Project No. 07524-32-02
February 19, 2019

Vulcan Materials Company, Western Division
Properties Office
7220 Trade Street, Suite 205
San Diego, California 92121

Attention: Ms. Patricia Schreibman

Subject: ADDENDUM TO GEOTECHNICAL REPORTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

References:
1. *Recommended Grading Specifications, Stone Creek, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California*, prepared by Geocon Incorporated, dated September 24, 2009 (Project No. 07524-32-02).

2. *Soil and Geologic Reconnaissance, Stone Creek, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California*, prepared by Geocon Incorporated, dated April 14, 2006, revised May 10, 2006 (Project No. 07524-32-01).

Dear Ms. Schreibman:

We have prepared this addendum letter to provide additional mitigation measures with respect to potential settlement beneath proposed structural improvements (improvements, infrastructure, and buildings) planned for the project. After the completion of reclamation grading, the property will be underlain by deep fills (50 feet to over 100 feet-thick) and shallow formational bedrock. Relatively sharp transitions from bedrock to deep fills will exist along the property margins and some interior areas.

We recommend the following mitigation measures be incorporated into the project:

- In areas where the fill thickness is greater than 50-feet, fill soils should be compacted to at least 93 percent of the laboratory maximum dry density at approximately 2 percent above optimum moisture content. Fills less than 50-feet-thick should be compacted to at least 90 percent of the maximum dry density at optimum moisture content or slightly above.

- Sharp transitions from bedrock to thick fills beneath buildings and underground improvements (e.g. sewer, storm drain, etc.) should be softened during remedial grading by sloping steep bedrock surfaces and undercutting building pads.

- At the completion of grading, the conditions beneath each building pad should be evaluated for potential soil compression assuming the fills become saturated. The building foundation

should be designed to accommodate estimated total and differential settlement from both short term settlement due to building loading and long-term soil compression in the event the soils become saturated. The type of foundation utilized should be determined once building type and locations are known and the depth of fill beneath the structures has been determined. Specific foundation recommendations should be provided in an update or as-graded geotechnical reports that will be required as part of the approval process.

- An evaluation of differential settlement should be performed for infrastructure located in areas of sharp transitions from bedrock to deep fills. This evaluation should be performed once the locations of infrastructure is known with respect to the transition areas. Mitigation measures that should be included in the utility design in areas where the estimated differential settlement could impact the performance of underground improvements include: additional bedrock undercutting; the use of flexible, water tight and specially designed joints to allow for movement; and increasing pipe gradients.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860

RCM:DBE:dmc

(e-mail) Addressee
(e-mail) KLR Planning
Attention: Ms. Karen Ruggels

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Project No. 07524-32-02
June 3, 2020

Vulcan Materials Company
Properties Office
P.O. Box 130635
Carlsbad, California 92013

Attention: Mr. Mike Linton

Subject: SLOPE STABILITY ANALYSIS FOR RECLAMATION SLOPES
CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

Reference: *Reclamation Plan, Carroll Canyon Mine, CA Mine ID# 91-37-0029, City of San Diego, California*, prepared by BDS Engineering, Inc., plot date April 28, 2020.

Dear Mr. Linton:

In accordance with the request of BDS Engineering, we have performed slope stability analyses for planned slopes shown on the referenced reclamation plans. We understand the City of San Diego LDR-Geology reviewer has requested documentation regarding cut slopes proposed on the property having a "minimum slope stability factor of safety that is suitable for the proposed end use".

Information on the referenced reclamation plans indicate that perimeter slopes will have an inclination of 2:1 (horizontal to vertical) or flatter. Taller slopes will have a bench every 30-foot vertical height. The tallest reclamation slopes are planned in Phase 4 where cut slopes up to approximately 120 feet will be constructed.

We used the computer program Slope/W (2018) distributed by Geo-Slope International to perform the slope stability analysis. The program uses conventional slope stability equations and a two-dimensional limit-equilibrium method to calculate the factor of safety against deep-seated failure. For our analyses, Spencer's Method with a circular failure mechanism was used. Graphical output of our analysis are provided on Figures 1 and 2. For conservatism, we did not include slope benches in our analysis. Also, fill slopes up to 120 feet are not currently shown on the reclamation plan; however, we used the maximum reclamation slope height for both the fill and cut slope analyses. Based on our analyses, project slopes have calculated factors of safety of 1.5 or greater with respect to global stability.

We performed seismic slope stability analysis in accordance with *Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California*, prepared by the Southern California Earthquake Center (SCEC), dated June 2002 and *Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California (2008)*.

The seismic slope stability analyses were performed using a peak ground acceleration of 0.27g for fill slopes and 0.23g for cut slopes. These accelerations correspond to a 10 percent probability of exceedance in 50 years. A modal magnitude and modal distance of 6.9 and 11.4 kilometers, respectively, were used in the analyses. The peak ground acceleration, modal magnitude, and modal distance were determined from a deaggregation analysis.

Using the parameters discussed above, equivalent site accelerations ($k_{EQ)}$ of 0.154g and 0.133g were calculated for fill and cut slopes, respectively, to perform a screening analysis. The calculated k_{EQ} was imputed as the horizontal seismic coefficient in the stability analyses. The analyses indicate factors of safety of 1.0 or greater for both fill and cut slopes. A slope is considered acceptable by the screening analysis if the calculated factor of safety is greater than 1.0 using k_{EQ}; therefore, the slopes pass the screening analysis for seismic slope stability. Printouts of the seismic slope stability analysis are provided on Figures 3 through 6.

Surficial slope stability analysis are shown on Figures 7 and 8. Our analysis indicates the slopes have a factor of safety of at least 1.5 for surficial stability.

Based on our analyses, cut and fill reclamation slopes have a minimum slope stability factor of safety for both global (static and seismic) and surficial that is suitable for the proposed end use.

If you have any questions, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860

RCM:DBE:arm

(e-mail) Addressee
(e-mail) BDS Engineering
Attention: Mr. Tom Jones
(e-mail) KLR Planning
Attention: Ms. Karen Ruggels

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Fill Slope.gsz
Date: 05/28/2020

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Qcf (Compacted Fill)	130	300	32

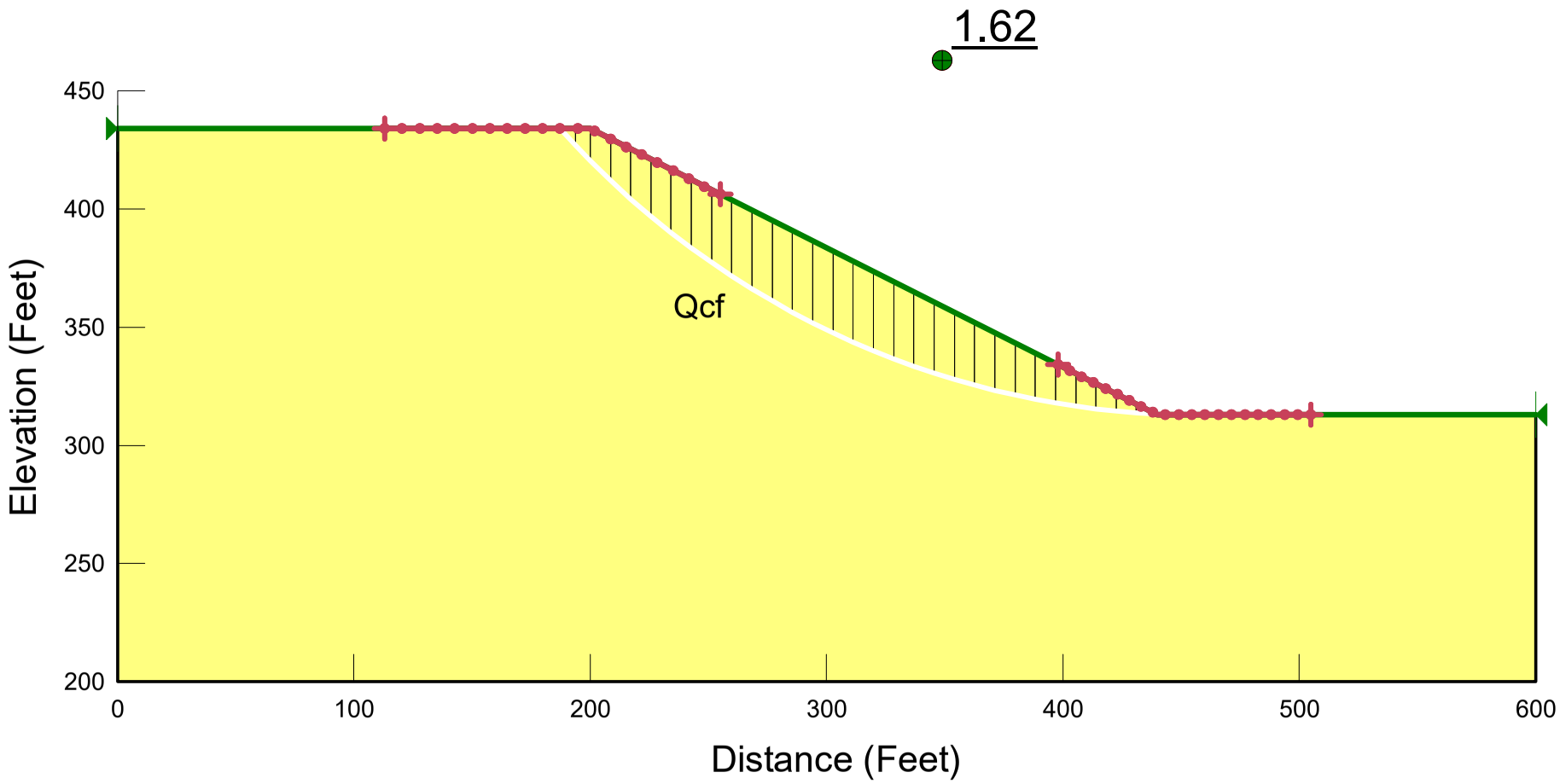


Figure 1

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Cut Slope.gsz
Date: 05/28/2020

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Tst (Stadium Conglomerate)	135	500	40

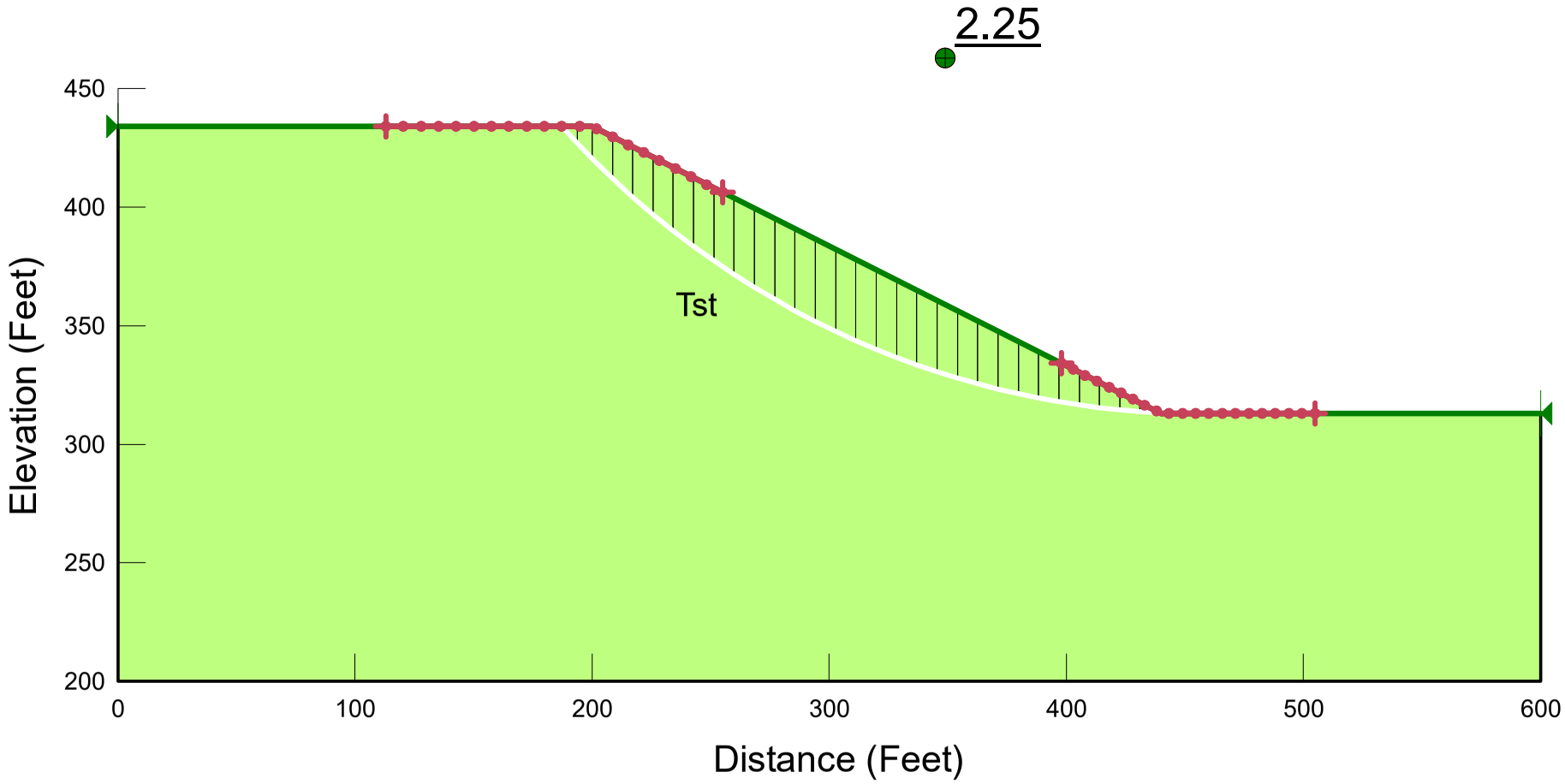


Figure 2

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Fill Slope (Seismic).gsz
Date: 05/28/2020
Horz Seismic Coef.: 0.154

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Qcf (Compacted Fill)	130	300	32

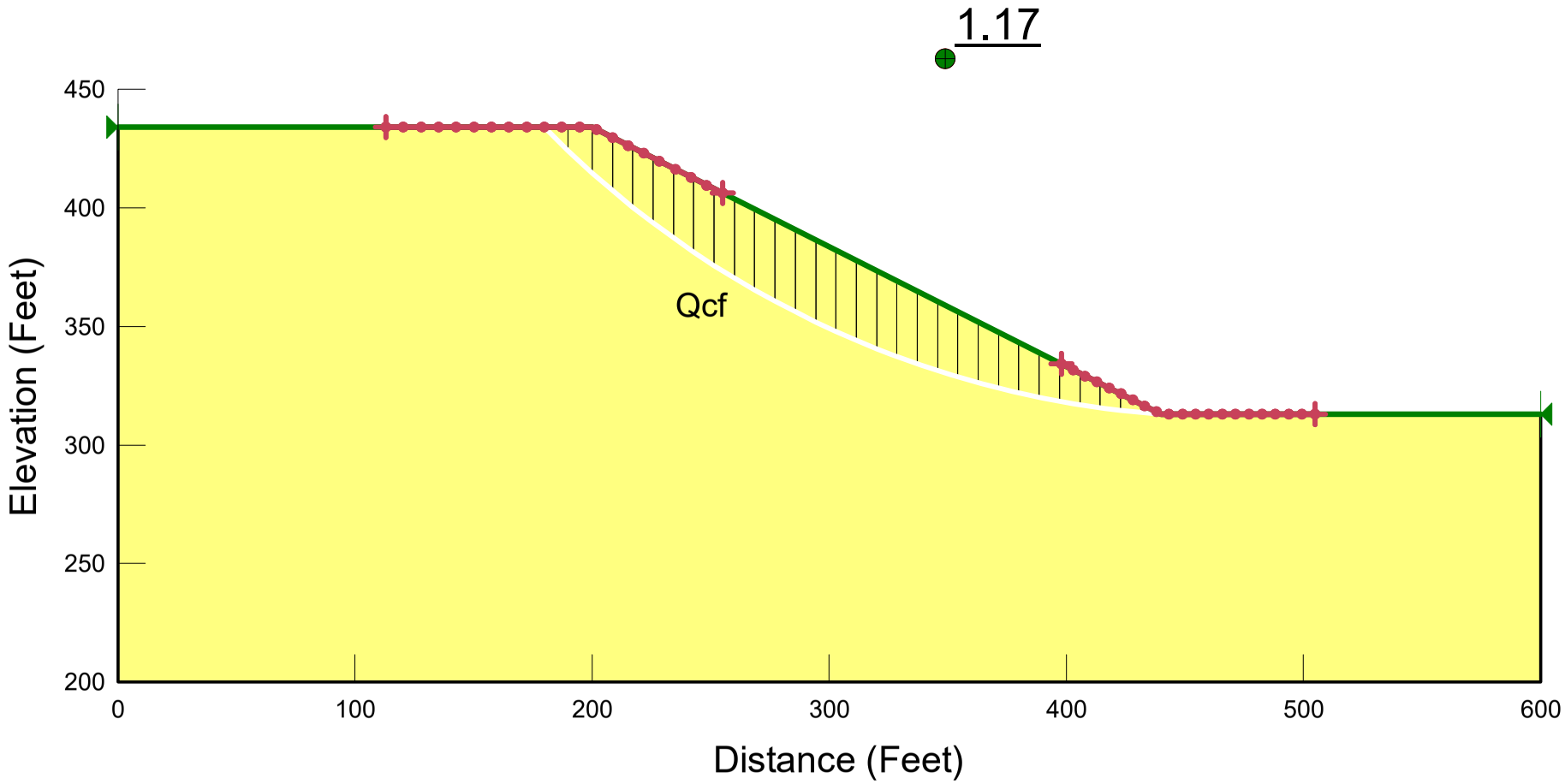


Figure 3

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Cut Slope (Seismic).gsz
Date: 05/28/2020
Horz Seismic Coef.: 0.133

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Tst (Stadium Conglomerate)	135	500	40

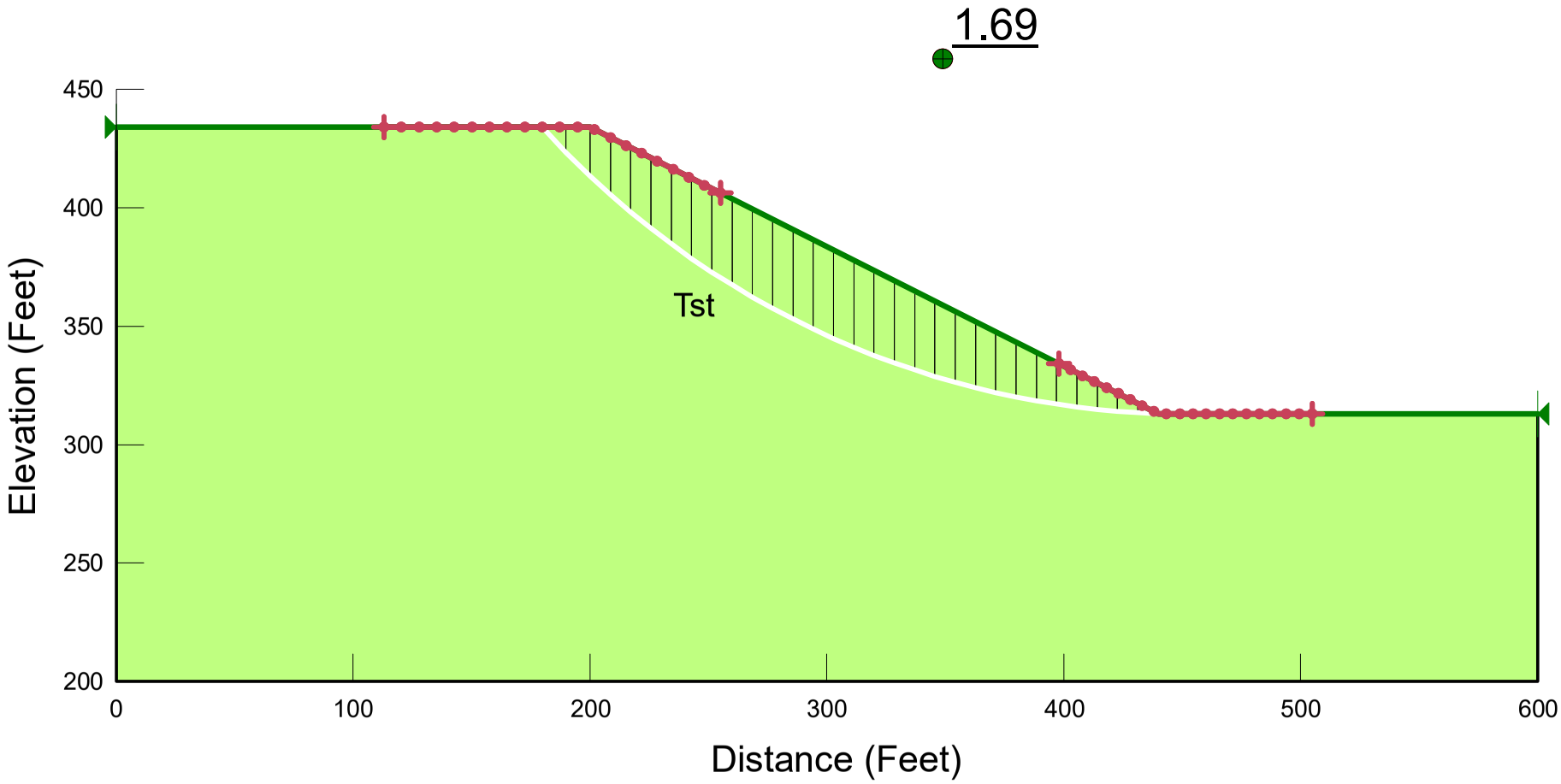


Figure 4

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project	Carroll Canyon Mine	**Computed By**	RCM
Project Number	07524-32-02		
Date	05/28/20		
Filename	Stonecreek Fill Slopes		

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.27	10% in 50 years
Modal Magnitude, M	6.90	
Modal Distance, r, km	11.4	
Site Condition, S (0 for rock, 1 for soil)	1	
Yield Acceleration, k_y/g	NA	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	NA	<--
Max Vertical Distance, H (Feet)	NA	<--
Is Slide X-Area > 25.000ft^2 (Y/N)	N	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	1.0	
Duration, $D_{5-95}\|_{med}$, sec	13.006	
Coefficient, C_1	0.5190	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0019	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.616	

Initial Screening with MHEA = MHA = k_{max}g

k_y/MHA	NA
$f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-\log(u/((MHA_r/g)*NRF*D_{5-95})))$	0.5709
$k_{EQ} = feq(MHA_r)/g$	0.154
Factor of Safety in Slope Analysis Using k_{EQ}	1.17

Passes Initial Screening Analysis

Approximation of Seismic Demand

Period of Sliding Mass, $T_s = 4H/V_s$, sec	NA
T_s/T_m	NA
MHEA/(MHA*NRF)	NA
$NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)$	1.12
MHEA/g	NA
$k_y/MHEA = k_y/k_{max}$	NA
Normalized Displacement, Normu	NA

Estimated Displacement, u (cm) NA

FIGURE 5

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project Carroll Canyon Mine **Computed By** RCM
Project Number 07524-32-02
Date 05/28/20
Filename Cut Slopes

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.23	10% in 50 years
Modal Magnitude, M	6.90	
Modal Distance, r, km	11.40	
Site Condition, S (0 for rock, 1 for soil)	1	
Yield Acceleration, k_y/g	NA	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	NA	<--
Max Vertical Distance, H (Feet)	NA	<--
Is Slide X-Area > 25.000ft^2 (Y/N)	N	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	1.0	
Duration, $D_{5\text{-}95}\|_{med}$, sec	13.006	
Coefficient, C_1	0.5190	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0019	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.616	

Initial Screening with MHEA = MHA = k_{max}g

k_y/MHA	NA
$f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-\log(u/((MHA_r/g)*NRF*D_{5\text{-}95})))$	0.5775
$k_{EQ} = feq(MHA_r)/g$	0.133
Factor of Safety in Slope Analysis Using k_{EQ}	1.69

Passes Initial Screening Analysis

Approximation of Seismic Demand

Period of Sliding Mass, $T_s = 4H/V_s$, sec	NA
T_s/T_m	NA
MHEA/(MHA*NRF)	NA
$NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)$	1.17
MHEA/g	NA
$k_y/MHEA = k_y/k_{max}$	NA
Normalized Displacement, Normu	NA

Estimated Displacement, u (cm) NA

FIGURE 6

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	5 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	130 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	32 degrees
APPARENT COHESION	C	=	300 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ \cos^2 i\ \tan \phi}{\gamma_t\ Z\ \sin i\ \cos i} = 1.8$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL SLOPE STABILITY ANALYSIS - FILL SLOPES

GEOCON INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 04 - 07 - 2020	PROJECT NO. 07524 - 32 - 02	FIG. 7

Plotted:05/28/2020 10:43AM | By:ALVIN LADRILLONO | File Location:Y:\1_GEOTECH\07000\07500\07524-32-02\2020-04-07\DETAILS\Slope Stability Analyses-Surficial (SSAS-F).dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	3 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	135 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	40 degrees
APPARENT COHESION	C	=	500 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ cos^2\ i\ tan\ \phi}{\gamma_t\ Z\ sin\ i\ cos\ i} = 4.0$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL SLOPE STABILITY ANALYSIS - CUT SLOPES

GEOCON INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 04 - 07 - 2020	PROJECT NO. 07524 - 32 - 02	FIG. 8

Plotted:05/28/2020 10:42AM | By:ALVIN LADRILLONO | File Location:Y:\1_GEOTECH\07000\07500\07524-32-02\2020-04-07\DETAILS\Slope Stability Analyses-Surficial (SSAS-C).dwg

RECOMMENDED GRADING SPECIFICATIONS

CARROLL CANYON MINE VULCAN MATERIALS COMPANY SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

VULCAN MATERIALS
LOS ANGELES, CALIFORNIA

JUNE 3, 2020
PROJECT NO. 07524-32-02

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. 07524-32-02
June 3, 2020

Vulcan Materials Company
500 North Brand Boulevard, Suite 500
Glendale, California 92103

Attention: Mr. Mike Linton

Subject: RECOMMENDED GRADING SPECIFICATIONS FOR RECLAMATION
CARROLL CANYON MINE
VULCAN MATERIALS COMPANY
SAN DIEGO, CALIFORNIA

Dear Mr. Linton:

In accordance with your authorization, we have prepared grading specifications for reclamation of the Carroll Canyon Mine project in San Diego, California. A final presentation of this information, including additional recommendations will be provided in a future update report that will summarize the various studies performed on the property.

