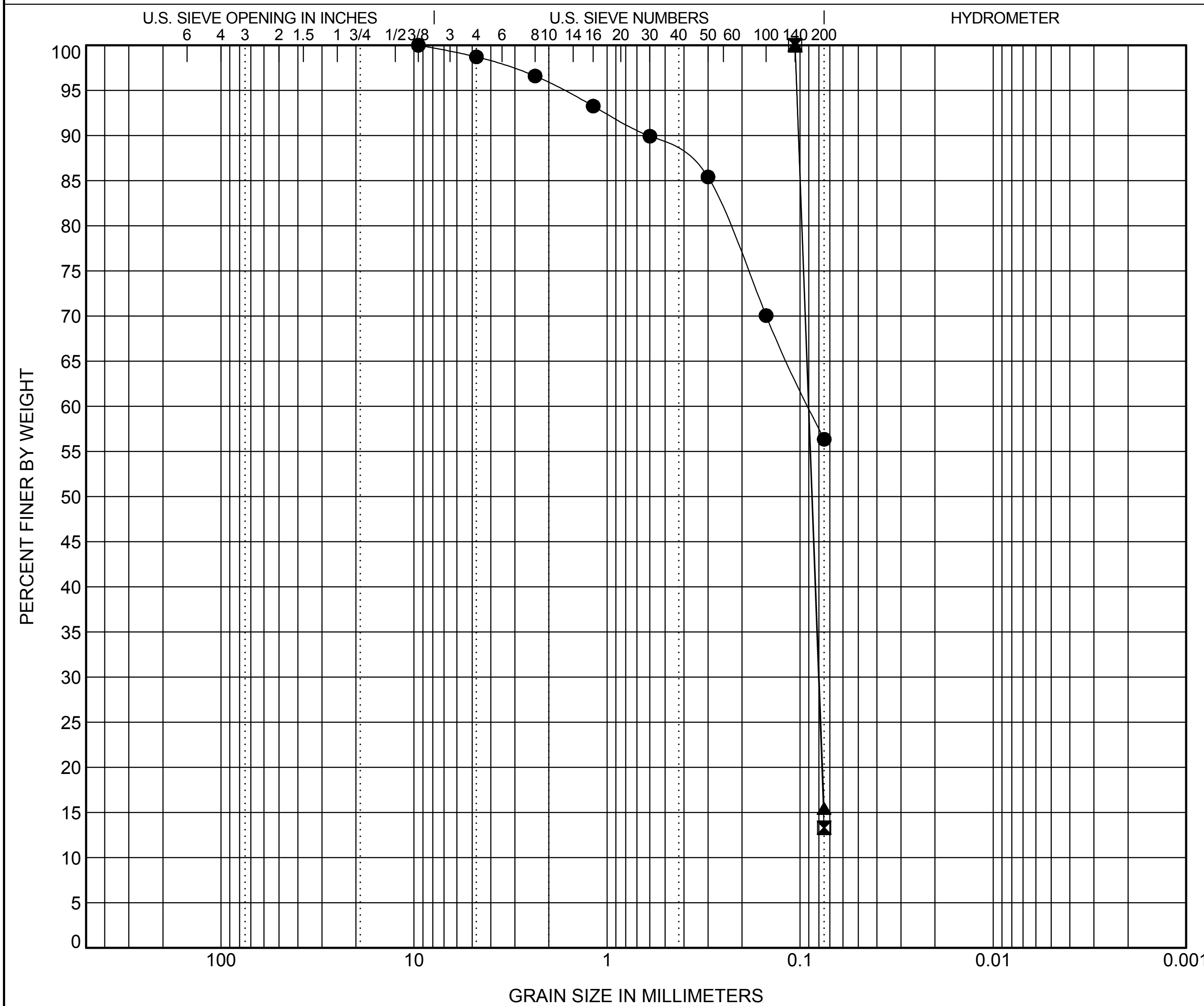
PROJECT NAME Capitola Park Avenue Slope Repair
PROJECT NUMBER 180920
PROJECT LOCATION Capitola, CA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	DATE TESTED	Classification	LL	PL	PI	Cc	Cu
●	B-1	11.0	7/30/2018						
⧗	B-1	16.0	7/30/2018						
▲	B-2	16.0	7/30/2018						

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	11.0	9.5	0.09			1.3	42.4	56.3	
⧗	B-1	16.0	0.106	0.09	0.08		0.0	86.7	13.3	
▲	B-2	16.0	0.106	0.09	0.08		0.0	84.6	15.4	