Should you have any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860

DBE:RCM:dmc

(email) Addressee
(email) KLR Planning
Attention: Ms. Karen Ruggels

6960 Flanders Drive ■ San Diego, California 92121-2974 ■ Telephone 858.558.6900 ■ Fax 858.558.6159

TABLE OF CONTENTS

DISCUSSION

The reclamation grading specifications presented herein specifically address Carroll Canyon Mine ID #91-37-0029 and the steps necessary to reclaim the site as a reclamation obligation that will occur from future mining activities.

The specifications involve the handling, placement and compaction of both historically imported inert fill that is currently stockpiled on site and awaiting placement, and the import of additional inert fill to achieve final reclamation plan grades. These inert fills are to be placed in phases throughout the site as reclamation occurs concurrently with mining. We understand that inert fill imports will be sufficient to bring the property up to the elevations consistent with the reclamation plan.

The purpose of this consultation is to provide geotechnical criteria for use in evaluating the cost of site remedial grading as a result of mining excavation, and to assist in determining reclamation logistics and phasing. The Mine plan will result in the excavation and processing of aggregate and rubble fill for sale as aggregates and recycle aggregates to the construction industry. The Mine Plan will also accomplish the removal and compaction of the undocumented embankments in the following areas; Utility Vault Area, Former Pond No. 1, Area North of Former Pond No. 1, Plant Area, Rubble Fill, Former Pond No. 3, FS-15 Fill and Landfill Area.

All activities having to do with the import and placement of inert fill required to reclaim excavation areas to the reclamation grade will be placed at 90% relative compaction under the testing and observation services of a qualified geotechnical consultant. In addition to compaction, areas underlain by wet mining fines may require partial removals and the installation of a wick drains and surcharging, as is anticipated for a portion of Pond No. 2. It is also anticipated that the concrete dome area located in the southeast corner of Pond No. 2 will be removed and processed as recycled aggregate during the remedial grading, or after settlement of the wick drain area.

Based upon a review of the existing geotechnical studies, other important remedial grading considerations will be the presence and handling of oversize materials in the undocumented embankments, processing and placement of wet materials in former pond areas and potential deleterious materials that will require segregation from suitable fill prior to placement.

The sections hereafter present a summary of our conclusions and geotechnical recommendations for use during reclamation grading based on a review of geotechnical reports performed on the site. Design criteria and recommendations for structural improvements will be provided in a future update report. The conclusions and recommendations herein are based on our knowledge of the various mapped deposits as presented in the project geotechnical reports and the constituents that are estimated to be present within the existing embankments.

The current mining location is subject to the Mira Mesa Community Plan which identifies the site as having the potential to be developed as either a future mixed-use project or a standard industrial/business park. Although the Community Plan includes the mining site within the Carroll Canyon Master Plan Element, it requires preparation of a Master Plan to guide future development once mining and reclamation is concluded. We understand that there is no requirement that any development occur in the future. Similarly, we understand that the Mining and Reclamation Plan does not commit nor does it establish criteria for future development.

CONCLUSIONS AND RECOMMENDATIONS

1.0 GENERAL

1.1 No soil or geologic conditions were encountered during previous site investigations that would preclude reclamation grading on the property, as presently planned, provided the recommendations of this document are followed.

1.2 The site is underlain by significant quantities of undocumented fill, construction-related debris piles, and natural surficial soils associated with the Stadium Conglomerate, and Carroll Canyon Creek. Remedial grading will be required to remove and compact potentially compressible undocumented fill, topsoil and alluvial soils. The depth of removal will vary, with the anticipated deepest removals on the order of 180 feet below the existing ground surface. Deeper pockets may be encountered depending on the geometry of the underlying mining surface.

1.3 Grading should be performed in accordance with the *Recommended Grading Specifications* presented in Appendix A. Where the recommendations in the *Recommended Grading Specifications* conflict with this section, the recommendations of this section take precedence.

1.4 It should be anticipated that an abundance of oversize materials, construction debris, scrap metal and other debris will be encountered during grading within the undocumented fills. The objectionable portion of these materials will require segregation and removal from the fill prior to placement as embankment fills. Screening, sifting, hand picking and/or other suitable means will be required to properly remove the debris prior to placement. The unacceptable materials should be disposed of off site. Inert materials, such as concrete, asphalt, masonry products, etc. that are not spongy or biodegradable may be incorporated into the embankments in accordance with the recommendations that follow.

2.0 GROUNDWATER

2.1 The most extensive occurrences of groundwater with a potential to impact the project are located in Pond No. 2, Carroll Canyon Creek and the ponded water area along the southern property boundary on the east side of Camino Ruiz. Water is at the ground surface in these areas. Seepage conditions were also encountered in many of the borings in other locations of the property (Boring Nos. 1 through 3, 9, 10, and 11, former Pond No. 1, FS-15 Fill). It should be noted that these occurrences of ground water are perched on impervious layers and do not represent a true water table. These water elevations are expected to fluctuate seasonally, and, hence, may occur at a shallower depth in the future.

2.2 The presence of perched and static groundwater/seepage should be considered when planning remedial grading, particularly if construction occurs during winter months. In addition, management of Carroll Canyon Creek, and other sources of surface runoff will be important considerations during site grading. Dewatering may be necessary to facilitate excavation particularly within the saturated alluvial zones along the creek alignment and where complete removals are anticipated in former pond areas. The degree of saturation may also require top loading of the wet materials.

2.3 Our observations and subsurface information from previous borings indicate undocumented fills and natural surficial deposits, particularly in former pond areas, are very moist to saturated. These materials will likely require significant mixing with drier material, or drying prior to their use as compacted fill. For this reason, the contractor should anticipate additional support equipment in fill areas and other logistical procedures to achieve proper fill placement (e.g. some scrapers and/or trucks and excavator in dry material and some in wet).

3.0 SUBDRAINS

3.1 Based on the information presented in the available geotechnical reports, subdrains are not anticipated at this time. However, once the remedial grading surfaces are exposed, or if "rock fill" embankments are placed, subdrains may be recommended.

4.0 WICK DRAIN CONSTRUCTION AND SETTLEMENT PLATES

4.1 A wick drain and surcharge program is proposed for Pond No. 2 to consolidate saturated pond deposits since removal and compaction of these soils is not practical. Prior to installation of the wick-drain system, the surface water should be drained and removed. The removal depth should be limited to approximately 3 feet above the saturated zone.

4.2 Where saturated soils are present at the surface, the area should be stabilized by placing a minor amount of fill (working mat) to create a stable platform for the equipment. The thickness of the working mat should be kept to a minimum to enable the passage of equipment and installation of the wick drains. The surface of the fill should be graded at 2 percent fall toward the collector area. The working mat should consist of granular "soil fill" (as defined in Appendix A) with a maximum particle size of 12 inches.

4.3 A porous media will be required above graded surface to allow the water emanating from the wick drains to flow beneath the surcharge embankment area and into a collector system. This can be provided by installing prefabricated horizontal strip-drains. Installation should be in accordance with the manufacturer's specifications. The collector system should be connected to the project storm-drain system or other suitable outlet. Due to the size of the treated area, multiple collection points may be necessary to efficiently dispose of excess water from the wick drain system.

4.4 After the vertical wick drains and horizontal strip drains are installed, the area should be loaded by placement of the planned embankment plus a minimum of 25 feet of additional surcharge fill. The thickness of the surcharge should be based upon the desired wick drain spacing and the time of consolidation (see Figure 4 of November 22, 2004 report by Geomtrix). The surcharge fill should be placed at a minimum of 90 percent relative compaction to an elevation of at least 10 feet above proposed finish grade to assure that properly compacted fill is present subsequent to the settlement. Within a radius of 50 feet surrounding the subsurface settlement plates, the proposed fill from the working mat to finish surcharge grade shall contain no particles greater than three inches. This is necessary to enable future drilling and "tagging" of the plates.

4.5 The consolidation process in the Pond No. 2 area should be monitored to determine when the majority of the settlement has occurred. Due to the low shear strength of the material, staged loading may be recommended to prevent possible shear failure in the underlying materials. The embankment should be placed such that the fill surface grades are uniform and don't exceed adjacent grades by more than vertical 10 feet. Additional recommendations in this regard may be provided at the time of grading. Settlement in Pond No. 2 should be monitored by utilizing steel plates placed at the base of the fill (within the working mat) and standard surface monuments installed immediately after the surcharge fill is completed. We anticipate that at least six to eight surface and subsurface plates will be necessary in the Pond No. 2 area. The recommended locations of these plates will be provided in a separate correspondence. Additional surface plates will be placed in select areas on the compacted fill embankments beyond Pond No. 2. The specific location of these

plates will be determined during remedial grading once the bedrock surface geometry is observed.

4.6 The subsurface settlement plates should be set at the working mat grade prior to construction of the proposed surcharge embankment. The minimum dimension of the steel plates should be at least 4-foot-square and ½-inch-thick. Each device should be placed level in a neat excavation slightly larger than the horizontal dimension of the plate (4 feet by 4 feet) and at a depth of approximately two feet below the surface of the working mat. Several inches of gravel should be placed below the plate as a leveling course. Once the device is essentially level, the project civil engineer shall survey the four corners and center of the plate to record its precise location and orientation. Six inches of gravel should be placed in the excavation above the plate. The area should then be backfilled with a few feet of soil fill to protect the device. Extreme care should be exercised to assure that deflection of the plate does not occur during backfill or surcharge placement.

4.7 Upon completion of the surcharge embankment, the subsurface settlement plates will be "tagged" by drilling to the plate with a small diameter drill rig. The project civil engineer should provide survey staking to enable drilling to the center of the plate and also record the elevation of the plate after "tagging" using a down-hole rod. Once the post-surcharge construction elevation is recorded, the subsurface plates can be abandoned and surface settlement monuments should be installed at the same general location as the subsurface plates.

4.8 The surface plates should consist of a two-inch-diameter steel rod embedded approximately four to five feet below the ground surface. The base of the rod should be connected to a two-foot-square steel plate and the top of the rod should extend above the surrounding soil grade at least one foot. The rod should be adequately protected to prevent disturbance during the extended monitoring period.

4.9 Monitoring of the surface monuments should be performed on a regular basis by the project civil engineer upon completion of the surcharge fills and the results should be provided to the project geotechnical engineer for analysis. The information gained from such a monitoring program should provide greater certainty regarding the consolidation/ compression characteristics of the alluvium as well as aid in determining when settlement has been satisfactorily completed.

4.10 It is recommended that the concrete washout dome located in the southeast corner of Pond No. 2 be removed during the wick drain/surcharge process. Depending on the conditions after dewatering, it may be necessary to commence removal after the surcharge program.

The specific methods to achieve removal of the dome and treatment of the underlying saturated deposits has not yet been determined.

5.0 GRADING

5.1 Fill Placement Procedures and Specifications

5.1.1 Prior to commencing reclamation grading, a preconstruction conference should be held at the site with the owner or developer, grading contractor, civil engineer, and geotechnical engineer in attendance. Special soil handling and/or the grading plans can be discussed at that time.

5.1.2 Grading should begin with removal and exportation of vegetation or deleterious material from areas to be graded. The depth of removal should be such that material to be used in fills is generally free of organic matter. In areas to receive fill, it is recommended that the upper 12 inches of the exposed surface be scarified (where practical), moisture conditioned and compacted to a minimum relative compaction of 90 percent in accordance with ASTM D 1557-91 (93 percent in fills thicker than 50 feet).

5.1.3 All potentially compressible surficial soils (undocumented fill soil, topsoils, colluvium, and alluvium) within areas of planned grading should be removed to firm natural ground and properly moisture conditioned and compacted prior to placing additional fill and/or structural loads. The actual extent of unsuitable soil removals should be determined in the field by the soil engineer and/or engineering geologist. Overly wet, surficial materials will require drying and/or mixing with drier soils to facilitate proper compaction.

5.1.4 The site should then be brought to final reclamation elevations with structural fill compacted in layers. In general, soils native to the site are suitable for re-use as fill if free from vegetation, and deleterious material as described herein. Layers of fill should be no thicker than will allow for adequate bonding and compaction. All fill, including backfill and scarified ground surfaces, should be compacted to at least 90 percent of maximum dry density, at or above, optimum moisture content, as determined in accordance with ASTM Test Procedure D 1557-02. Fill materials near and/or below optimum moisture content may require additional moisture conditioning prior to placing additional fill. Fills less than 50 feet thick should be compacted to at least 90 percent of the maximum dry density at optimum moisture content or slightly above. **Fills greater than 50 feet thick should be compacted to at least 93 percent of the laboratory maximum dry density at approximately 2 percent above the optimum moisture content.**

5.1.5 The surficial deposits (Undocumented Fill, Alluvium, etc.) on the site may contain construction debris, trash, metallic products, roots/organic debris (including wood) or other perishable, spongy, and biodegradable matter. On-site processing of these debris-laden embankments will likely require physical "sifting" using heavy grading equipment processors, breakers or crushers and laborers in order to remove the deleterious materials and organic matter. Some soil may have such a high concentration of these materials that on-site processing would be impractical and exportation from the site may be necessary. The grading contractor should consider an additional allowance for root picking, mechanically sifting or other acceptable means to remove the organic material and trash during filling operations.

5.1.6 Oversize materials (defined as material greater than 12 inches in nominal dimension) will likely be generated from excavations within the Undocumented fills and possibly the Stadium Conglomerate. Placement of oversize materials within fills will require special placement procedures and grading operations should be scheduled so as to permit the placement of oversized material in deeper fills.

5.1.7 The upper 10 feet of embankments should consist of 12-inch minus *soil fill* with the upper three feet containing rock fragments generally smaller than 6 inches. S*oil-rock fills* containing rock fragments with a maximum particle dimension up to 4 feet should be placed at least 10 feet below finish grade or 3 feet below the deepest utility, whichever is greater. In some instances, larger rock fragments may be individually incorporated into the compacted soil fills with additional placement and compactive effort. Additional oversize rock restrictions and exclusion zones may be required.

5.1.8 Concrete chunks may be incorporated into properly compacted soil embankments provided they are 2 feet, or less in maximum dimension. Embedded reinforcing bars, or similar materials subject to decomposition that protrude greater than two inches beyond the edge of the concrete shall not be permitted. Slabs in excess of 2 feet should be reduced in size by crushing, breaking, or other suitable means to reduce the material prior to placement. Flat concrete, masonry blocks or other similar products with low compressive strength or non-uniform shapes (hollow centers, irregular surfaces, etc.) should be broken down by crushing or track walking with a large bulldozer to break up the materials prior to incorporation into the soils fills.

5.1.9 Chunks of asphalt encountered during remedial grading may be incorporated into reclamation fills provided that they are less than 12 inches in maximum dimension and placed within designated areas. The asphalt should be placed such that the individual fragments are not concentrated and are surrounded by properly compacted soil.

5.1.10 Placement of fill materials classified as *soil-rock* embankments should consist of spreading and compacting the materials with a bulldozer in 2-foot-thick lifts, or less. Where the matrix consists of finer grained material (greater than 30 percent passing the 200 sieve), lift thicknesses should be 12-inches, or less. During placement of each lift, the fill should be uniformly wheel-rolled with loaded rock trucks. Prior to compacting, the soil should be properly moisture conditioned during spreading. Selective In-place density tests should be performed within the soil matrix to evaluate whether or not the minimum relative compaction requirements are being achieved.

5.1.11 Where practical, the upper 4 feet of finish grade (cut or fill) should be composed of properly compacted or undisturbed formational "very low" to "low" expansive soils as defined in the table below. The more highly expansive fill soils should be placed in the deeper fill areas and properly compacted. "Very low" to "low" expansive soils are defined as those soils that have an Expansion Index of 50 or less. A thicker select cap may be recommended in sloping sheet-graded areas.

TABLE 5.1
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification
0 – 20	Very Low
21 – 50	Low
51 – 90	Medium
91 – 130	High
Greater Than 130	Very High

5.2 Over-Excavation

5.2.1 Gradual Bedrock Transitions

5.2.1.1 To reduce the potential for differential settlement, it is recommended that the cut portion of cut-fill transitions be undercut at least 3 feet and replaced with properly compacted "very low" to "low" expansive fill soils. Where the thickness of the fill containing the cut-fill transition exceeds 15 feet, the depth of the undercut should be increased to one-fifth of the maximum fill thickness up to a maximum undercut depth of 15 feet. The bottom of the undercut should be inclined slightly toward the area of thicker fill. Additional undercutting recommendations may be provided for future considerations.

5.2.2 Steep Bedrock Transitions

5.2.2.1 Selective undercutting of formational materials will be required where steep natural ground slopes have resulted from previous mining activities (i.e. Former Pond Nos. 1, 2 and 3 etc.). Specifically, it is recommended that the upper portion of the bedrock rim surrounding Pond No. 1 be undercut 25 vertical feet below ultimate finish grade and replaced with properly compacted fill. The excavation should commence 50 feet horizontally from the top of the exposed bedrock rim and result in a 2:1 (horizontal:vertical) slope towards the center of the excavation. Similar undercutting is recommended where steep bedrock slopes exist in areas surrounding Pond No. 3. In addition, selective bedrock undercutting around Pond No. 2 will be necessary to soften the differential between embankments supported by Stadium Conglomerate and the surcharged pond deposits.

5.2.2.2 It is likely that additional undercutting will be recommended between Pond 3 and excavations to the north where steep bedrock ridges are present. The actual recommendations will be made during remedial grading once these areas are exposed. Additional undercutting recommendations may be provided once the actual bedrock surface is exposed during remedial grading.

5.2.3 Hard/Cemented Materials

5.2.3.1 Consideration should be given to undercutting areas exposing hard/cemented Stadium Conglomerate or concretionary zones at least 3 feet and replacing the excavation with properly compacted "very low" to "low" expansive soil. The need for undercutting can be evaluated during grading based on the observed conditions when finish grade is achieved. The bottom of the undercut should be inclined slightly toward the area of thicker fill.

5.3 Slopes

5.3.1 All final fill and cut slopes should be constructed at gradients of 2:1 or flatter.

5.3.2 The outer 15 feet (or a distance equal to the height of the slope, whichever is less) of fill slopes should be composed of properly compacted granular “soil” fill to reduce the potential for surficial sloughing. This distance is measured from face of slope, horizontally. In general, soils with an Expansion Index of less than 90 or at least 35 percent sand size particles should be acceptable as “granular” fill. Soils of questionable strength to satisfy surficial stability should be tested in the laboratory for acceptable drained shear strength.

5.3.3 Fill slopes should be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not to exceed 4 feet and should be track-walked at the completion of each slope

such that the fill soils are uniformly compacted to at least 90 percent relative compaction to the face of the finished slope. Alternatively, the fill slope may be over-built and cut back to yield a properly compacted slope face.

5.3.4 All slopes should be planted, drained, and properly maintained to reduce erosion. Slope planting should generally consist of drought tolerant plants having a variable root depth. Slope watering should be kept to a minimum to just support the plant growth

6.0 SETTLEMENT

6.1 Fill soil, even though properly compacted, will experience settlement over time. The ultimate total settlement potential of the fill is a function of the soil classification, placement relative compaction (i.e. 93% for deep fills vs. 90%), subsequent increases in the soil moisture content, and geometry and thickness of the fill embankment.

6.2 Remedial grading may result in the placement of up to approximately 200 feet of compacted fill. Settlement monitoring should be performed during and after grading over a sufficient period of time to evaluate when primary settlement is essentially complete.

APPENDIX A

APPENDIX A

RECOMMENDED GRADING SPECIFICATIONS

FOR

CARROLL CANYON MINE
VULCAN MATERIALS COMPANY
SAN DIEGO, CALIFORNIA

PROJECT NO. 07524-32-02

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of reclamation grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, adverse weather, result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the reclamation grading for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks (natural or broken-up concrete) or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks (natural or broken-up concrete) or hard lumps larger than 2 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks (natural or broken-up concrete), or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.1.4 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.2 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall

not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.3 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.4 Samples of minus ¾-inch soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.5 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

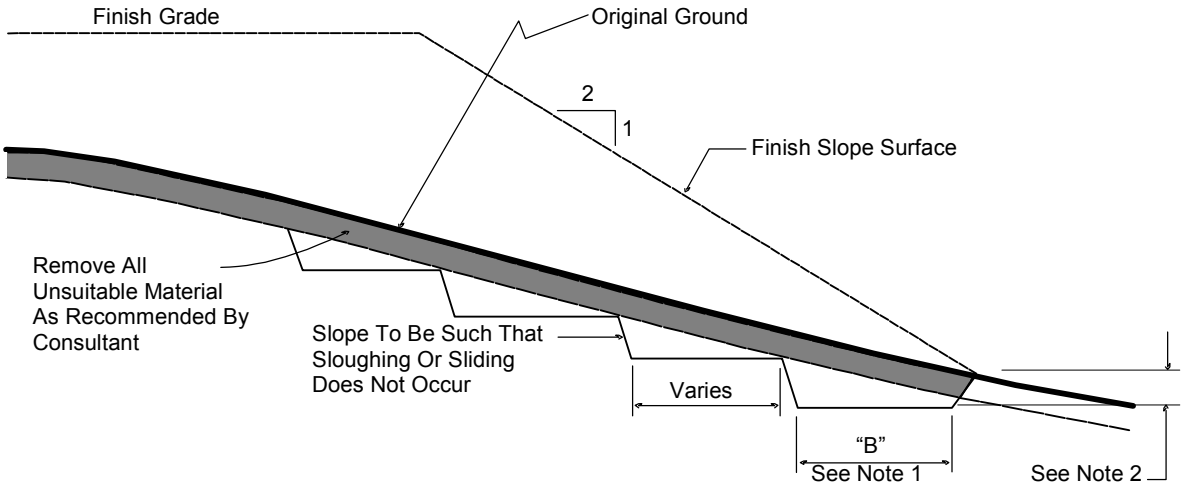
4. CLEARING AND PREPARING AREAS TO BE FILLED

4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, manmade structures, and similar deleterious materials. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 12 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.3 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in general accordance with the following illustration. Benching recommendations in areas of steep bedrock slopes may be modified as approved by the Consultant (e.g. steep mining areas).

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES: (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.4 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by fully loaded rock trucks, sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557-02.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent (93 percent for fills thicker than 50 feet). Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557-02. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at

least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice and a minimum relative compaction of 90% is achieved.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted soil fill, but shall be limited to the area measured at least 15 feet minimum horizontally from the slope face and at least 10 feet below finish grade.

6.2.2 Soil-rock fill shall be placed in lifts not exceeding 2 feet. Rocks or rock fragments between 2 and 4 feet in maximum dimension may be individually placed with sufficient effort and compaction equipment. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist

of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.4 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

6.3.5 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

6.3.6 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. OBSERVATION AND TESTING

7.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

7.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill

material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

7.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

7.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

7.5 If subdrains are necessary, the Consultant should observe the placement of subdrains, to verify that the drainage devices have been placed and constructed in substantial conformance with project specifications.

7.6 Testing procedures shall conform to the following Standards as appropriate:

7.6.1 Soil and Soil-Rock Fills:

7.6.1.1 Field Density Test, ASTM D 1556-02, *Density of Soil In-Place By the Sand-Cone Method.*

7.6.1.2 Field Density Test, Nuclear Method, ASTM D 2922-01, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

7.6.1.3 Laboratory Compaction Test, ASTM D 1557-02, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop.*

7.6.1.4 Expansion Index Test, ASTM D 4829-03*, Expansion Index Test.*

7.6.2 Rock Fills:

7.6.2.1 Observation as well as in-place density tests within the soil matrix.

8. PROTECTION OF WORK

8.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

8.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

9. CERTIFICATIONS AND FINAL REPORTS

9.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the graded surface is within 0.1 foot vertically of elevations shown on the reclamation grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

9.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this correspondence pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

2. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

SOIL AND GEOLOGIC RECONNAISSANCE

CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

VULCAN MATERIALS COMPANY
GLENDALE, CALIFORNIA

JUNE 12, 2020
PROJECT NO. 07524-32-02

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. 07524-32-02
June 12, 2020

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Attention: Mr. Mike Linton

Subject: SOIL AND GEOLOGIC RECONNAISSANCE
CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

Reference: *Carroll Canyon Mine, CA Mine ID# 91-37-0029, City of San Diego, California*, prepared by BDS Engineering, Inc., plot date May 26, 2020.

Dear Mr. Linton:

In accordance with your authorization, we have prepared this soil and geologic reconnaissance for the Carroll Canyon mine located in San Diego, California. The property is currently being utilized to mine gravel and cobble from the Stadium Conglomerate formation to produce sand and aggregate products. The accompanying report presents a summary of the existing soil and geologic conditions on the site.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

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Attention: Ms. Karen Ruggels

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SOIL AND GEOLOGIC RECONNAISSANCE

1. PURPOSE AND SCOPE

This report presents the results of our soil and geologic reconnaissance for the Carroll Canyon Mine located in the Mira Mesa area of the city of San Diego (see Vicinity Map, Figure 1). The purpose of this report is to provide soil and geologic information in support of ongoing mining.

The scope of our study consisted of a review of readily available published and unpublished geologic literature and previous geotechnical reports prepared by Geocon Incorporated and others for the property (see *List of References*).

Site geologic conditions depicted on the Geologic Map (Figures 2 and 3) were plotted on a CAD base of the plans provided by BDS Engineering, Inc. The plans depict existing topography as of January 2020, proposed mining grades, and reclamation grades. Geologic cross sections are provided on Figure 4. Due to active mining, the topography shown on the cross sections as existing grade may not represent conditions to date.

2. SITE DESCRIPTION AND PREVIOUS GRADING

The site consists of about 290 acres located immediately west of Black Mountain Road near its intersection with Carroll Canyon Road and extending about 1.7 miles to the west. Carroll Canyon Creek flows onto the site at the east end and exits just west of Camino Ruiz. Camino Ruiz separates the west active mining pit from the eastern property that is currently being used for aggregate processing, plant facilities, material storage, and soil stockpiling.

Existing site elevations range from about 460 feet above mean sea level (MSL) at the northeast rim of the property to about 210 feet MSL at the bottom of mine excavations within the west pit. Active mining is occurring in the west pit. Cut slopes for mining purposes have been excavated to gradients as steep as ½:1 (horizontal:vertical) at elevations generally below 350 to 360 feet MSL in accordance with the mining plan. Above elevation 350 to 360 feet, the slope on the north side of the west pit has been cut to an interim temporary condition of approximately 1.5:1. Eventually, the perimeter slopes will be constructed at inclinations of 2:1 or flatter in conformance with the reclamation plan.

Residential developments exist north and west of the property. Light industrial structures have been constructed to the south and east of the property. Current site usage is sand/aggregate mining, concrete and asphalt production, and other ancillary uses. The majority of the site is covered with undocumented fills. Industrial detention ponds are present in the west pit and in the southwest corner of the eastern property. Soil stockpiles, rubble fills, and former ponds that have been capped are present on portions of the property east of Camino Ruiz.

Two areas of compacted fill were placed under the observation and testing of Geocon Incorporated in the west pit area. Undocumented fills and soil stockpiles currently overlie the compacted fills. The limits of the documented fills are shown on the Geologic Map, Figure 2.

3. MINE RECLAMATION

The mine will be reclaimed by infilling pit areas to the proposed reclamation grades shown on the reclamation plan. Planned reclamation grades range from 310 feet to 320 feet MSL in the western pit and 300 feet to 425 feet MSL in the eastern portion of the property. Perimeter slopes will be cut to an inclination of 2:1 with heights up to approximately 120 feet (west pit area) and 85 feet (east pit area). Carroll Canyon Creek will be realigned to cross the central and southern portion of the property east of Camino Ruiz. On the east side of Camino Ruiz the creek drainage currently connects to a double box culvert that passes below Camino Ruiz and outlets to the creek bed to the west. Drainage will continue in this manner under the Reclamation Plan.

4. SOIL AND GEOLOGIC CONDITIONS

At the completion of mining, the property will be underlain by undocumented fill, compacted fill, Very Old Paralic Deposits and the Stadium Conglomerate Formation. Alluvium is present in the creek drainage along the south side of the western pit area. A general description of the soil and geologic units is provided below. The approximate lateral extent of surficial soils and geologic formational units based on recent and previous field mapping and borings is shown on the Geologic Map and Cross Sections (Figures 2 through 4).

4.1 Undocumented Fill (Qudf)

Undocumented fills are present throughout most of the property. The undocumented fills are comprised of stockpiles of overburden soil from mining activities, reject spoils, rubble fills, accumulated soils in ponds, aggregate stockpiles, backfilled excavations from former settling ponds and miscellaneous stockpiles in various locations. Undocumented fills on the property east of Camino Ruiz were previously identified and evaluated by GMX (see References). The locations of the fills and former pond areas are shown on the Geologic Map (Figures 2 and 3). Some of the backfilled excavations contain several tens to as much as 180 feet of undocumented fill and pond deposits. The table below provides a brief summary of each identified undocumented fill area.

SUMMARY OF IDENTIFIED UNDOCUMENTED FILL AREAS

Location	Comments
Utility Vault Area	This area was graded nearly flat to provide working/storage area for a manufacturer of utility vaults. The thickness of undocumented fills, if any, is not known in this area.

Location	Comments
Plant Area	It appears no mining has been performed in this area, though some grading may have taken place to create level ground for mining operations. A boring performed by GMX encountered 13 feet of undocumented fill.
Pond No. 2	This areas was reportedly excavated between 1967 and 1983. At the time of the GMX exploration, the water was up to 15 feet deep. It has been estimated that up to 120 feet of predominantly silty clay deposits existed below the water at that time. The southeast corner of Pond No. 2 was previously used as a concrete wash out area. The thickness of concrete materials exceeds 36 feet.
Former Pond No. 1	It was reported that Former Pond No. 1 was excavated to a depth of about 180 feet and subsequently backfilled with FS-15 sand and rubble. FS-15 sand is a mining by-product with a Sand Equivalent value of about 15.
Area North of Former Pond No. 1	No mining was reported to have occurred in this area though fill was encountered and is estimated to be up to 30 feet thick.
Former Pond No. 3	This area contains up to 60 feet of fill, debris, and discarded equipment.
Rubble Fill	Up to 150 feet of rubble fill has been mapped in this area.
FS-15 Fill	About 67 feet of fill was encountered in this area during the exploration in 2002. The elevation in this area has been raised since that time.
Landfill Area	The estimated depth and character of fill in this area is unknown, but may be similar to the adjacent FS-15 Fill area.
West Pit	Active Mining is occurring. The area is underlain by stockpiles generated during mining, existing ponds, former ponds, and an embankment fill to support the conveyor belt and mining activities. Two areas at the western end of the pit have documented compacted fill placed over the mining pit bottom. Currently, undocumented fill has been stockpiled over the compacted fill.

4.2 Compacted Fill (Qcf)

Compacted fill was placed in two areas at the base of the western pit. The fill was placed in 2012 and 2018. Geocon Incorporated observed placement of the fill and performed compaction testing during grading. A summary of the grading operation and compaction test results are provided in Geocon's interim grading reports (see References). Fills were placed and compacted to at least 93 percent relative compaction.

4.3 Alluvium (Qal)

Alluvium exists within the creek drainage along the property margin south of the west pit. Alluvium could also be present below undocumented fills in portions of the property east of Camino Ruiz. Kennedy and Tan (2008) mapped alluvium within the central and eastern portions of the property east of Camino Ruiz.

4.4 Very Old Paralic Deposits (Qvop)

Very Old Paralic Deposits (formally known as Lindavista Formation) is exposed on the upper portion of the mined slopes and canyon walls and caps the mesa top. This unit is also comprised of sand/gravel/cobble that can be well-cemented. It can also contain a very clayey surficial topsoil layer.

4.5 Stadium Conglomerate (Tst)

The Eocene-age Stadium Conglomerate is the predominant formational unit on the property. This unit was the primary material mined to generate aggregate. The deposit contains a relatively high percentage of cobble (up to approximately 60 percent by weight) embedded in a silty to clayey, fine to medium sand soil matrix. The cobble typically ranges in size from approximately 3 inches to 12 inches, however, boulder size clasts up to 24 inches cam be present.

Stadium Conglomerate is exposed on the perimeter mined slopes. Stadium Conglomerate is also present at the base of the western pit below the ponded water, stockpiles, and compacted fills. Stadium Conglomerate is also expected to be present on the east side of Camino Ruiz in areas where mining has not been performed; however, due to plant activities and stockpile soils, accurate mapping of the Stadium Conglomerate could not be performed.

5. GROUNDWATER

Based on review of monitoring well data obtained from www.water.ca.gov, groundwater to the west of the site was shown at an elevation of approximately 80 feet (MSL). Based on information provided by plant personnel, perched water has been encountered near an elevation 215 MSL during mining.

6. GEOLOGIC HAZARDS

6.1 Faulting and Seismicity

Based on a review of geologic literature and experience with the soil and geologic conditions in the general area, it is our opinion that no known active or potentially active faults are located on the property.

A minor fault was mapped on an interim mined slope in the west pit (see Geocon 2012 and 2018 for location). Recent mining has removed the slope. We suspect the fault trace extends to the north and south property margins. Additional fault mapping would be required once mining is complete to locate the fault trace, if present, on perimeter slopes.

We suspect this fault is similar to faults observed in the adjacent property to the southwest (Hanson's former aggregate mine), which did not extend through Quaternary units. In our opinion the fault is not active.

The nearest known active fault to the property is the Newport-Inglewood/Rose Canyon Fault Zone, located approximately 6 miles west of the site. The Newport-Inglewood/Rose Canyon Fault Zone is the dominant source of potential ground motion. Earthquakes that might occur on the Newport-Inglewood/Rose Canyon Fault Zone or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Newport-Inglewood/Rose Canyon Fault Zone are 7.5 and 0.36g, respectively.

6.2 Ground Rupture

The risk associated with ground rupture hazard is very low due to the absence of active faults at the subject site.

6.3 Tsunamis and Seiches

The site is not located near the ocean or downstream of any large bodies of water. Therefore, the risk of tsunamis or seiches associated with the site is low.

6.4 Liquefaction

The risk associated with soil liquefaction within the pit area is low. The alluvium in the creek drainage along the southern property boundary has a slight potential for liquefaction.

6.5 Landslides

Based on our review of published geologic maps for the site vicinity, it is our opinion landslides are not present at the property or at a location that could impact the site.

6.6 Geologic Hazard Category

Review of the 2008 *City of San Diego Seismic Safety Study, Geologic Hazards and Faults, Sheet 35*, indicates the site is mapped as Geologic Hazard Categories 51, 52, 53, and 32. Category 51 is described as- *level mesas – underlain by terrace deposits and bedrock, nominal risk.* Category 52 is described as- *other level areas, gently sloping to steep terrain, favorable geologic structure, low risk*. Category 53 is described as-*level or sloping terrain, unfavorable geologic structure, low to moderate risk*. Category 32 listed under liquefaction is described as- *low potential – fluctuating groundwater, minor drainages*.

7. SLOPE STABILITY

We performed slope stability analyses for planned slopes shown on the referenced reclamation plans. This analysis was presented in our letter titled *Slope Stability Analysis for Reclamation Slopes, Carroll Canyon Mine, San Diego, California*, dated June 3, 2020 (Project No. 07524-32-02). We included the analysis in this report.

The plans indicate that perimeter slopes will have an inclination of 2:1 (horizontal to vertical) or flatter. Taller slopes will have a bench every 30-foot vertical height. The tallest reclamation slopes are planned in the west pit area where cut slopes up to approximately 120 feet will be constructed.

We used the computer program Slope/W (2018) distributed by Geo-Slope International to perform the slope stability analysis. The program uses conventional slope stability equations and a two-dimensional limit-equilibrium method to calculate the factor of safety against deep-seated failure. For our analyses, Spencer's Method with a circular failure mechanism was used. Graphical output of our analysis are provided on Figures 5 and 6. For conservatism, we did not include slope benches in our analysis. Also, fill slopes up to 120 feet are not currently shown on the reclamation plan; however, we used the maximum reclamation slope height for both the fill and cut slope analyses. Based on our analyses, proposed reclamation slopes have calculated factors of safety of 1.5 or greater with respect to global stability.

We performed seismic slope stability analysis in accordance with Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California, prepared by the Southern California Earthquake Center (SCEC), dated June 2002 and Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California (2008).

The seismic slope stability analyses were performed using a peak ground acceleration of 0.27g for fill slopes and 0.23g for cut slopes. These accelerations correspond to a 10 percent probability of exceedance in 50 years. A modal magnitude and modal distance of 6.9 and 11.4 kilometers, respectively, were used in the analyses. The peak ground acceleration, modal magnitude, and modal distance were determined from a deaggregation analysis.

Using the parameters discussed above, equivalent site accelerations ($k_{EQ)}$ of 0.154g and 0.133g were calculated for fill and cut slopes, respectively, to perform a screening analysis. The calculated k_{EQ} was imputed as the horizontal seismic coefficient in the stability analyses. The analyses indicate factors of safety of 1.0 or greater for both fill and cut slopes. A slope is considered acceptable by the screening analysis if the calculated factor of safety is greater than 1.0 using k_{EQ}; therefore, the slopes

pass the screening analysis for seismic slope stability. Printouts of the seismic slope stability analysis are provided on Figures 7 through 10.

Surficial slope stability analysis are shown on Figures 11 and 12. Our analysis indicates the slopes have a factor of safety of at least 1.5 for surficial stability.

Based on our analyses, cut and fill reclamation slopes have a minimum slope stability factor of safety for both global (static and seismic) and surficial that is suitable for the proposed end use.

All slopes should be landscaped with drought-tolerant vegetation, having variable root depths and requiring minimal landscape irrigation. In addition, all slopes should be drained and properly maintained to reduce erosion.

8. LIMITATIONS

The findings of this report are valid as of the present date. However, changes in the conditions of a property will occur with the passage of time, whether they be due to mining activities or natural processes. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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NO SCALE

VICINITY MAP

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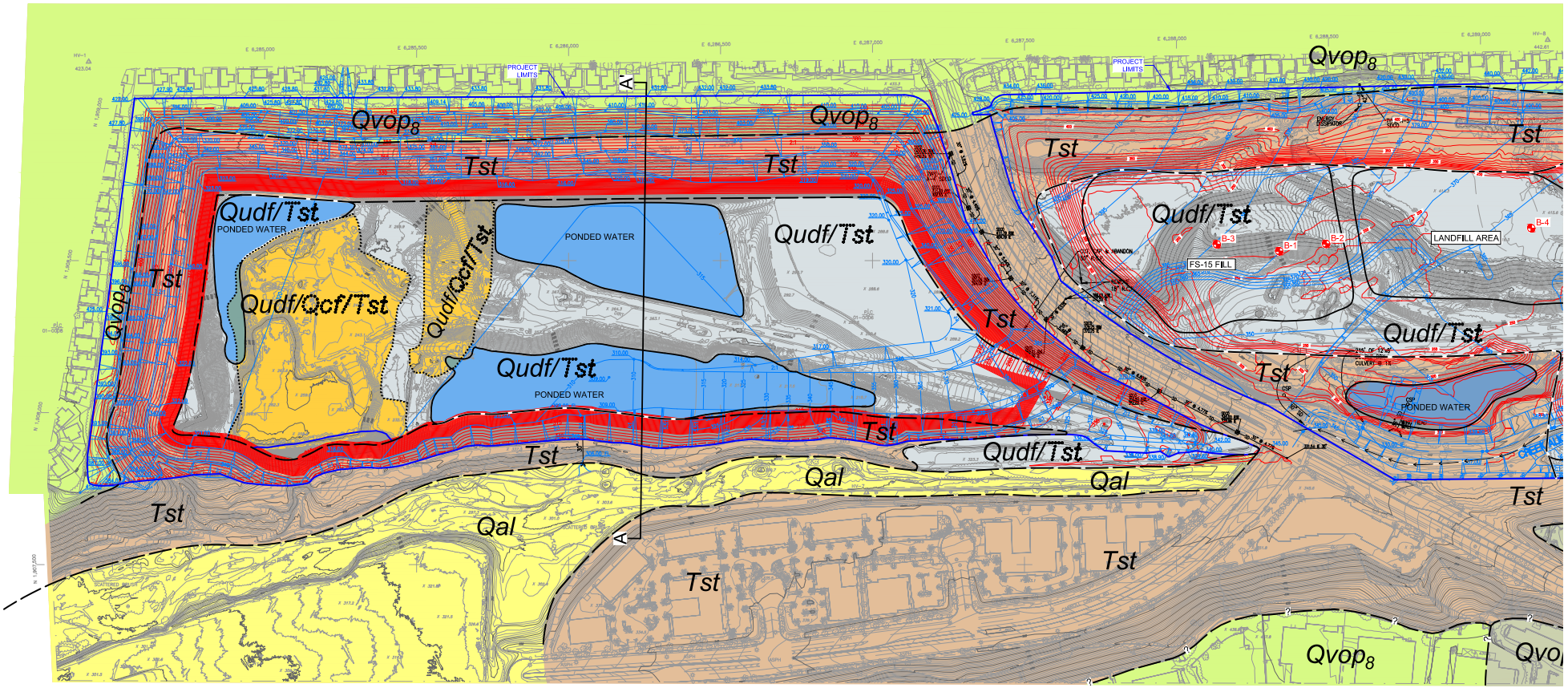
PHONE 858 558-6900 - FAX 858 558-6159

STONE CREEK
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD

DATE 06 - 12 - 2020	PROJECT NO. 07524 - 32 - 02	FIG. 1

Plotted:06/12/2020 9:39AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\07524-32-02 (Stone Creek)\DETAILS\07524-32-02 Vic Map.dwg



GEOCON LEGEND

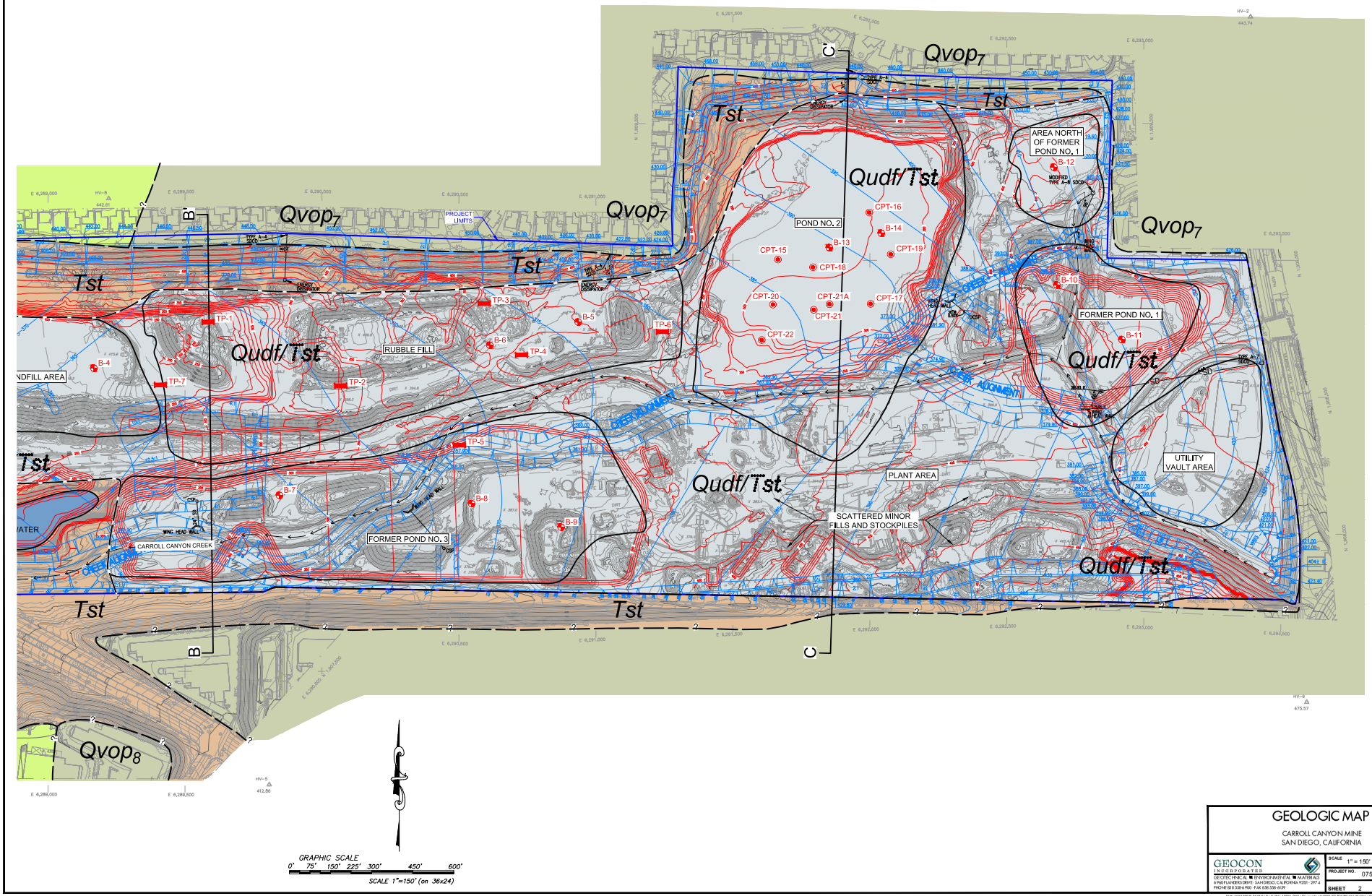
- Qudf ..... UNDOCUMENTED
- Qcf ..... COMPACTED FILL
- Qal ..... ALLUVIUM
- Qvop7 ..... VERY OLD PARALIC DEPOSITS - UNIT 7
- Qvop8 ..... VERY OLD PARALIC DEPOSITS - UNIT 8
- Tst ..... STADIUM CONGLOMERATE
- TP-1 ..... APPROX. LOCATION OF EXPLORATORY TRENCH (Geomatrix, 2003)
- B-12 ..... APPROX. LOCATION OF EXPLORATORY BORING (Geomatrix, 2003)
- CPT-21A ..... APPROX. LOCATION OF CONE PENETROMETER TEST (Geomatrix, 2003)
- ..... APPROX. LOCATION OF GEOLOGIC CONTACT
- ..... ALIGNMENT OF CARROLL CANYON CREEK AND TRIBUTARY
- 420 ..... CARROLL CANYON TOPOGRAPHY (January 2020)
- 380 ..... RECLAMATION GRADES
- 360 ..... MINING GRADES

GEOLOGIC MAP

CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858.558.6900 - FAX 858.558.6159

SCALE	1" = 150'
DATE	06 - 12 - 2020
PROJECT NO.	07524 - 32 - 02
FIGURE	2
SHEET	1 OF 2



GEOLOGIC MAP

CARROLL CANYON MINE
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
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6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
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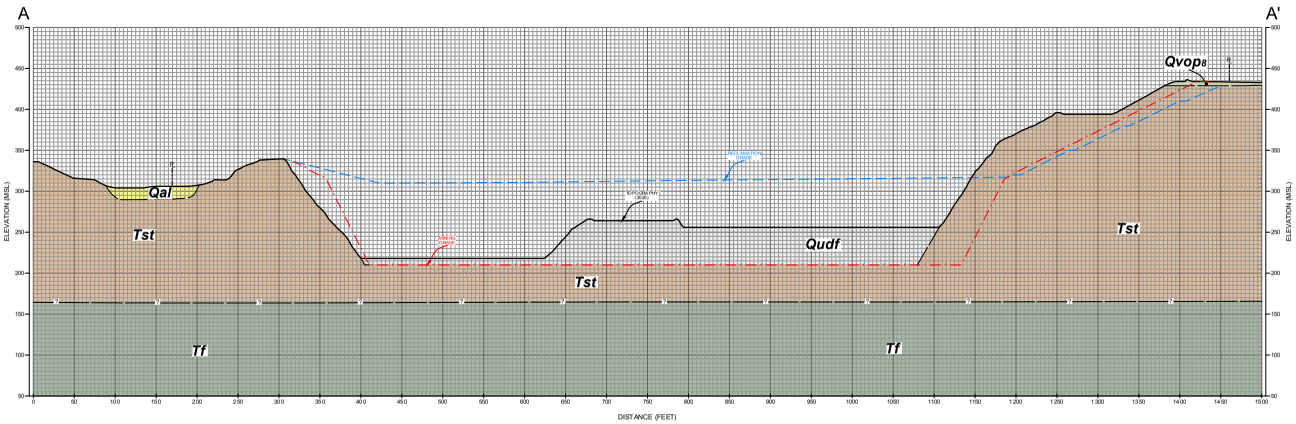
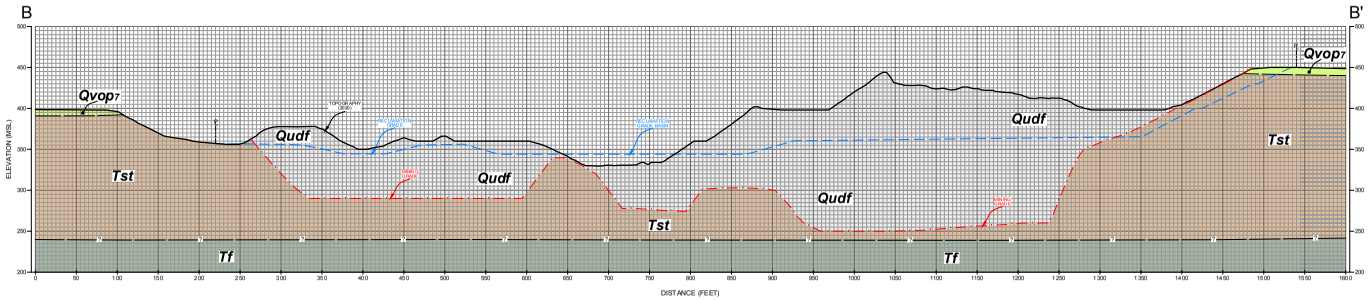
SCALE	1" = 150'
DATE	06 - 12 - 2020
PROJECT NO.	07524 - 32 - 02
FIGURE	3
SHEET	2 OF 2



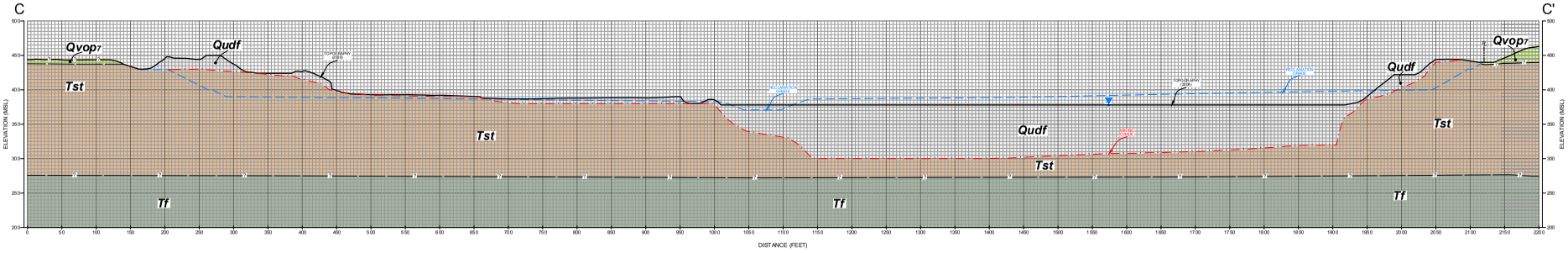
GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION B-B'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION C-C'

SCALE: 1" = 50' (Vert. = Horiz.)

GEOCON LEGEND

- Qudf — UNDOCUMENTED FILL
- Qal — ALLUVIUM
- Qvop7 — VERY OLD PARALIC DEPOSITS - UNIT 7
- Qvop8 — VERY OLD PARALIC DEPOSITS - UNIT 8
- Tst — STADIUM CONGLOMERATE
- Tf — FRIARS FORMATION
- APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- SURFACE TOPOGRAPHY IN 2004
- RUE LAWATION GRADE
- MINING GRADE
- PROPOSED GRADE
- SURFACE GROUNDWATER

GEOLOGIC CROSS - SECTIONS

STONE CREEK
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE: 1" = 50'
DATE: 06 - 12 - 2012
PROJECT NO.: 07924 - 32 - 02
SHEET: 1 OF 1
FIGURE: 4

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Fill Slope.gsz
Date: 06/12/2020

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Qcf (Compacted Fill)	130	300	32

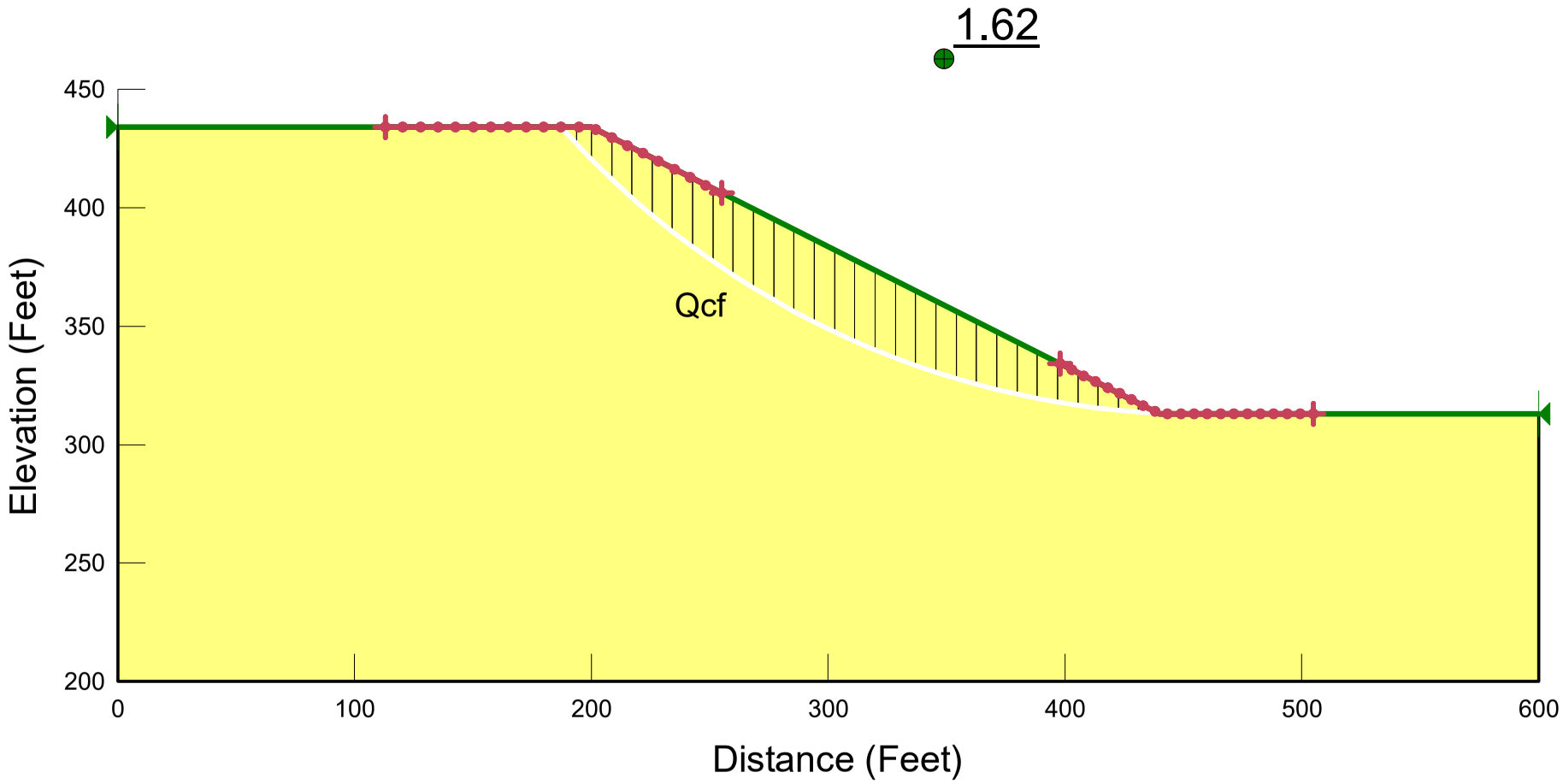


Figure 5

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Cut Slope.gsz
Date: 06/12/2020

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Tst (Stadium Conglomerate)	135	500	40

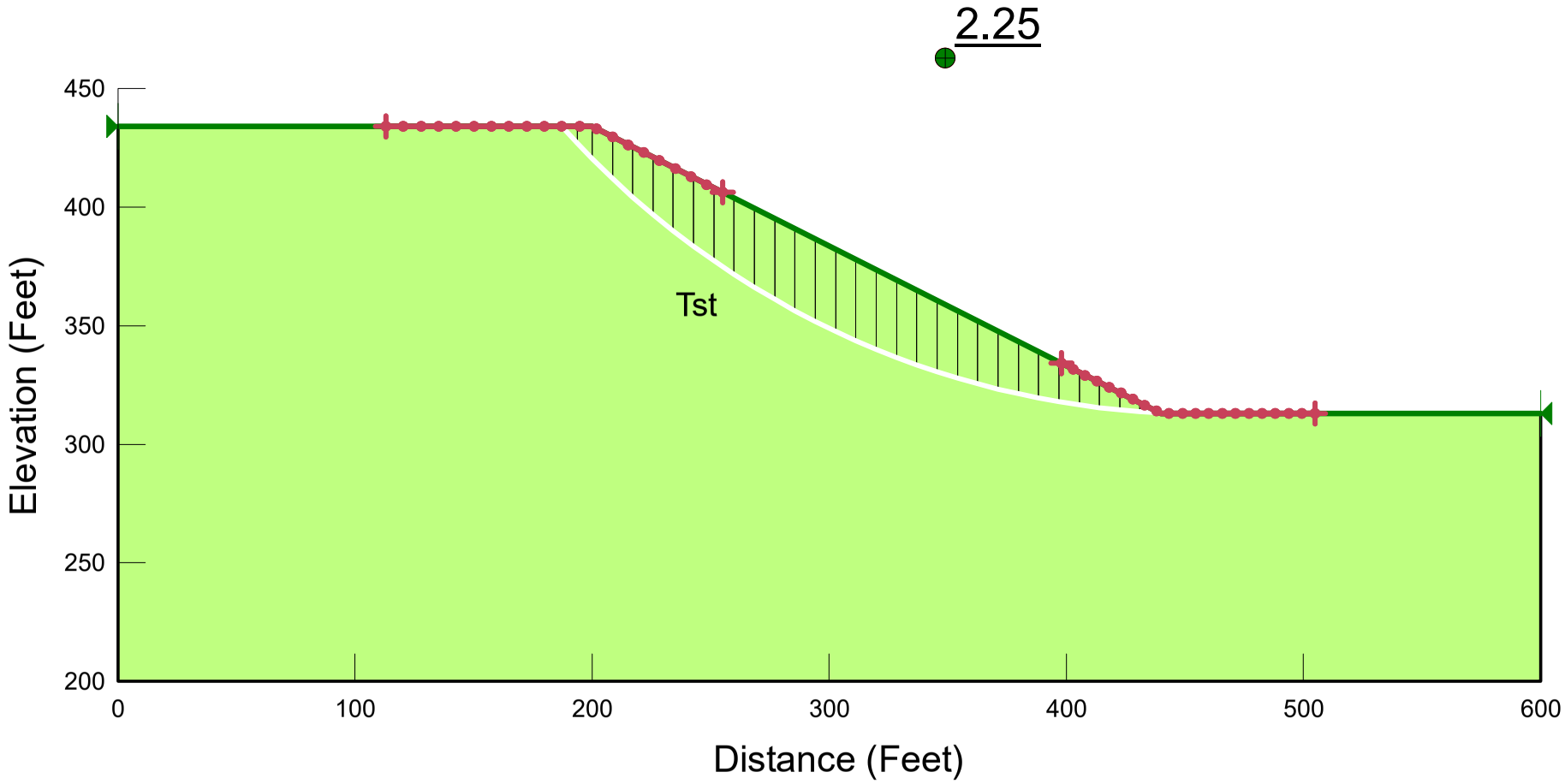


Figure 6

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Fill Slope (Seismic).gsz
Date: 06/12/2020
Horz Seismic Coef.: 0.154

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Qcf (Compacted Fill)	130	300	32

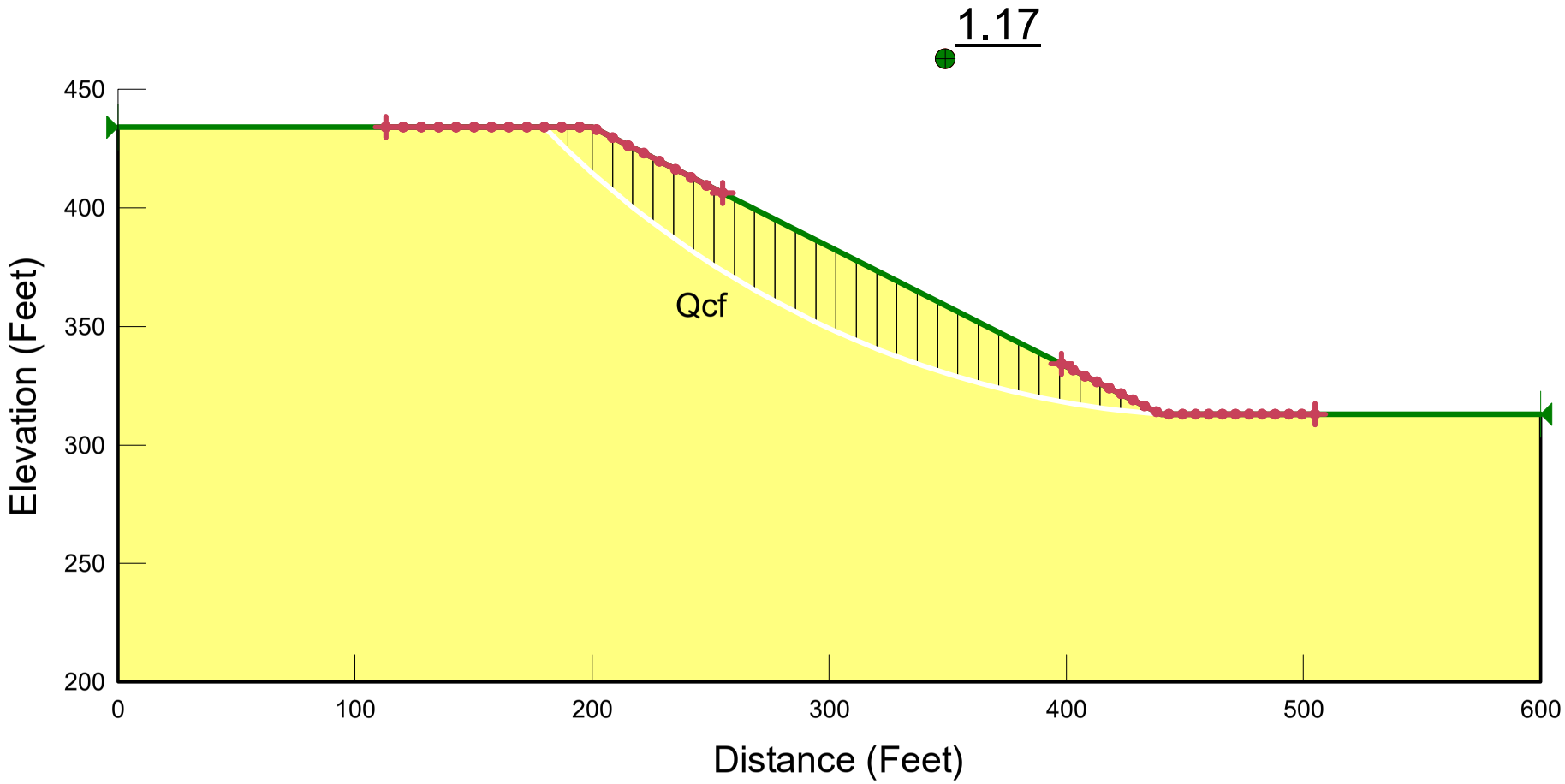


Figure 7

Carroll Canyon Mine
Project No. 07524-32-02
File Name: 2-to-1 Slope Cut Slope (Seismic).gsz
Date: 06/12/2020
Horz Seismic Coef.: 0.133

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Tst (Stadium Conglomerate)	135	500	40

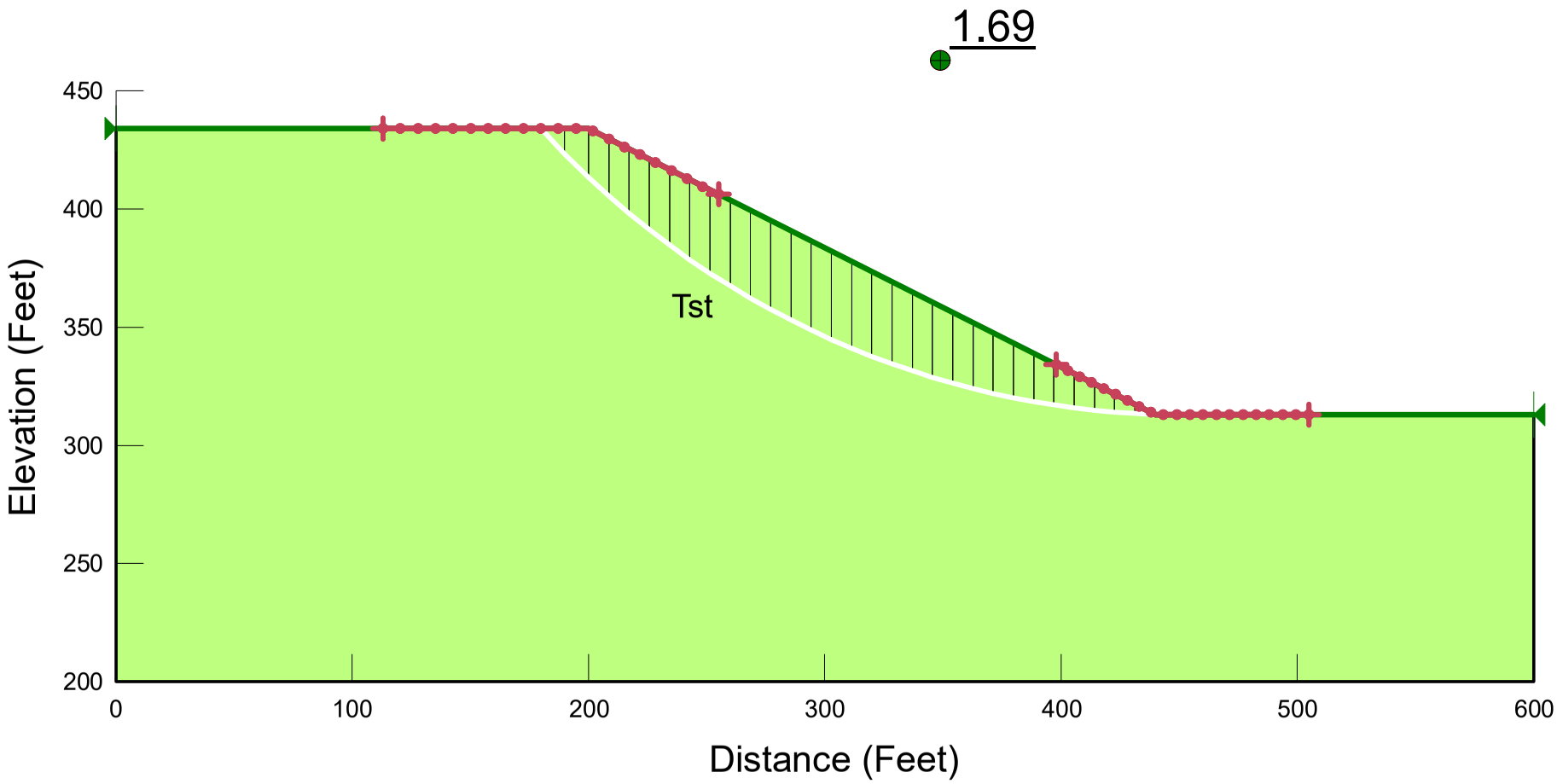


Figure 8

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project Carroll Canyon Mine **Computed By** RCM
Project Number 07524-32-02
Date 06/12/20
Filename Stonecreek Fill Slopes

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.27	10% in 50 years
Modal Magnitude, M	6.90	
Modal Distance, r, km	11.4	
Site Condition, S (0 for rock, 1 for soil)	1	
Yield Acceleration, k_y/g	NA	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	NA	<--
Max Vertical Distance, H (Feet)	NA	<--
Is Slide X-Area > 25.000ft^2 (Y/N)	N	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	1.0	
Duration, $D_{5-95}\|_{med}$, sec	13.006	
Coefficient, C_1	0.5190	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0019	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.616	

Initial Screening with MHEA = MHA = k_{max}g

k_y/MHA	NA
$f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-\log(u/((MHA_r/g)*NRF*D_{5-95})))$	0.5709
$k_{EQ} = feq(MHA_r)/g$	0.154
Factor of Safety in Slope Analysis Using k_{EQ}	1.17

Passes Initial Screening Analysis

Approximation of Seismic Demand

Period of Sliding Mass, $T_s = 4H/V_s$, sec	NA
T_s/T_m	NA
MHEA/(MHA*NRF)	NA
$NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)$	1.12
MHEA/g	NA
$k_y/MHEA = k_y/k_{max}$	NA
Normalized Displacement, Normu	NA

Estimated Displacement, u (cm) NA

FIGURE 9

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project Carroll Canyon Mine **Computed By** RCM
Project Number 07524-32-02
Date 06/12/20
Filename Cut Slopes

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.23	10% in 50 years
Modal Magnitude, M	6.90	
Modal Distance, r, km	11.40	
Site Condition, S (0 for rock, 1 for soil)	1	
Yield Acceleration, k_y/g	NA	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	NA	<--
Max Vertical Distance, H (Feet)	NA	<--
Is Slide X-Area > 25.000ft^2 (Y/N)	N	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	1.0	
Duration, $D_{5-95}\|_{med}$, sec	13.006	
Coefficient, C_1	0.5190	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0019	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.616	

Initial Screening with MHEA = MHA = k_{max}g

k_y/MHA	NA
$f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-log(u/((MHA_r/g)*NRF*D_{5-95})))$	0.5775
$k_{EQ} = feq(MHA_r)/g$	0.133
Factor of Safety in Slope Analysis Using k_{EQ}	1.69

Passes Initial Screening Analysis

Approximation of Seismic Demand

Period of Sliding Mass, $T_s = 4H/V_s$, sec	NA
T_s/T_m	NA
MHEA/(MHA*NRF)	NA
$NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)$	1.17
MHEA/g	NA
$k_y/MHEA = k_y/k_{max}$	NA
Normalized Displacement, Normu	NA

Estimated Displacement, u (cm) NA

FIGURE 10

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	5 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	130 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	32 degrees
APPARENT COHESION	C	=	300 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ \cos^2 i\ \tan \phi}{\gamma_t\ Z\ \sin i\ \cos i} = 1.8$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL SLOPE STABILITY ANALYSIS - FILL SLOPES

GEOCON INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

STONE CREEK
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 06 - 12 - 2020	PROJECT NO. 07524 - 32 - 02	FIG. 11

Plotted:06/12/2020 11:27AM | By:ALVIN LADRILLONO | File Location:Y:\1_GEOTECH\07000\07500\07524-32-02\2020-06-12\DETAILS\Slope Stability Analyses-Surficial (SSAS-F).dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	3 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	135 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	40 degrees
APPARENT COHESION	C	=	500 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ cos^2\ i\ tan\ \phi}{\gamma_t\ Z\ sin\ i\ cos\ i} = 4.0$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL SLOPE STABILITY ANALYSIS - CUT SLOPES

GEOCON INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

STONE CREEK
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 06 - 12 - 2020	PROJECT NO. 07524 - 32 - 02	FIG. 12

Plotted:06/12/2020 11:28AM | By:ALVIN LADRILLONO | File Location:Y:\1_GEOTECH\07000\07500\07524-32-02\2020-06-12\DETAILS\Slope Stability Analyses-Surficial (SSAS-C).dwg

LIST OF REFERENCES

1. BDS Engineering, Inc. (2020), *Reclamation Plan, Carroll Canyon Mine, CA Mine ID# 91-37-0029, City of San Diego, California*, plot date May 26, 2020;

2. City of San Diego (2008), *Seismic Safety Study, Geologic Hazards and Faults, Grid Tile 35*;

3. Geocon Incorporated, *Logging/Well Construction, Vulcan Materials Carroll Canyon San Diego, California,* dated January 27, 2005 (Project No. 07390-22-01);

4. Geocon Incorporated (2006), *Soil and Geologic Reconnaissance, Stone Creek, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California*, dated April 14, 2006, Revised May 10, 2006 (Project No. 07524-42-01);

5. Geocon Incorporated (2012), *Interim Report of Testing and Observation Services During Site Grading, Stone Creek – West Pit, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California,* dated February 29, 2012 (Project No. 07524-42-03);

6. Geocon Incorporated (2018), *2nd Interim Report of Testing and Observation Services During Site Grading, Stone Creek – West Pit, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California,* dated October 2, 2018 (Project No. 07524-42-03);

7. Geocon Incorporated, *Slope Stability Analysis for Reclamation Slopes, Carroll Canyon Mine, San Diego, California*, dated June 3, 2020 (Project No. 07524-32-02);

8. Geomatrix Consultants, Inc. (2003), *Preliminary Geotechnical Report, Vulcan Materials Company Carroll Canyon Plant, San Diego, California*, Project No. 8309.000.0, dated March 3, 2003;

9. Geomatrix Consultants, Inc. (2004), *Preliminary Geotechnical Investigation Report, Vulcan Materials Company, Carroll Canyon Plant, San Diego, California*, Project No. 8309.000.0, dated November 22, 2004;

10. Kennedy, M. P. (1975), *Geology of the Point Loma Quadrangle San Diego County, California*, 1:24,000 Scale, in *Geology of the San Diego Metropolitan Area, California*, CDMG Bull. 200;

11. Kennedy, M. P., and Tan, S. S. (2008), *Geologic Map of the San Diego 30' x 60' Quadrangle, California*, USGS Regional Geologic Map Series, 1:100,000 Scale, Map No. 3;

12. USGS (2016), *Quaternary Fault and Fold Database of the United States:* U.S. Geological Survey website, http://earthquakes,usgs.gov/hazards/qfaults, accessed April 29, 2020.

INFILTRATION
FEASIBILITY CONDITION LETTER

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

VULCAN MATERIALS COMPANY
WESTERN DIVISION
SAN MARCOS, CALIFORNIA

OCTOBER 24, 2018
PROJECT NO. 07524-32-02

Project No. 07524-32-02
October 24, 2018

Vulcan Materials Company, Western Division
Properties Office
7220 Trade Street, Suite 205
San Diego, California 92121

Attention: Ms. Patricia Schreibman

Subject: INFILTRATION FEASIBILITY CONDITION LETTER
STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

References:
1. *Soil and Geologic Reconnaissance, Stone Creek, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California*, prepared by Geocon Incorporated, revision dated May 10, 2006 (Project No. 07524-42-01).
2. *Response to LDR–Engineering Review Comments, Stone Creek, Vesting Tentative Map No. 208328, P.T.S. No. 67943, San Diego, California,* prepared by Geocon Incorporated, revision dated January 5, 2018 (Project No. 07524-32-02).
3. *Vesting Tentative Map No. 208328, Stone Creek, P.T.S. No. 67943, City of San Diego, California;* prepared by BDS Engineering, Inc., plot dated August 11, 2016 (Job No. 04-23).

Dear Ms. Schreibman:

In accordance with the request of Mr. Tom Jones with BDS Engineering, Inc., we have prepared this letter regarding storm water management for the subject project. Previous recommendations specific to storm water management, as well as a summary of expected soil conditions, was provided in Reference Nos. 1 and 2. Reference No. 2 was prepared to address storm water infiltration feasibility in accordance with the 2018 City of San Diego Storm Water Standards Manual. Due to the "No Infiltration" condition identified in Reference No. 2, the City of San Diego is requesting an "Infiltration Feasibility Condition" letter providing specific references to Appendix C.1.1 of the City Storm Water Manual.

SITE AND PROJECT DESCRIPTION

The subject site supports an active mining operation where the Stadium Conglomerate Formation is excavated and processed to remove the rock particles from the soil matrix. The rock is crushed to

create aggregate products and the soil byproduct is disposed of within the on-site excavations. In addition, inert fill materials from offsite sources are accepted in some areas of the quarry and placed as undocumented fills. The western portion of the property contains the active mining operation exposing the Stadium Conglomerate and the eastern approximately two-thirds have been generally in-filled with undocumented materials. The ultimate site development will include removing and compacting the undocumented fills and performing excavations around the perimeter of the property. The resulting grading will yield fill thicknesses up to approximately 100 to 150 feet. Due to the extent of remedial grading that will occur during site development, all of the basins will be underlain by properly compacted fill soil over Stadium Conglomerate.

The scope of our previous storm water infiltration feasibility study included performing four, in-situ permeability tests where the Stadium Conglomerate was exposed in the western portion of the property to aid in evaluating the feasibility of storm water BMP design considering the bedrock. In addition, to consider the compacted fill embankments that will result after remedial grading, four random soil samples were collected that may represent the future fill materials. These samples were remolded to ninety percent of their maximum dry density at near optimum moisture content and subjected to laboratory permeability testing. In addition, laboratory hydro-consolidation testing on these samples was performed to evaluate the volume change (settlement/heave) that would occur if water is allowed to infiltrate the soil. The following information is provided to support storm water BMP design in accordance with the *2018 City of San Diego Storm Water Standards Manual.*

PREVIOUS GEOTECHNICAL STUDIES

We prepared the referenced *Soil and Geologic Reconnaissance* dated May 10, 2006 and several response letters responding to City of San Diego development services cycle issues. One of the latest response letters (Reference No. 2) provided Worksheet C.4-1 from the newly adopted 2018 City of San Diego Storm Water Standards (SWS) Manual. Based on the field exploration, the existing property is underlain by stadium conglomerate which is composed of a cobble conglomerate having dark-yellowish-brown, coarse-grained sandstone matrix. Field percolation testing and laboratory permeability testing indicated very slow infiltration rates that help support the “No Infiltration” condition as discussed herein.

HYDROLOGIC SOIL GROUP

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, provides general information regarding soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups.

TABLE 1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property falls within Hydraulic Soil Group D, which has a very slow infiltration rating. Soil Group D soils are not considered suitable for infiltration BMP's. Table 2 presents the information from the USDA website for the property.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	Estimated Hydraulic Conductivity (in/hr)
Gravel Pits	GP	18	-	-
Redding gravelly loam, 2 to 9 percent slopes	RdC	28	D	0.00 to 0.06
Redding cobbly loam, 9 to 30 percent slopes	ReE	17	D	0.00 to 0.06
Redding cobbly loam, dissected, 15 to 50 percent slopes	RfF	16	D	0.00 to 0.06
Riverwash	Rm	16	D	5.95 to 19.98
Terrace escarpments	TeF	5	-	-

GROUNDWATER ELEVATIONS

Groundwater was not encountered during reclamation grading/mining. Several ponds have formed due to surface water, rainfall, and on-site mining activities. Based on review of monitoring well data obtained from www.water.ca.gov, groundwater to the west of the site was shown at an elevation of

approximately 80 feet (msl). The proposed basins will be situated at elevations ranging between approximately 350 feet (msl) to 410 ft (msl), therefore groundwater should be expected several hundred feet below the site and is not expected to be a factor. Groundwater mounding is caused when infiltration is allowed and the lateral hydraulic conductivity is relatively low causing an increase in the groundwater table. Groundwater mounding could occur if full infiltration was considered. For partial infiltration, groundwater mounding is not likely given the expected low volume of water to infiltrate vertically into the ground.

INFILTRATION RATES

We performed four in-situ Soil Moisture, Inc. Aardvark Permeameter tests at the locations shown on the attached *Geologic Map*, Figure 1. The test borings were generally 10 to 12 inches in diameter due to large cobble content. The results of the tests provide parameters regarding the saturated hydraulic conductivity and infiltration characteristics of on-site soil and geologic units. Table 3 presents the results of the field saturated hydraulic conductivity/infiltration rates obtained from the Aardvark Permeameter tests. We applied a feasibility factor of safety of 2 to the infiltration test results. Soil infiltration rates from in-situ tests can vary significantly from one location to another due to the non-homogeneous characteristics inherent to most soil.

TABLE 3
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	Geologic Unit	Test Depth (feet, below grade)	Field-Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Field Infiltration Rate (inch/hour)
P-1	Tst	1.0	0.06	0.03
P-2	Tst	1.0	0.13	0.07
P-3	Tst	1.33	0.44	0.22
P-4	Tst	1.08	0.11	0.06

*Factor of Safety of 2.0 for feasibility determination.

Laboratory hydraulic conductivity testing was performed on 4 remolded soil samples in accordance with ASTM Test Method D5084. The samples were remolded to approximately 90 percent of the applicable maximum dry density at or slightly above optimum moisture content. The objective of this testing was to evaluate the permeability characteristics of proposed compacted fill that may be placed across the site to achieve proposed grades. The laboratory test results are summarized in Table 4. A feasibility factor of safety of 2 was applied to the laboratory test results to determine the infiltration rate.

TABLE 4
LABORATORY HYDRAULIC CONDUCTIVITY TEST RESULTS
ASTM D5084

Test No.	Soil Type	Initial Dry Density, pcf	Initial Moisture Content (%)	Final Dry Density, pcf	Final Moisture Content (%)	Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Field Infiltration Rate (inch/hour)
1	SM	119.8	7.7	117.1	15.0	0.38	0.19
2	SM	119.6	7.7	117.6	15.0	0.10	0.05
3	SM	114.6	10.1	111.9	18.4	0.14	0.07
4	SM	114.3	10.0	111.9	18.2	0.19	0.10

Laboratory hydro-consolidation testing was also performed on two of the four soil samples collected that may represent the ultimate compacted fill. The samples were remolded to approximately 90 percent of the applicable maximum dry density at near optimum moisture content. The consolidation test results indicate that the proposed compacted fill, derived from on-site soils, may hydro-consolidate approximately 0.2 to 0.3 percent of the total thickness when water is allowed to soak into the soil. In addition, at lighter overburden loads (500 psf), both samples swelled between 0.4 and 1.2 percent. The results of this testing indicate that a 70-foot thick compacted fill may potentially settle on the order of 2.5 inches if water is allowed to infiltrate over time. The upper approximately 5 feet could heave on the order of 0.75 inches. The test results were provided in Reference No. 2.

STORM WATER DESIGN NARRATIVE

The site is underlain by Stadium Conglomerate. Based on infiltration testing, the Stadium Conglomerate does not exhibit infiltration rates high enough to support full infiltration. In addition to the slow infiltration characteristics of the bedrock, the proposed DMAs will be founded in compacted fill. Infiltration BMP's founded in compacted fill are not recommended. Infiltration BMP's supported by compacted fill are expected to settle and/or heave as described above, and potentially migrate laterally into adjacent private and public improvements. Presented below are additional responses to Appendix C.1.1 questions:

- The property is an active mining operation. The in-situ testing was performed in an accessible area within the Stadium Conglomerate at existing grade elevations, generally greater than 100 to 150 feet below planned finish grades. Proposed grading will result in upwards of 150 feet of compacted fill to achieve finish grades.

- We are not aware of any previous geotechnical infiltration testing at the site.

- The project is in the Tentative Map stage of development and is planned to convert an active mining area into a commercial/residential development, including extension of Carroll Canyon Road from Black Mountain Road to Camino Ruiz.

- The locations of the proposed basins were provided by the Project Civil Engineer. Based on the information provided, each of the BMP locations was chosen based on the future ultimate development for the entire Stone Creek site including; raising the finish grade, constructing roadways, curb and gutters, sidewalks, and associated utilities to mitigate peak flow runoff and satisfy hydromodification requirements for each DMA area.

- A site design alternative to include full or partial infiltration would be limited to a dry well system across the majority of the property. However, the infiltration zone would extend approximately 100 to 150 feet below finish grade in areas and is considered practically infeasible.

DMA NUMBERS 1 THROUGH 9

Based on the discussion above, both the field and laboratory infiltration tests did not meet the feasibility criteria for full infiltration. Because the proposed storm water basins will be supported by compacted fill on the order of 100 to 150 feet thick, infiltration BMP's are considered infeasible. As such, a subdrain is recommended to prevent over-flow of the system. An impermeable liner, such as a 30 mil PVC or HDPE, should be used to prevent soil saturation and infiltration. The subdrain should be perforated, installed near the base of the excavation, be at least 4-inches in diameter and consist of Schedule 40 PVC pipe. The final segment of the subdrain outside the limits of the storm water BMP should consist of solid pipe and connected to a proper outlet.

DMA EXHIBIT AND GEOLOGIC MAP

We have appended to this report a copy of the current DMA map. We have also added the latest geotechnical map.

CONCLUSIONS AND RECOMMENDATIONS

Our results indicate the site has very slow infiltration characteristics due to the dense nature of the Stadium Conglomerate and compacted fill. Because of these site conditions, it is our opinion that there is a high probability for lateral water migration. In addition, infiltration BMP's supported by compacted fill would result in adverse settlement of the deeper fills and/or heaving od the near surface compacted fills. Considering the site and geologic conditions, it is our opinion that full and partial infiltration is infeasible on this site. Liners and subdrains should be installed within BMP areas. If water is allowed to infiltrate the soil, water could migrate away from the basins and into public and private improvements, or induce adverse soil movement.

In our professional opinion and based on our site specific investigation, there are no areas of the site where any amount of storm water infiltration is feasible. The infiltration rates are too low and/or there is an un-mitigatable risk of settlement/heaving and lateral flow into nearby rights-of-way, utility trenches and adjacent properties.

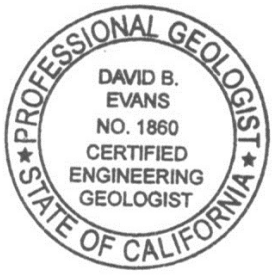
If you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

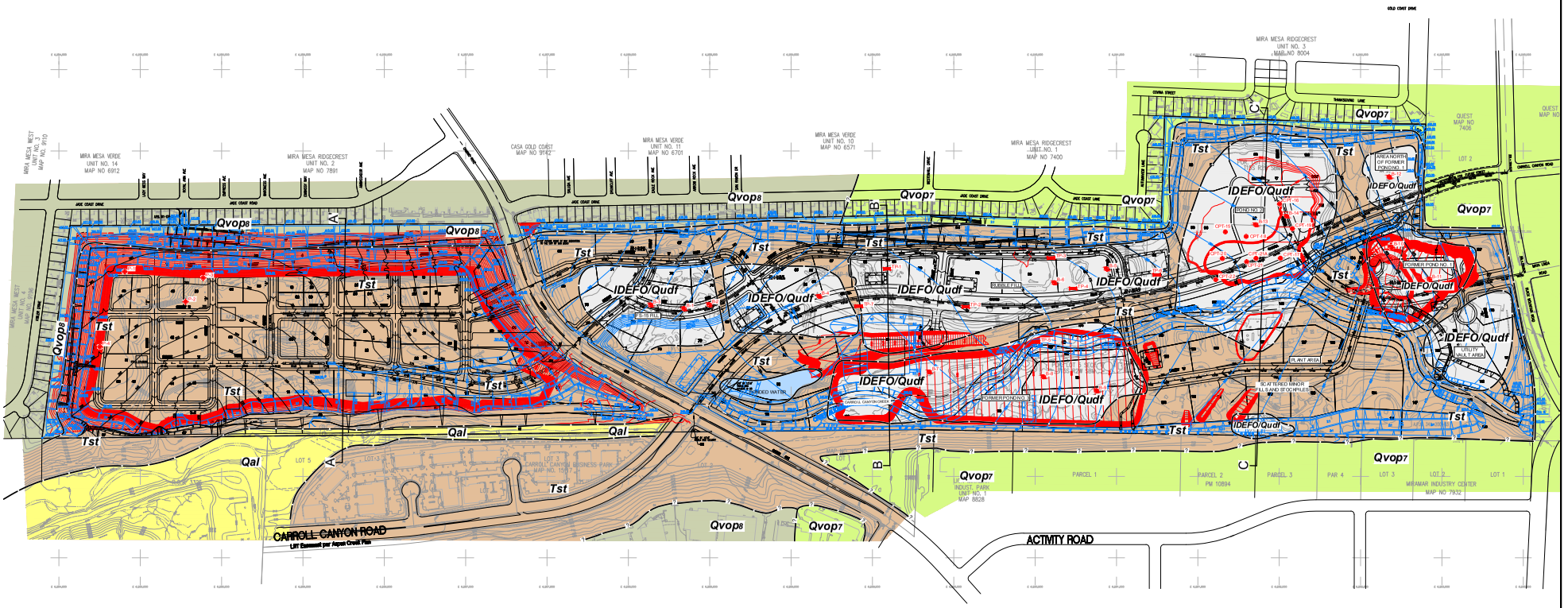
Trevor E. Myers
RCE 63773

David B. Evans
CEG 1860



TEM:DBE:dmc

(e-mail) Addressee
(e-mail) BDS Engineering, Inc.
Attention: Mr. Tom Jones
(e-mail) KLR Planning
Attention: Ms. Karen Ruggels



GEOCON LEGEND

- IDEFO/Qudf — ARTIFICIAL FILL (ENGINEERED FILL, OPERATION MATERIALS AND OTHER FILLS ASSOCIATED WITH THE MINING OPERATION)
- Qal — ALLUVIUM
- Qvop7 — VERY OLD PARALIC DEPOSITS - UNIT 7
- Qvop8 — VERY OLD PARALIC DEPOSITS - UNIT 8
- Tst — STADIUM CONGLOMERATE
- APPROX. LOCATION OF IN-S TU INFILTRATION TEST
- APPROX. LOCATION OF EXPLORATORY TRENCH (EARTHWORK, 2018)
- APPROX. LOCATION OF EXPLORATORY BORING (EARTHWORK, 2018)
- APPROX. LOCATION OF CONE PENETROMETER TEST (EARTHWORK, 2018)
- APPROX. LOCATION OF GEOLOGIC CONTACT
- ALIGNMENT OF CARROLL CANYON CREEK AND TRIBUTARY
- CARROLL CANYON TOPOGRAPHY (2018)
- RECLAMATION GRADES
- MINING GRADES
- PROPOSED GRADES

GEOLOGIC MAP

STONE CREEK
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE	1" = 200'
DATE	10 - 24 - 2018
PROJECT NO.	07524 - 32 - 02
FIGURE NO.	1
SHEET	1 OF 1

DRAINAGE MANAGEMENT AREAS

LEGEND

ALL EXISTING ITEMS ARE SCREENED

EXISTING CONTOURS 380

PROPERTY LINE —P—

RIGHT-OF-WAY —R/W—

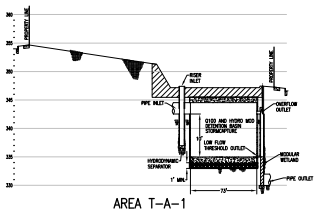
NEW CONTOURS 400

STORM DRAIN CLEANOUTS

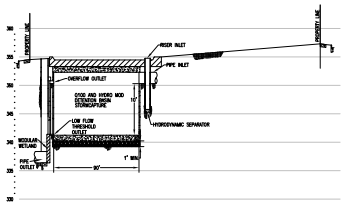
DRAINAGE DIRECTION

STORM DRAIN SD

DMA BOUNDARY



AREA T-A-1
SECTION A-A
SCALE: NO SCALE



AREA T-A-2
SECTION B-B
SCALE: NO SCALE

SITE INFORMATION:

HYDROLOGIC SOIL GROUP: D

GROUND WATER DEPTH: >200 FEET

CRITICAL COARSE SEDIMENT YIELD AREAS: YES, THERE ARE CCSYAs ON SITE. SEE NEXT EXHIBIT FOR CCSYAs

THE PROJECT WILL BE IMPLEMENTING GREEN STREET ELEMENTS DURING CONSTRUCTION PHASE

DMA 1
T-A-1
DRAINS TO STRUCTURAL BMP#1

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	219,542
NATURAL (D SOIL)	294,901
TOTAL	514,443

DMA 2
T-A-2
DRAINS TO STRUCTURAL BMP#2

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	376,358
NATURAL (D SOIL)	317,552
TOTAL	693,910

DMA 3
T-A-3
DRAINS TO STRUCTURAL BMP#3

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	639,896
NATURAL (D SOIL)	262,231
TOTAL	902,127

DMA 4
T-A-4
DRAINS TO STRUCTURAL BMP#4

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	1,004,273
NATURAL (D SOIL)	487,001
TOTAL	1,491,274

DMA 5
T-D-2
DRAINS TO STRUCTURAL BMP#5

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	546,889
NATURAL (D SOIL)	100,624
TOTAL	647,513

DMA 6
T-F-3
DRAINS TO STRUCTURAL BMP#6

DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	2,718,579
NATURAL (D SOIL)	1,570,773
TOTAL	4,289,352

DMA 7
T-L-1
DRAINS TO STRUCTURAL BMP#7

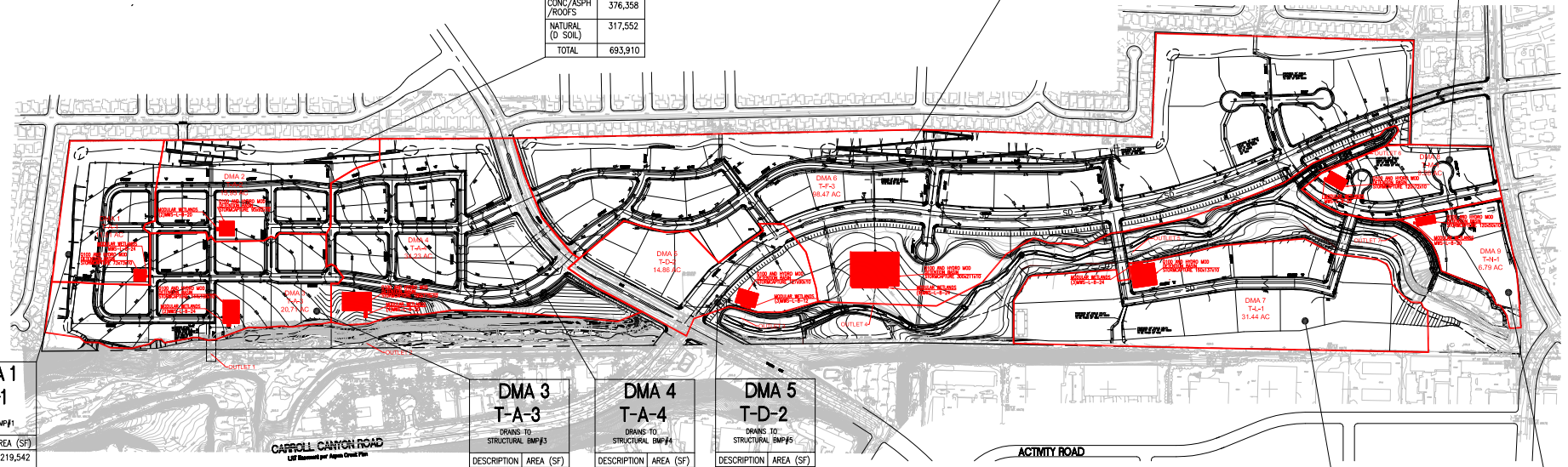
DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	945,252
NATURAL (D SOIL)	424,274
TOTAL	1,369,526

DMA 8
T-M-1
DRAINS TO STRUCTURAL BMP#8

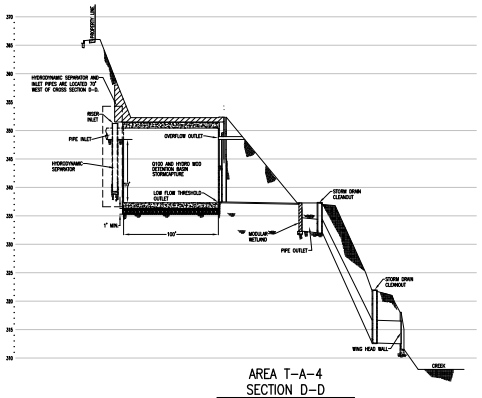
DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	353,707
NATURAL (D SOIL)	62,726
TOTAL	416,433

DMA 9
T-N-1
DRAINS TO STRUCTURAL BMP#9

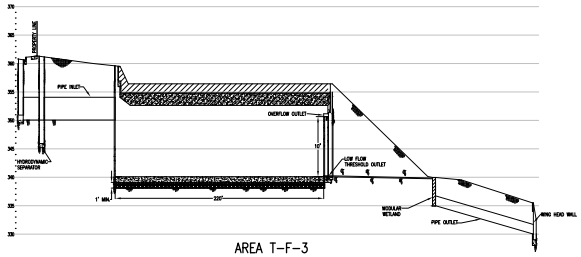
DESCRIPTION	AREA (SF)
CONC/ASPH /ROOFS	247,421
NATURAL (D SOIL)	48,352
TOTAL	295,773



POINTS OF COMPLIANCE
OUTLETS 1, 2, 3, 4, 5, 6, 7



AREA T-A-4
SECTION D-D
SCALE: NO SCALE



AREA T-F-3
SECTION E-E
NO SCALE

N

SCALE 1"=300'

GRAPHIC SCALE

0 150' 300' 600' 900'

SCALE: 1" = 300'

DMA EXHIBIT

STONE CREEK – TENTATIVE PHASE

ENGINEER OF WORK:
BDS ENGINEERING, INC.
CIVIL ENGINEERING
LAND SURVEYING
5576 Lake Park Way, Suite 114
La Mesa, California 91942
(619) 582-4982

DWG FILE: L:\PROJECTS\0423\Admin\Hydro\02 MAPS\DMA EXHIBIT 10-04-2018.dwg

04-23
JOB NO.

Project No. 07524-32-02
May 23, 2012

BDS Engineering
6859 Federal Boulevard
Lemon Grove, California 91945

Attention: Mr. Tom Jones

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328
PTS NO. 67943, W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

Reference: *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated December 1, 2011, and the grading change dated May 23, 2012.

Dear Mr. Jones:

This correspondence has been prepared to respond to review comments contained in the January 15, 2012 *Cycle 33 Review* prepared by the City of San Diego LDR-Geology section. Two additional comments are addressed based on our meeting with representatives of the City of San Diego on April 25, 2012. Each comment along with our response is presented below.

Comment 20: *The reclamation plan retention basin proposed in the western part of the site appears to allow for passive infiltration of temporary impounded storm water. The project's geotechnical consultant must address storm water infiltration in accordance with Appendix F of the City of San Diego's guidelines for Geotechnical reports.*

Response: Active infiltration/percolation is not proposed for this project. With respect to passive infiltration, considering: (1) the geologic materials that will be exposed within the detention basin; (2) The elevation of the basin with respect to surrounding improvements; (3) the basin is not intended for infiltration; and (4) the duration of floodwater impoundment is relatively short during a 100-year event (estimated 72 hours), it is our opinion that storm water infiltration/percolation in the proposed unlined detention basins will not result in soil piping, daylight water seepage, slope instability, ground settlement, or adverse impacts to public improvements.

Comment 21: *Address rapid draw-down slope stability of the proposed pumped retention basin.*

Response: To address rapid drawdown, we performed a stability analysis for the proposed basin slope under the maximum impounded water height elevation (215 feet

MSL). The results of our analyses indicate the basin slopes are stable with a factor of safety in excess of 1.5. Figure 1, attached, graphically depicts the stability analyses. The shear strength parameters used in the analysis are based on our experience with the Stadium Conglomerate and compacted fill generated from Stadium Conglomerate excavations.

Comment 22: *Address the findings, recommendation and conclusions listed in Appendix F of the City of San Diego's Guidelines for Geotechnical Reports*.

Response: The proposed basin bottom as shown on referenced reclamation plan will be excavated in native Stadium Conglomerate Formation. Based on our experience, the Stadium Conglomerate has low permeability and in some instances is impermeable. The basin is not intended as an infiltration basin and will be constructed with a pumping system such that impounded water is expected to have a duration of 3 days or less. As indicated in Response to Comment No. 20, it is our opinion that infiltration/percolation in the proposed unlined detention basin will not result in soil piping, daylight water seepage, slope instability, ground settlement, or adverse impacts to public improvements.

***Comment*:** *Mr. Quinn inquired about the elevation of the contact between the Stadium Conglomerate and Friars Formation, and whether or not it would occur within the base of the proposed grading excavation*.

Response: We have reviewed published geologic information and in-house geotechnical reports pertaining to the surrounding area of the West Mining Pit. There is a wealth of geotechnical information; however, since the base of the proposed excavation is more than 200 feet below any of the surrounding properties investigated, our boring and trench information did not extend to this depth.

A correspondence from the adjacent property entitled *Limited Investigation to Evaluate Aggregate Mining, Fenton Carroll Canyon*, prepared by Geocon Incorporated, dated August 25, 1998, did reveal Stadium Conglomerate down to an elevation of 236 Mean Sea Level (MSL). The trench site is approximately ½ mile west of the West Mining Pit and was the lowest elevation investigated during this study.

We did locate a useful as-graded report from a project 1.5 miles southwest of the West Mining Pit. The report is entitled *Final Report of Testing and Observation Services during Mass Grading Operations, Daley Property, Recho Road, San Diego, California*, prepared by Geocon Incorporated, dated June 29, 1990. In this report, the Stadium Conglomerate was mapped during grading to an elevation of at least 190 Mean Sea Level MSL.

Personal communications with Mr. Pat Coughlin, Operations Manager of Vulcan Materials Company indicate that several borings were drilled in the vicinity of the western mining pit to evaluate their aggregate reserves. The borings indicated that the Stadium Conglomerate extends to the maximum depth investigated, which was 210 MSL.

Based on the information above, it appears that the Stadium Conglomerate formation will be exposed in the base of the excavation shown on the reclamation plan, and the Friars Formation will not be exposed.

***Comment*:** *Mr. Quinn asked us to provide an opinion whether or not the proximity of an ephemeral stream located directly south of the southern property margin could cause soil piping and/or slope instability on the Stone Creek project.*

Response: We have performed a geologic reconnaissance along the southern property boundary to observe the geologic materials exposed within and around the drainage course. We have also reviewed 1953 aerial photographs of the area. The drainage is situated in a topographic depression with developed property on the south (business park) and a natural slope on the north. The natural slope is undulatory and ranges in height from approximately 5 to 30 feet. The horizontal distance between the axis of the drainage and the proposed reclamation slopes ranges from approximately 100 to 400 feet.

The geologic materials exposed in the drainage area consist of minor topsoil and alluvium underlain by Stadium Conglomerate. Our observations suggest that the alluvium consists of loose sandy gravel and cobble, and the Stadium Conglomerate is very dense bedrock. The dense bedrock forms the northern slope adjacent to the drainage.

Based on our observations of the geologic materials exposed within the drainage course (i.e. very dense conglomeratic bedrock), our review of the proposed berm along the southeast property margin and the ephemeral streams proximity to the proposed reclamation slopes, it is our opinion that the potential for soil piping or slope instability caused by the drainage is very low.

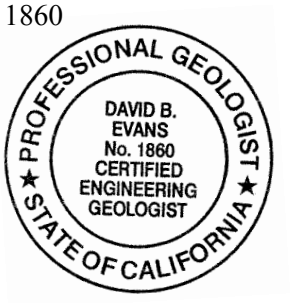
If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860



DBE:RCM:dmc

(4) Addressee
(e-mail) KLR Planning
Attention: Ms. Karen Ruggles
(e-mail) Vulcan Materials Company
Attention: Ms. Patty Schreibman

RESPONSE TO REVIEW COMMENTS

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
PTS NO. 67943, W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

BDS ENGINEERING
LEMON GROVE, CALIFORNIA

SEPTEMBER 13, 2012
PROJECT NO. 07524-32-02

Project No. 07524-32-02
September 13, 2012

BDS Engineering
6859 Federal Boulevard
Lemon Grove, California 91945

Attention: Mr. Tom Jones

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328
PTS NO. 67943, W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

Reference: *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated December 1, 2011, and the grading change dated May 23, 2012.

Dear Mr. Jones:

This correspondence has been prepared to respond to review comments contained in the January 15, 2012 *Cycle 33 Review* prepared by the City of San Diego LDR-Geology section. Additional comments are addressed based on our meeting with representatives of the City of San Diego on April 25, 2012 and several telephone conversations. Each comment along with our response is presented below.

Comment 20: *The reclamation plan retention basin proposed in the western part of the site appears to allow for passive infiltration of temporary impounded storm water. The project's geotechnical consultant must address storm water infiltration in accordance with Appendix F of the City of San Diego's guidelines for Geotechnical reports.*

Response: Active infiltration/percolation is not proposed for this project. With respect to passive infiltration, considering: (1) the materials that will be exposed within the detention basin; (2) The elevation of the basin with respect to surrounding improvements; (3) the basin is not intended for infiltration; and (4) the duration of floodwater impoundment is relatively short during a 100-year event (estimated 72 hours), it is our opinion that storm water infiltration/percolation in the proposed unlined detention basin will not result in soil piping, daylight water seepage, slope instability, ground settlement, or adverse impacts to public improvements.

Comment 21: *Address rapid draw-down slope stability of the proposed pumped retention basin.*

Response: To address rapid drawdown, we performed a stability analysis for the proposed basin slope under the maximum impounded water height elevation (268 feet

MSL). The bottom of the basin is at 265 feet MSL. The results of our analyses indicate the basin slopes are stable with a factor of safety in excess of 1.5. Figure 1, attached, graphically depicts the stability analyses. The shear strength parameters used in the analysis are based on our experience with the Stadium Conglomerate and compacted fill generated from Stadium Conglomerate excavations.

Comment 22: *Address the findings, recommendation and conclusions listed in Appendix F of the City of San Diego's Guidelines for Geotechnical Reports.*

Response: The proposed basin bottom as shown on the reclamation plan will expose properly compacted fill derived from the Stadium Conglomerate. The basin is not intended as an infiltration basin and will be constructed with a pumping system such that impounded water is expected to have a duration of 3 days or less. As indicated in Response to Comment No. 20, it is our opinion that due to its proximity to surrounding improvements, passive infiltration/percolation in the proposed unlined detention basin will not result in soil piping, daylight water seepage, slope instability, ground settlement, or adverse impacts to public improvements.

***Comment*:** Mr. Quinn inquired about the elevation of the contact between the Stadium Conglomerate and Friars Formation, and whether or not it would occur within the base of the proposed grading excavation. In addition, it was desired to identify the elevation of groundwater in the area since the base of the detention basin cannot be within 10 vertical feet of the water table unless an impermeable liner is proposed.

Response: We have obtained subsurface boring information from 1974 and 2005 relating to the western mining pit. Appendix A contains a map of the boring locations and the boring logs Drawing Nos. 5 through 10 (1974) and Figures A-1 through A-3 (2005). The logs identify the contact between the Stadium Conglomerate and Friars Formation between 159 and 170 MSL, therefore the bottom of the basin shown on the reclamation plan (265 MSL) will be above the Stadium Conglomerate/Friars Formation contact.

With respect to water table, perched seepage was encountered in the three borings drilled in 2005. In addition, a monitoring well was constructed in Boring CC04 1. The water equilibrium in the well was measured at an elevation of 252 MSL. Although this level is likely a result of the boring filling up with the perched seepage, the base of the proposed detention basin has been raised to an elevation of 265 MSL in order to be at least 10 feet above the seepage.

***Comment*:** Mr. Quinn asked us to provide an opinion whether or not the proximity of an ephemeral stream located directly south of the southern property margin could cause soil piping and/or slope instability on the Stone Creek reclamation project. Mr. Quinn also requested a slope stability analysis considering rapid draw down conditions within the embankment planned in the southeast corner of the western mining pit.

Response: We have performed a geologic reconnaissance along the southern property boundary to observe the geologic materials exposed within and around the

drainage course. We have also reviewed 1953 aerial photographs of the area. The drainage is situated in a topographic depression with developed property on the south (business park) and a natural slope on the north. The natural slope is undulatory and ranges in height from approximately 5 to 30 feet. The horizontal distance between the axis of the drainage and the proposed reclamation slopes ranges from approximately 100 to 400 feet.

The geologic materials exposed in the drainage area consist of minor topsoil and alluvium underlain by Stadium Conglomerate. Our observations suggest that the alluvium consists of loose sandy gravel and cobble, and the Stadium Conglomerate is very dense bedrock. The dense bedrock forms the northern slope adjacent to the drainage.

An embankment has been planned north of the stream along the southeast corner of the western mining pit (see Figures 2 and 3). It is our understanding that the fill is proposed to contain a 100-year flood event and prevent water from flowing into the reclamation area. We understand the high water elevation from the flood would range from 329 to 335 MSL. We have performed a slope stability analysis considering static and rapid drawdown conditions. Figures 4 and 5 present the results of the analyses indicating that a minimum factor of safety of 1.5 against slope instability has been satisfied.

Based on our observations of the geologic materials exposed within the drainage course (i.e. very dense conglomeratic bedrock), our review and analyses of the proposed berm along the southeast property margin and the ephemeral streams proximity to the proposed reclamation slopes, it is our opinion that the potential for soil piping or slope instability caused by the drainage is very low.

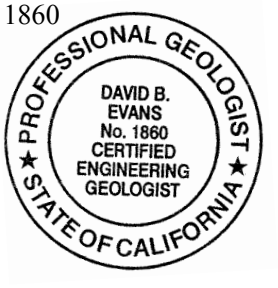
If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860



DBE:RCM:dmc

(4) Addressee
(e-mail) KLR Planning
Attention: Ms. Karen Ruggles
(2) Vulcan Materials Company
Attention: Ms. Patty Schreibman

Unit Weight: 130 pcf
Cohesion: 300 psf
Phi: 32 °

Name: Tst
Unit Weight: 130 pcf
Cohesion: 500 psf
Phi: 40 °

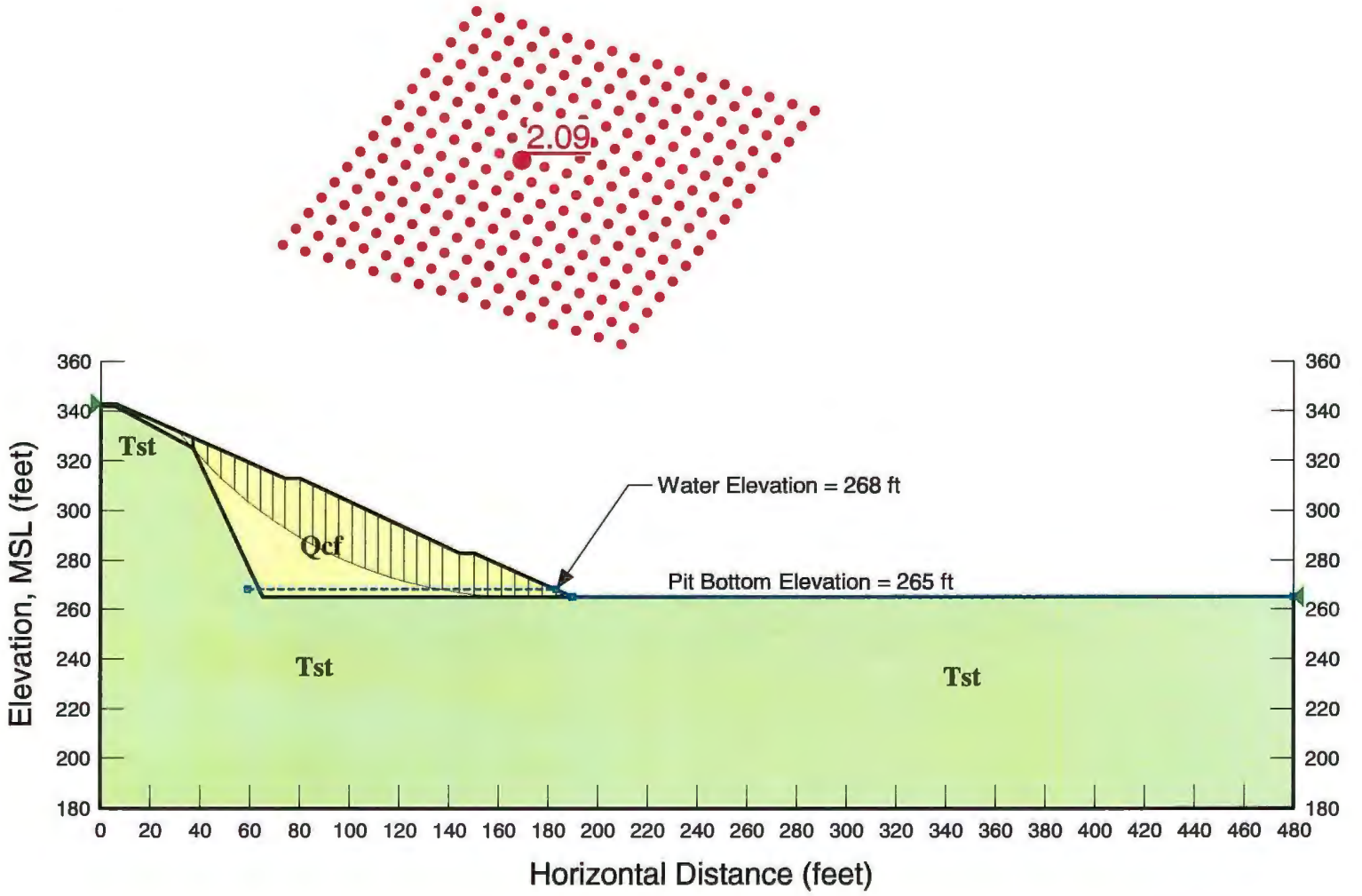
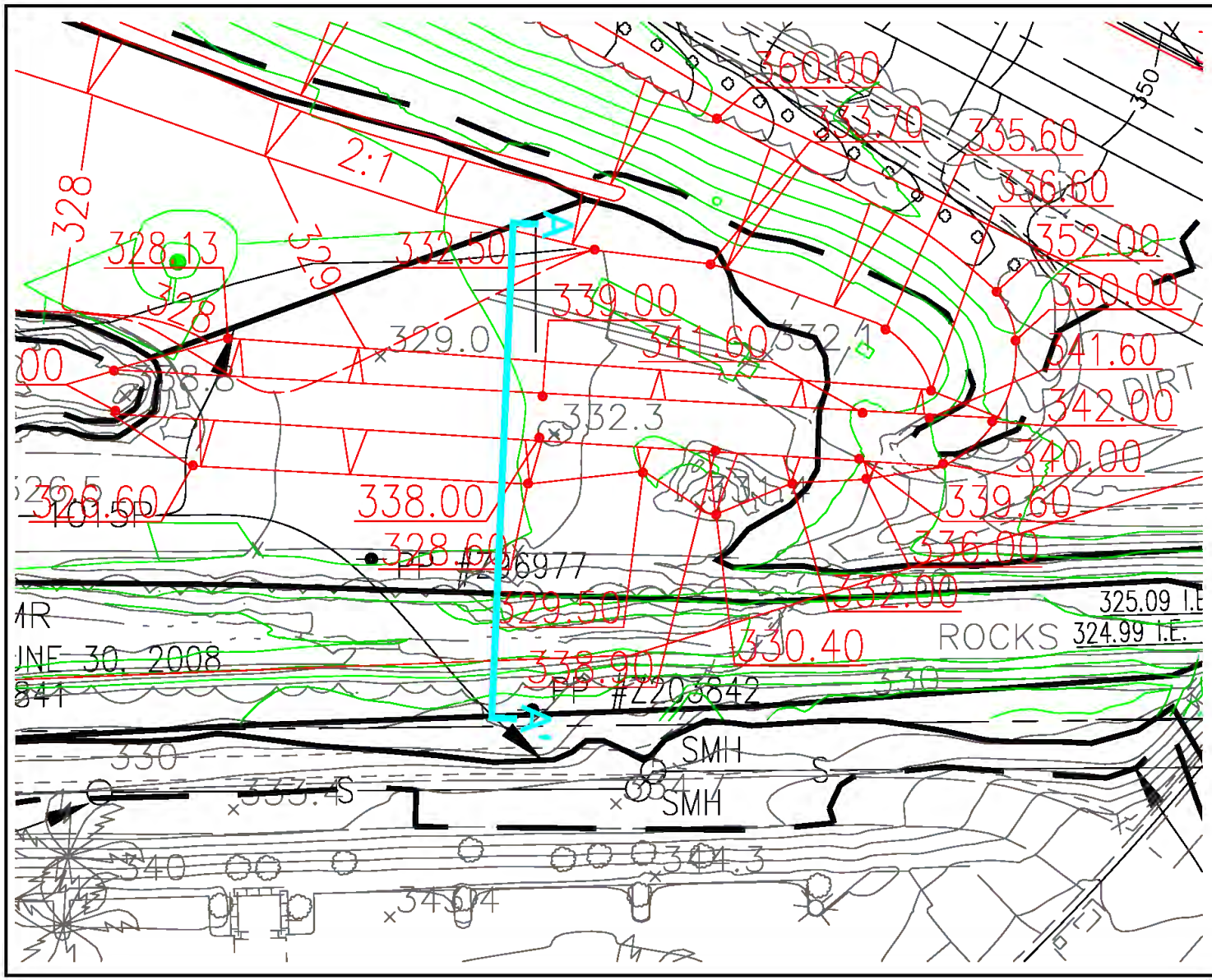


Figure 1



STONE CREEK
SAN DIEGO, CALIFORNIA

GRAPHIC SCALE
0' 20' 40' 60' 80'
SCALE 1"=40'

GEOCON LEGEND

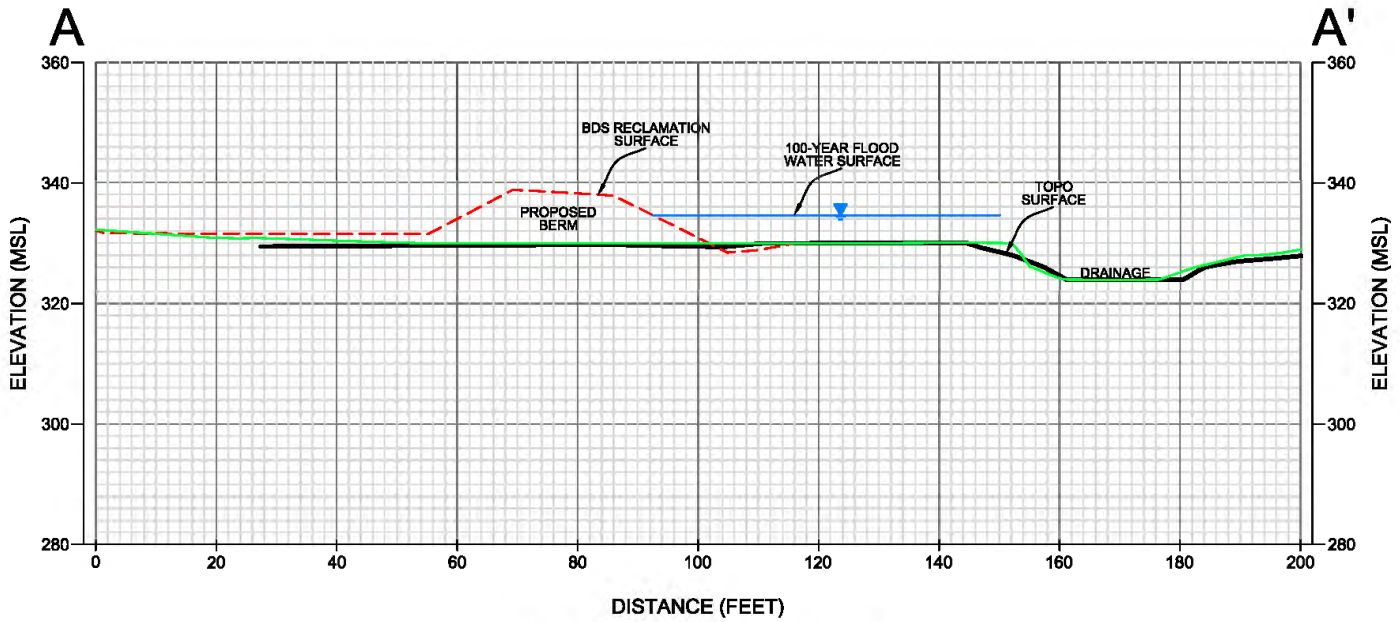
A A' .....APPROX. LOCATION OF GROSS-SECTION

SITE PLAN

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. 07524 - 32 - 02
FIGURE 2
DATE 09 - 13 - 2012

Y:\PROJECTS\07524-32-02 STONE CREEK\SHEETS\07524-32-02 SitePlan (StoneCreekRecPlan).dwg

STONE CREEK
SAN DIEGO, CALIFORNIA



CROSS-SECTION A-A'

SCALE: 1" = 20' (Vert. = Horiz.)

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. 07524 - 32 - 02
FIGURE 3
DATE 09 - 13 - 2012

Y:\PROJECTS\07524-32-02 STONE CREEK\SHEETS\07524-32-02 Cross-Section-BDS Reclamation.dwg

Project Name: STONE CREEK
Project No. : 07524-32-02
Materials Name: Qcf Unit Weight: 130 pcf Cohesion: 300 psf Phi: 32 ° Piezometric Line: 1
Analysis: Proposed with water at 334 MSL

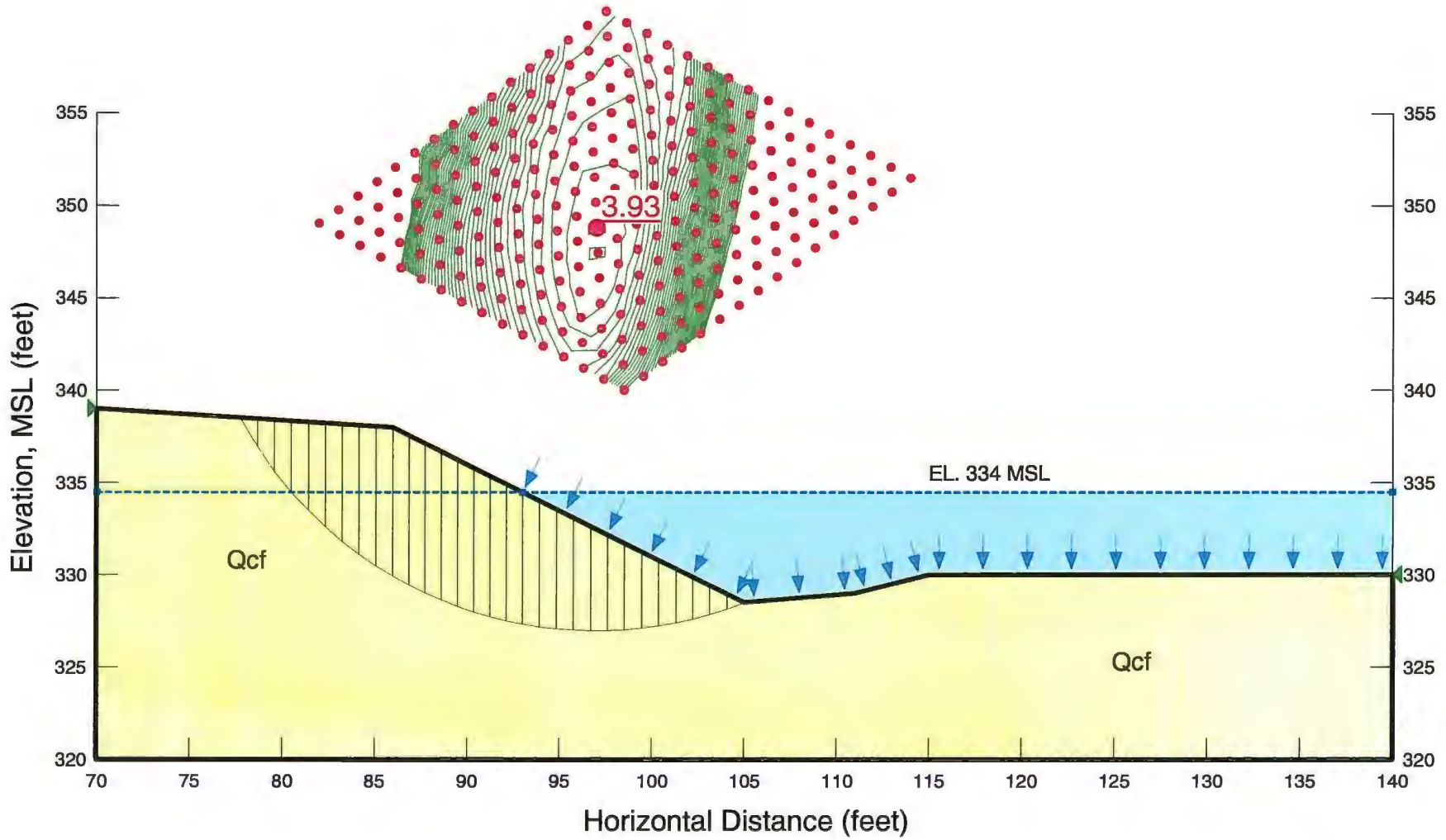


FIGURE 4

Project Name: STONE CREEK
Project No. : 07524-32-02
Materials Name: Qcf Unit Weight: 130 pcf Cohesion: 300 psf Phi: 32 ° Piezometric Line: 1
Analysis: Rapid Drawdown

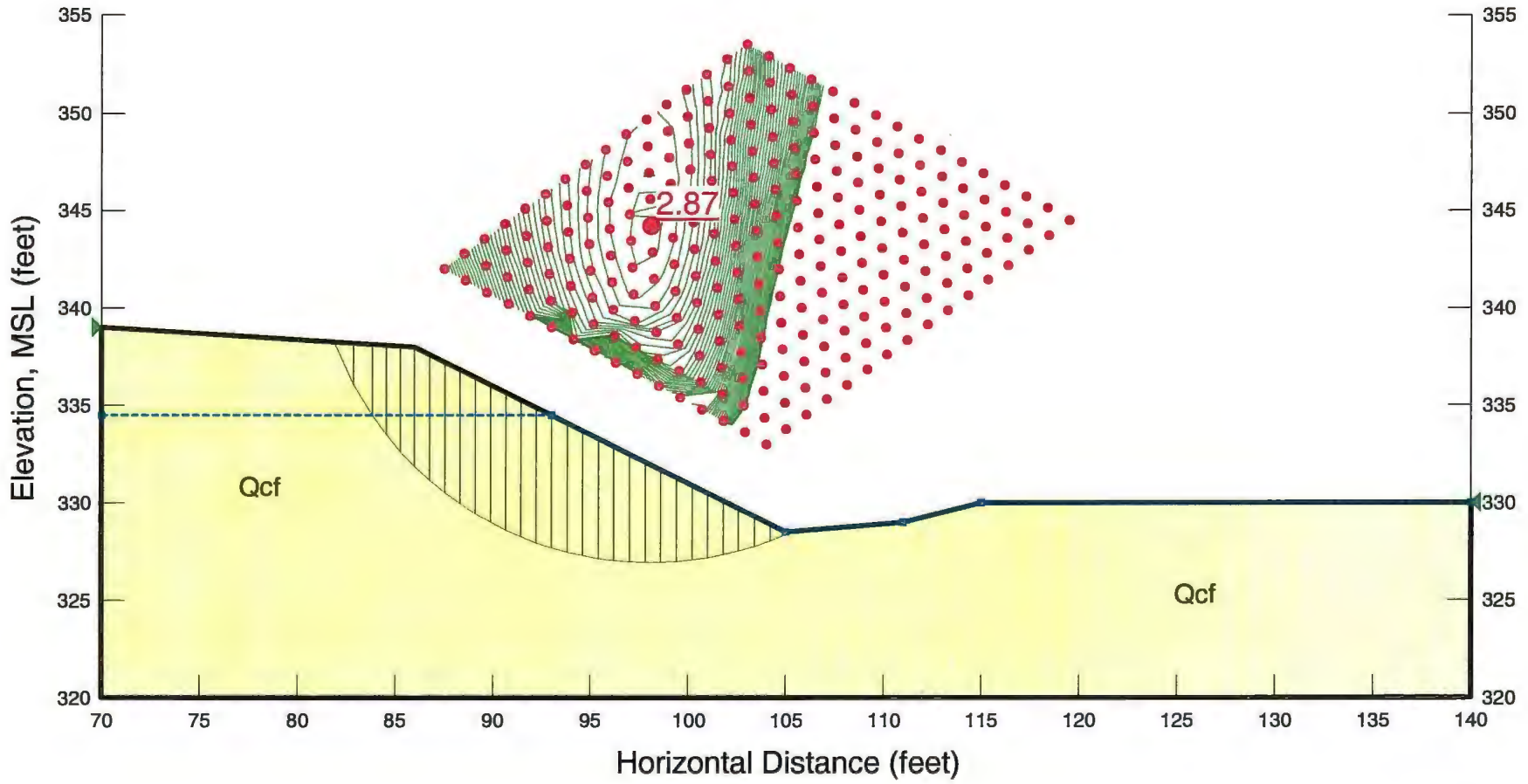


FIGURE 5

APPENDIX A

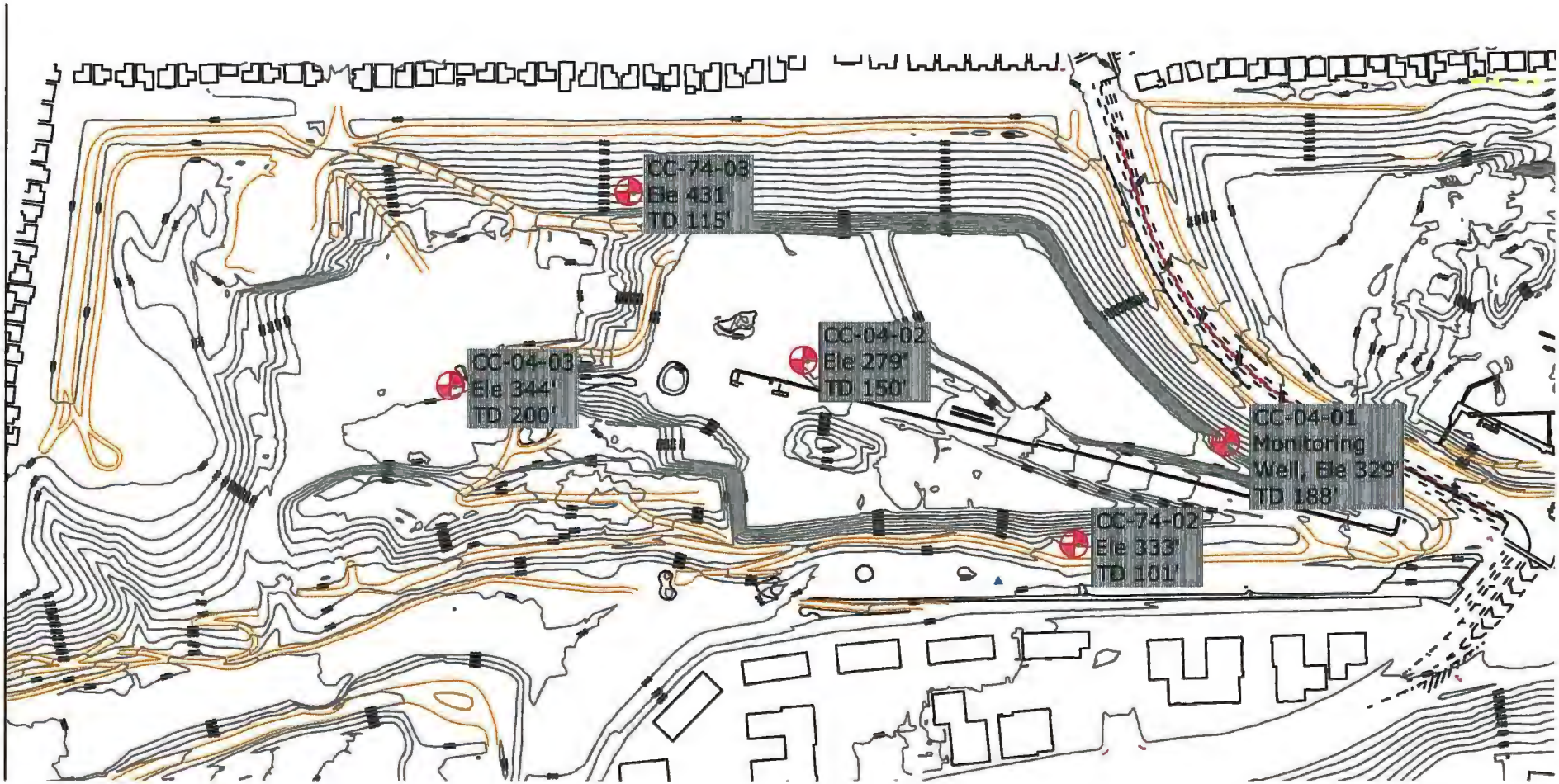
APPENDIX A

MAPS AND LOGS

FOR

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
PTS NO. 67943, W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

PROJECT NO. 07524-32-02

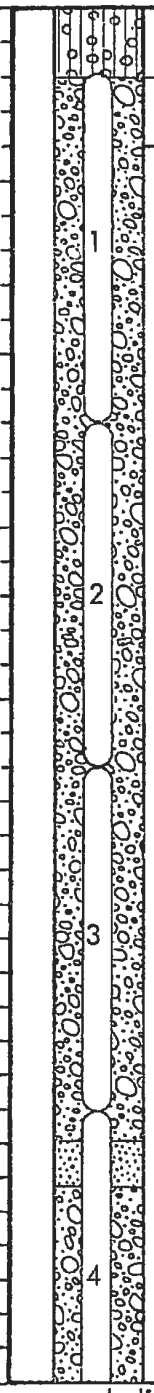

CC-74-03
Ele 431'
TD 115'
CC-04-03
Ele 344'
TD 200'
CC-04-02
Ele 279'
TD 150'
CC-04-01
Monitoring
Well, Ele 329'
TD 188'
CC-74-02
Ele 333'
TD 101'

SUMMARY — BORING NO. 2

DATE DRILLED: Jan. 10, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

ELEVATION: 333'



						FIELD REMARKS
very moist	moder. dense	dark brown	SILTY GRAVEL GRAVELLY SILT	cobbles to 8"	60-10-30 40-10-50	
slightly moist	m. dense to dense	light brown	SANDY GRAVEL	& cobbles to 8"	60-25-15 15-65-20	Very rough drilling cemented
moist	dense to very dense			& boulders to 18" & cobbles	60-30-10	
		light brown to brown				
	very dense					
		brown	GRAVELLY SAND		30-70-00	
		brown to dark brown	SANDY GRAVEL	& cobbles silty sand lenses	60-20-20 40-35-25	

(1) Indicates number and range of bulk sample

(continued)

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO. 5

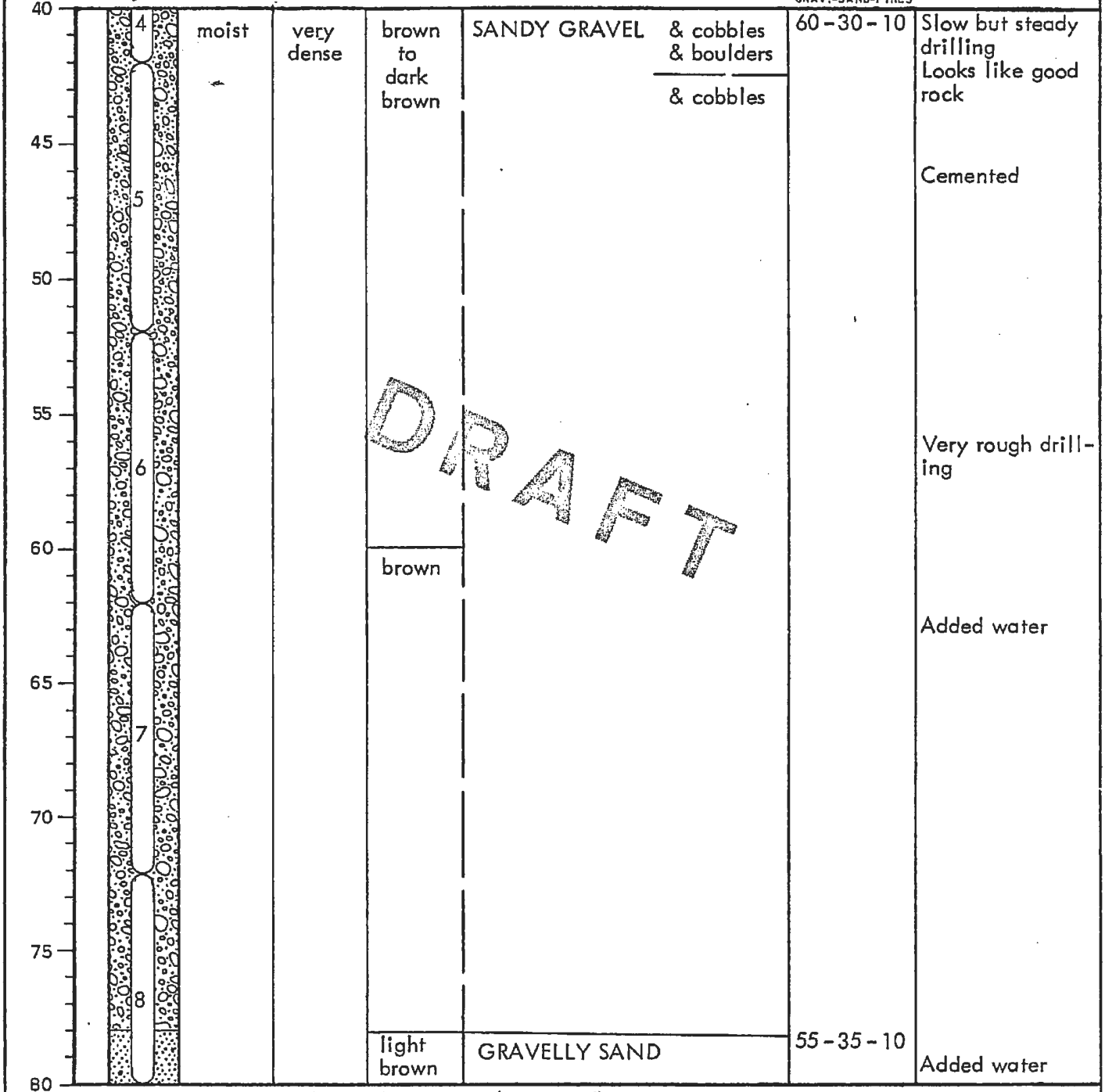
CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO 73-232-AEFH

SUMMARY — BORING NO. 2 (Continued)

DATE DRILLED: Jan. 10, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.



(5) Indicates number and range of bulk sample

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO. 6

CONVERSE, DAVIS AND ASSOCIATES — *Consulting Engineers and Geologists* — PROJ. NO. 73-232-AEFH

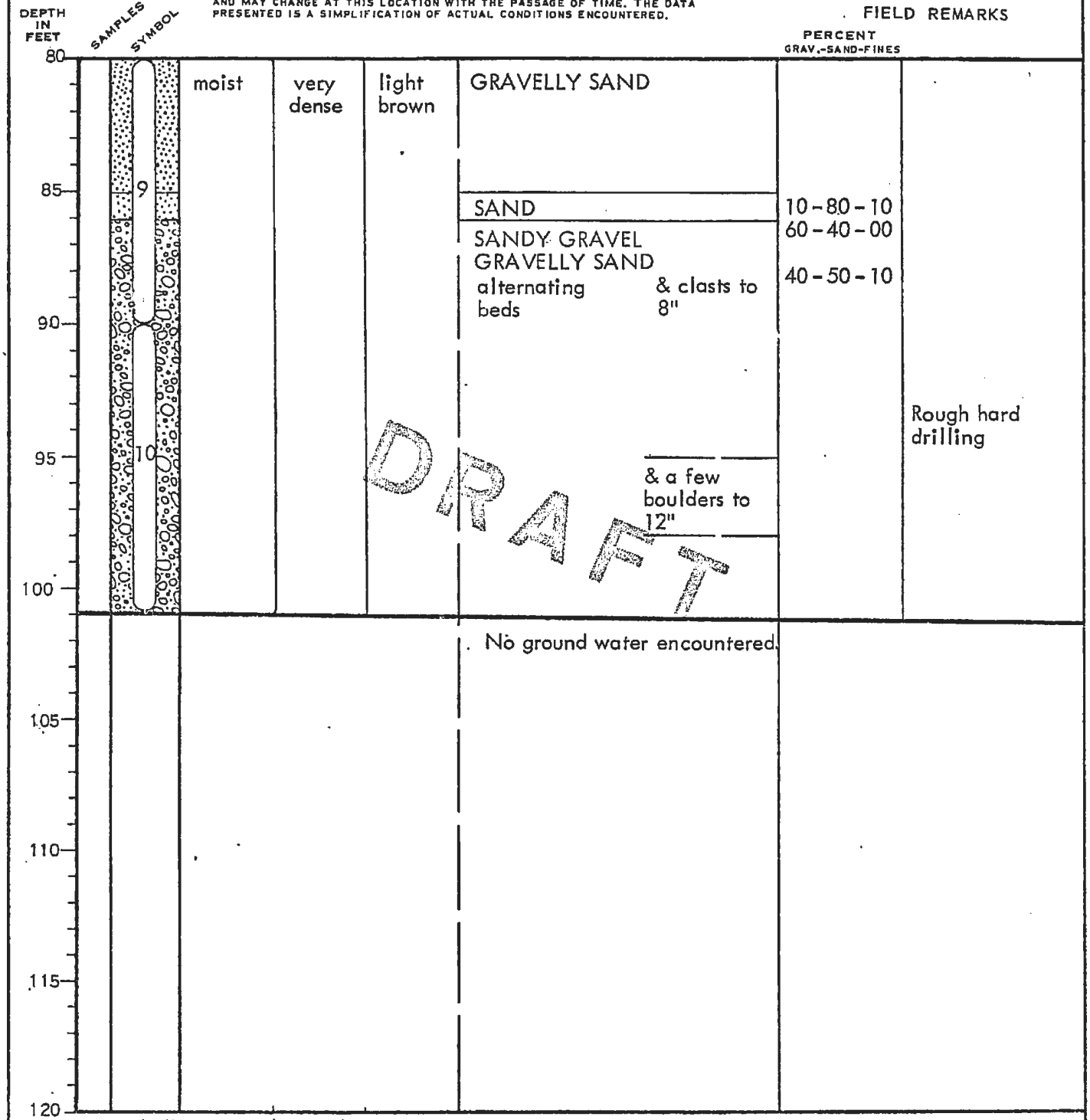
APPROVED FOR PUBLICATION

FORM NO. CDA-7/3

SUMMARY — BORING NO. 2 (Continued)

DATE DRILLED: Jan. 10, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.



(9) Indicates number and range of bulk sample

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO 7

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO. 73-232-AEFH

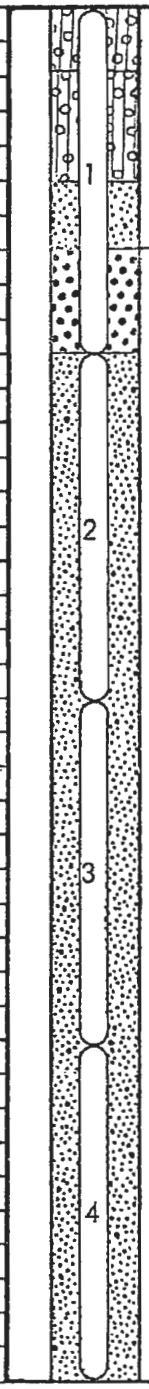
APPROVED FOR PUBLICATION

SUMMARY — BORING NO. 3

DATE DRILLED: Jan. 14, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

ELEVATION: 431'±



					FIELD REMARKS
				PERCENT GRAV.-SAND-FINES	
very moist	firm	red brn.	SANDY SILT CLAYEY SAND	0-50-50	Fast smooth drilling
	soft-firm	brown	CLAYEY SANDY SILT & gravel & clasts	0-25-75	
	moder. dense	yellow brown	GRAVELLY SAND & clayey sandy silt	30-40-30	Hard drilling (Cap rock?)
moist	very dense		SANDY GRAVEL	55-40-5	
			GRAVELLY SAND & a few boulders to 10"	40-55-5	Very rough drilling
			& sandy gravel alternating beds	&55-40-5	Fast, easy drilling
			alt. gravelly sand & sandy silt beds		Fast, easy drilling
					Rough drilling
			SAND & gravel	10-85-5	Moderately slow drilling
			GRAVELLY SAND & sandy gravel	55-40-5 to 40-55-5	Fast drilling

① Indicates number and range of bulk sample

(continued)

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO. 8

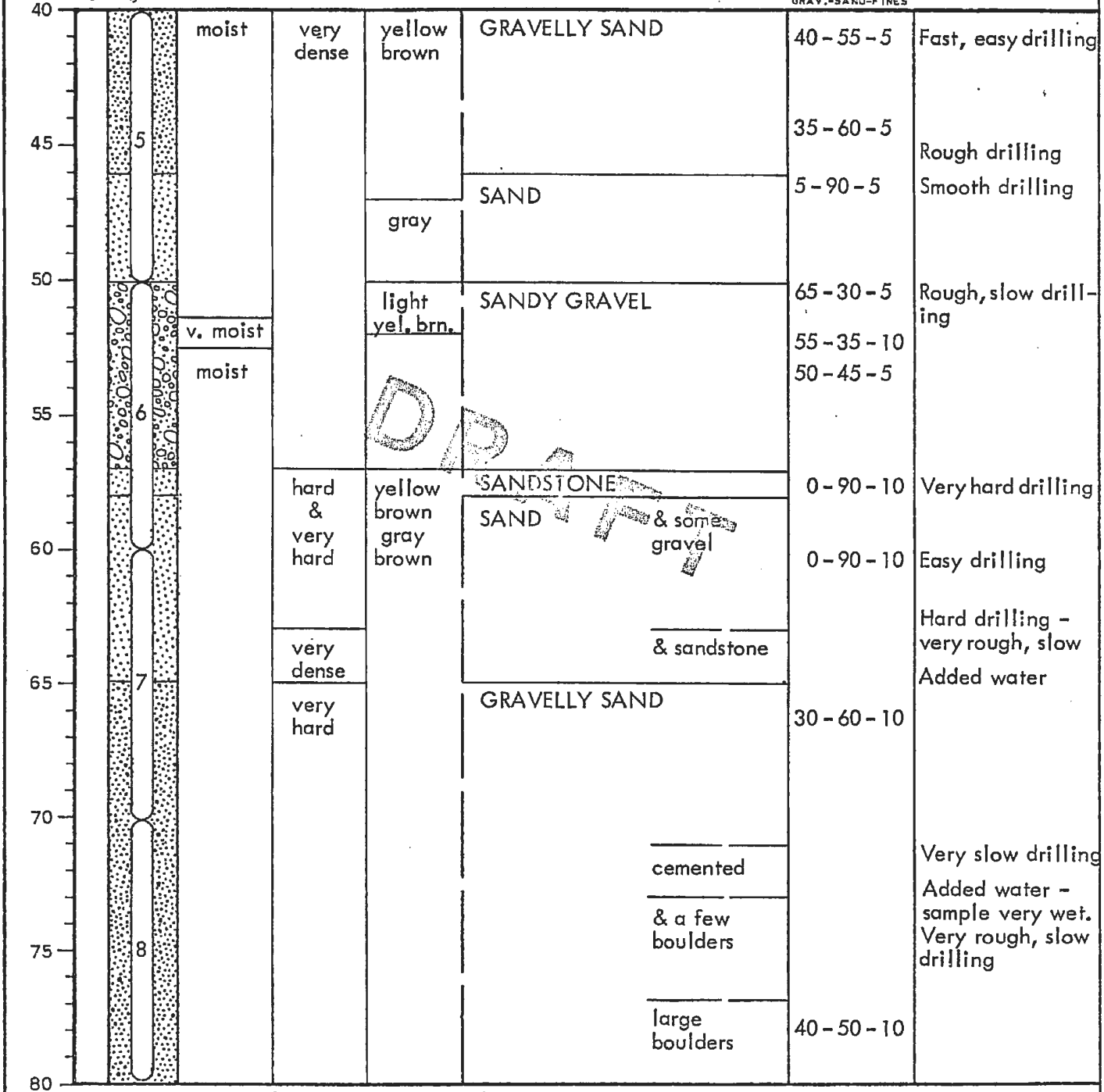
CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO. 73-232-AEFH

SUMMARY — BORING NO. 3 (Continued)

DATE DRILLED: Jan. 15, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.



⑥ Indicates number and range of bulk sample

(continued)

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO. 9

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

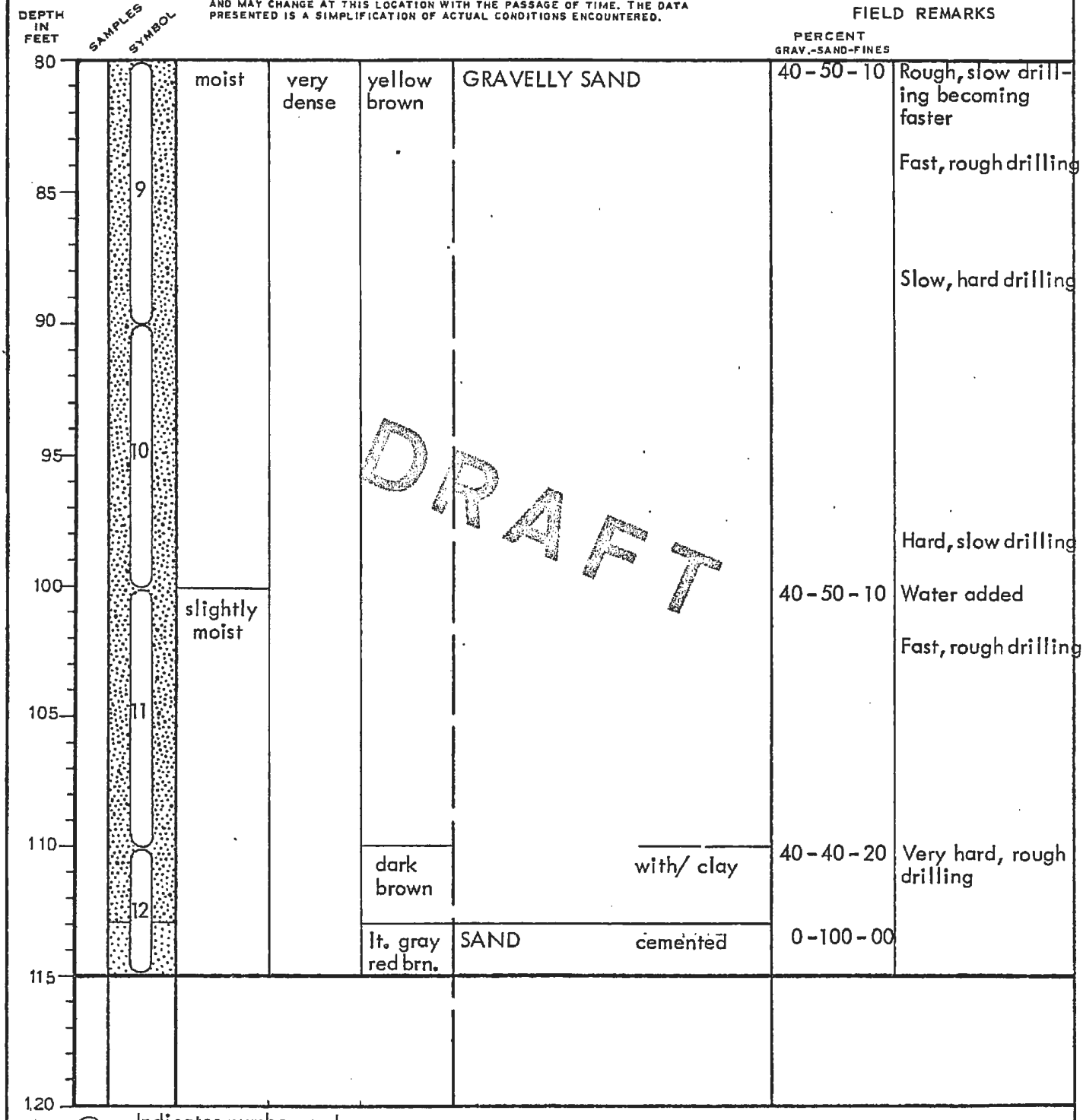
PROJ. NO. 73-232-AEFH

FORM NO. CDA-13 APPROVED FOR SUBMITTAL

SUMMARY — BORING NO. 3 (Continued)

DATE DRILLED: Jan. 16, 1974

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.



(9) Indicates number and range of bulk sample

AGGREGATE INVESTIGATION - CARROLL CANYON PLANT SITE
Carroll Canyon, San Diego, California
for Conrock Company

DRAWING NO. 10

CONVERSE, DAVIS AND ASSOCIATES — *Consulting Engineers and Geologists*

PROJ. NO. 73-232-AEFH

PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	CC04-1 0-2				**STADIUM CONGLOMERATE** Very dense, moist, yellowish gray, pale red, yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand. Angular to rounded, scattered (less than 10 percent) cobbles, moderately cemented. Larger clasts reduced in size by drilling			
2	CC04-1 2-3							
	CC04-1 3-4							
4	CC04-1 4-6							
6	CC04-1 6-8			GM	-Strongly cemented below 6 feet, gradual decrease in gravel, increase in sand downward			
8	CC04-1 8-10							
10	CC04-1 10-11							
	CC04-1 11-13							
12								
	CC04-1 13-15							
14								

Figure A-1,
Log of Boring CC04 1, Page 1 of 13

07390-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ▨ ... DISTURBED OR BAG SAMPLE
- ◧ ... STANDARD PENETRATION TEST
- ◥ ... CHUNK SAMPLE
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
16	CC04-1 15-18			SM/GM	Very dense, moist, pale yellowish brown, Silty SAND with (predominantly) fine gravel/Silty, angular to rounded GRAVEL with sand. Angular to rounded (less than 10 percent) cobbles. Moderately to strongly cemented. Other cobbles and boulders reduced in size by drilling.			
18	CC04-1 18-20			GM	Very dense, moist, pale yellowish brown, Silty, fine, angular to rounded GRAVEL with Sand; Larger clasts reduced in size by drilling			
20	CC04-1 20-22							
22	CC04-1 22-24							
24	CC04-1 24-25							
	CC04-1 25-27							
26								
	CC04-1 27-28							
28	CC04-1 28-30							

Figure A-1,
Log of Boring CC04 1, Page 2 of 13

07390-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ▨ ... DISTURBED OR BAG SAMPLE
- ◧ ... STANDARD PENETRATION TEST
- ◥ ... CHUNK SAMPLE
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	CC04-1 30-31			GM	Very dense, moist, pale yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with Sand; less than 10 percent angular to rounded cobbles in sample. Other cobbles and boulders reduced in size by drilling. Moderately cemented			
	CC04-1 31-33							
32								
	CC04-1 33-34							
34	CC04-1 34-37							
36				SP	Dense, moist, dark yellowish orange, poorly graded, fine to medium SAND, weakly to moderately cemented			
	CC04-1 37-39							
38				GM	Very dense, pale yellowish brown, moist, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented. Cobbles and boulders reduced in size by drilling, (none in cuttings)			
	CC04-1 39-41				-Less than 10 percent cobbles in cuttings from 39 to 43 feet			
40								
	CC04-1 41-43							
42								
	CC04-1 43-45							
44								

Figure A-1,
Log of Boring CC04 1, Page 3 of 13

07390-22-01.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
	CC04-1 45-46			SP	Dense, moist, moderate yellowish brown, poorly graded fine to medium SAND, weakly cemented			
46	CC04-1 46-47			GM	Very dense, moist, pale yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand; moderately cemented. No cobbles in sample. Cobbles and boulders reduced in size by drilling. Below 47 feet, angular to subrounded cobbles (less than 10 percent)			
	CC04-1 47-49							
48								
	CC04-1 49-51			SP-SM	Medium dense to dense, moist, grayish orange to moderate yellowish brown, poorly graded, fine to medium SAND, with Silt, scattered subrounded cobbles, (less than 10 percent), weak to moderate cementation			
50								
	CC04-1 51-53							
52				GM	Very dense, moist, pale yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented. Cobbles and boulders reduced in size by drilling			
	CC04-1 53-55			SM	Medium dense, moist, grayish orange, Silty, fine to medium SAND with rounded, fine to coarse gravel, weakly cemented			
54				GM	Very dense, moist, pale yellowish brown, Silty, angular to rounded GRAVEL with sand, moderately cemented, approximately 20 percent rounded to angular cobbles between 53.5 and 55 feet, none below 55 (in cuttings). Other cobbles and boulders reduced in size by drilling.			
	CC04-1 55-57							
56								
	CC04-1 57-58							
58	CC04-1 58-60			SP-SM	Dense, moist, dark yellowish orange, poorly graded fine to medium SAND with silt and rounded fine to coarse gravel -Gravel sized pieces of siltstone from 58 to 59.5 feet			

Figure A-1,
Log of Boring CC04 1, Page 4 of 13

07390-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	CC04-1 60-62			SP-SM	Dense, moist, yellowish gray, poorly graded fine to medium SAND with silt, moderately cemented			
62	CC04-1 62-63			GM	Very dense, pale yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately to well cemented. Approximately 10 percent rounded to angular cobbles in sample. Other cobbles and boulders reduced in size by drilling			
	CC04-1 63-65							
64								
	CC04-1 65-66				-No cobbles in cuttings 65 to 66 feet			
66	CC04-1 66-68							
68	CC04-1 68-70							
70	CC04-1 70-72				-Approximately 20 percent rounded cobbles 70 to 72 feet			
72	CC04-1 72-74				-No cobbles in sample 72 to 74 feet			
74	CC04-1 74-76				-Less than 10 percent cobbles, subrounded, 74 to 76 feet			

Figure A-1,
Log of Boring CC04 1, Page 5 of 13

07390-22-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
76	CC04-1 76-78		▼	GM	Very dense, moist, pale yellowish brown and dark yellowish orange, Silty, fine to coarse angular to rounded GRAVEL with sand, moderately cemented, no cobbles in samples. Cobbles and boulders reduced in size by drilling			
78	CC04-1 78-79							
	CC04-1 79-81							
80					-1 rounded cobble			
	CC04-1 81-83							
82								
	CC04-1 83-85			SP	Dense, moist, yellowish gray and dark yellowish orange, poorly graded, fine to medium SAND, weakly cemented, no cobbles			
84								
	CC04-1 85-87			GM	Very dense, moist, pale yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented. No cobbles in samples. Cobbles and boulders reduced in size by drilling. 6 inches thick silty sand (85 to 85.5 feet); 10 to 20 percent rounded to angular cobbles between 85 and 87 feet			
86								
	CC04-1 87-89							
88								
	CC04-1 89-90			SM	Dense, moist, yellowish gray and dark yellowish gray, Silty, fine to medium SAND			

Figure A-1,
Log of Boring CC04 1, Page 6 of 13

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ▨ ... DISTURBED OR BAG SAMPLE
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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
90	CC04-1 90-92			GM	Very dense, moist to wet, grayish orange to moderate yellowish brown, Silty, fine to coarse, angular to rounded GRAVEL with sand. No cobbles in samples, cobbles and boulders reduced in size by drilling, weakly cemented			
92	CC04-1 92-93			SM	Dense, moist to wet, moderate yellowish brown, Silty, fine to coarse SAND with angular and rounded gravel. Cobbles and boulders reduced in size by drilling. Non cemented			
	CC04-1 93-95							
94				GM	Very dense, moist, grayish orange to pale yellowish brown, Silty, fine to coarse angular to rounded GRAVEL with sand. Rounded, coarse grained cobbles up to 5 inch diameter, appear to be cored larger clasts. Other cobbles and boulders reduced in size by drilling			
	CC04-1 95-97.5			SM	Dense, moist to wet, dark yellowish orange, Silty SAND with angular and rounded gravel. 6 inch thick silty gravel with sand at 96 feet, moderately cemented			
96								
98	CC04-1 97.5-99			SM	Very dense, dry, light gray, SANDSTONE (rock), strongly cemented, fresh (unweathered), extremely hard. Recovered as 4.5 inch diameter core in pieces up to 3 inches long and rock flour. Strong reaction with hydrochloric acid.			
	CC04-1 99-101							
100								
	CC04-1 101-102							
102	CC04-1 102-104			GM	Very dense, wet, dark yellowish orange and dark yellowish brown, Silty, fine to coarse angular to rounded GRAVEL with sand. No cobbles in cuttings. Cobbles and boulders reduced in size by drilling. Non cemented			
104	CC04-1 104-106							

Figure A-1,
Log of Boring CC04 1, Page 7 of 13

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
106	CC04-1 106-108			GM	Very dense, moist to wet, dark yellowish orange, Silty, fine to coarse rounded to angular GRAVEL with sand. No cobbles in samples. Cobbles and boulders reduced in size by drilling. Weakly cemented			
108	CC04-1 108-110				-Rounded 4 inch cobble			
110	CC04-1 110-112			ML	Hard, dry to moist, pale red, Sandy SILT, strongly cemented. Excavates as gravel sized chips			
112	CC04-1 112-113			GM	Very dense, moist to wet, dark yellowish orange, Silty, fine to coarse rounded to angular GRAVEL with sand. 5 inch cobble at 110.5 feet, interbeds (inches thick) of silt and clay. Cobbles and boulders reduced in size by drilling. Non cemented			
	CC04-1 113-115							
114					-3 rounded cobbles			
	CC04-1 115-117							
116					-No cobbles			
	CC04-1 117-118							
118	CC04-1 118-121							

Figure A-1,
Log of Boring CC04 1, Page 8 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
120	CC04-1 121-123				Very dense, moist to wet, browns, Silty, fine to coarse, angular to rounded GRAVEL with sand, no cobbles in samples. Some interbeds of silt and clay, inches thick. Percentage of fines gradually increases downwards. Fines also include ground up rock (flour), moderately cemented, larger clasts reduced in size by drilling			
122	CC04-1 123-125							
124	CC04-1 125-127							
126	CC04-1 127-128			GM	-Predominantly grays below 127 feet			
128	CC04-1 128-130							
130	CC04-1 130-131				-5.5 inch rounded cobble (probably a cored cobble or boulder) at 130.5 feet, decrease in fines content below 130 feet			
	CC04-1 131-133							
132					-4 inch cobble			
	CC04-1 133-135							
134								

Figure A-1,
Log of Boring CC04 1, Page 9 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
136	CC04-1 135-136			GM	Very dense, dry to moist, predominantly grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. Cobbles and boulders reduced in size by drilling. Weakly cemented			
	CC04-1 136-138				-1 foot thick, moist to wet -Rounded 5 inch cobble			
138	CC04-1 138-141				Very dense, wet, moderate yellowish brown, Clayey, fine to coarse, angular to rounded GRAVEL with sand. Cobbles and boulders reduced in size by drilling -Rounded to subangular 5 inch cobble with wet surfaces			
140								
	CC04-1 141-143							
142				GC				
	CC04-1 143-144				-Predominantly rounded, fine to coarse GRAVEL below 143 feet, (less cobbles)			
144	CC04-1 144-146							
146	CC04-1 146-148							
148	CC04-1 148-150							

Figure A-1,
Log of Boring CC04 1, Page 10 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
150	CC04-1 150-151			GM + GC	Very dense, moist to wet, dark yellowish brown and dark yellowish orange, Silty and Clayey, fine to coarse (predominantly) rounded GRAVEL. Cobbles reduced in size by drilling. Weakly cemented			
	CC04-1 151-154							
152								
154	CC04-1 154-155							
	CC04-1 155-157							
156								
	CC04-1 157-159			GM/SM/ GC/SC	Very dense, moist to wet, dark yellowish brown and dark yellowish orange, Silty and Clayey SAND with rounded, fine to coarse gravel/silty and clayey rounded fine to coarse gravel with sand; 5 inch cobble, rounded at 158 feet. Weakly cemented			
158								
	CC04-1 159-161							
160				SM	Dense, moist to wet, dark yellowish orange, Clayey/Silty, fine to medium SAND, non cemented			
	CC04-1 161-163			GC/SM	Very dense, wet, dark yellowish brown and dark yellowish orange, Silty and Clayey, fine to coarse, (predominantly) rounded GRAVEL with sand. Cobbles and boulders reduced in size by drilling			
162								
	CC04-1 163-165							
164								

Figure A-1,
Log of Boring CC04 1, Page 11 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
166	CC04-1 165-167			GM/GC	Very dense, moist, grays and browns, Silty and Clayey, fine to coarse, angular to rounded GRAVEL with sand. Larger clasts reduced in size by drilling. Strong, calcareous cementation below 167 feet, appears as concrete like chunks and rock flour			
168	CC04-1 167-169							
170	CC04-1 169-170			SC/SM	Very dense, moist to wet, grays, Silty and Clayey SANDSTONE, strong calcareous cementation, extremely hard rock with interbeds of silty/clayey gravel with sand. Sandstone excavates as chunks and cores up to 5 inches long (5 inch diameter)			
	CC04-1 170-172			GM	**FRIARS FORMATION** Very dense, wet, medium dark gray, Silty, fine to coarse (predominantly) rounded, GRAVEL with sand.			
172	CC04-1 172-174			SM	Dense, wet, medium and dark gray, Silty, fine to coarse SAND with (predominantly) fine angular to rounded gravel. Larger clasts reduced in size by drilling			
174	CC04-1 174-176			GM/GC	Very dense, wet, medium and dark gray, Silty and Clayey, fine to coarse, angular to rounded GRAVEL with sand. Larger clasts reduced in size by drilling. Rounded 5 inch cobbles at 174 to 175 feet			
176	CC04-1 176-178			SM/SC	Loose, wet, medium gray, Silty/Clayey, fine to medium SAND, not cemented			
178	CC04-1 178-180				-Strongly cemented			

Figure A-1,
Log of Boring CC04 1, Page 12 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 1

ELEV. (MSL.) 329' DATE COMPLETED 01-15-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
180	CC04-1 180-183			SP-SM + SP-SC	**FRIARS FORMATION** Loose, wet, medium gray, poorly graded, fine to medium SAND with silt and clay. Non-cemented, with scattered strong calcareous cementation in interbeds up to 4 inches thick. Approximately 10 percent of section cemented; 5 inch rounded cobble at 180 feet			
182								
	CC04-1 183-184			SC/GC	Loose to medium dense, wet, medium gray, Clayey SAND with rounded and angular, fine to coarse gravel/clayey gravel with sand. 5 inch rounded cobble at 184 feet. Larger clasts reduced in size by drilling -Rounded 5 inch cobble			
184	CC04-1 184-186							
				SC/GC	Strong, calcareous cementation, produces 5 inch diameter core up to 3 inches long and rock flour			
186	CC04-1 186-188			GC	Dense, wet, medium gray, Clayey, fine to coarse, angular to rounded GRAVEL with sand. Larger clasts reduced in size by drilling			
188					BORING TERMINATED AT 188 FEET Well installed			

Figure A-1,
Log of Boring CC04 1, Page 13 of 13

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	CC04-2 0-1			GM	**STADIUM CONGLOMERATE** Very dense, moist, mottled browns and grays, Silty, fine to coarse angular to rounded GRAVEL with sand. Angular to rounded, scattered, (less than 10 percent) cobbles up to 4 inches diameter. Clasts reduced in size by drilling; weakly cemented			
	CC04-2 1-3							
2								
	CC04-2 3-4							
4	CC04-2 4-6							
6	CC04-2 6-7							
	CC04-2 7-9			SM	Very dense, moist, dark yellowish orange, Silty, fine to coarse SAND, moderately cemented			
8				GM	Very dense, moist, mottled browns and grays, Silty, fine to coarse angular to rounded GRAVEL with sand. Angular to rounded, scattered, (less than 10 percent) cobbles up to 4 inches diameter. Clasts reduced in size by drilling; weakly cemented			
	CC04-2 9-10				-No cobbles below 10 feet			
10	CC04-2 10-12							
12	CC04-2 12-13				-Scattered cobbles from 12 to 13 feet, abundant rock flour, strongly cemented from 12 to 13 feet -5 inches long, 5 inch diameter core of cobble or boulder, no cobbles in samples below 13 feet			
	CC04-2 13-14							
14	CC04-2 14-16							

Figure A-2,
Log of Boring CC04 2, Page 1 of 10

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SAMPLE SYMBOLS

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- ◧ ... STANDARD PENETRATION TEST
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- ▨ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
	CC04-2 14-16			GM	Very dense, moist, browns and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. No cobbles in samples, clasts reduced in size by drilling, strongly cemented			
16	CC04-2 16-18							
18	CC04-2 18-20				-Scattered rounded cobbles below 18 feet			
20	CC04-2 20-21			SM	Very dense, moist, dark yellowish orange and yellowish gray, Silty, fine to coarse SAND with rounded fine gravel. Below 20 feet, weakly to moderately cemented, trace of gravel, predominantly yellowish gray. Silty sand with rounded fine to coarse gravel below 21.5 feet			
	CC04-2 21-22							
22	CC04-2 22-24			GM	Very dense, moist, mottled browns and grays, Silty, fine to coarse angular to rounded GRAVEL with sand. No cobbles in samples, clasts reduced in size by drilling			
24	CC04-2 24-26							
26	CC04-2 26-27							
	CC04-2 27-29							
28					-Cobble, rounded			
	CC04-2 29-31				-Cobble, rounded, broken, abundant rock flour, strongly cemented			

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Figure A-2,
Log of Boring CC04 2, Page 2 of 10

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	CC04-2 29-31		▼	GM	Very dense, moist, mottled browns and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. Scattered (less than 10 percent) cobbles, rounded, clasts reduced in size by drilling			
	CC04-2 31-33							
32								
	CC04-2 33-35			SM	Very dense, moist to wet, dark yellowish orange, Silty, fine to coarse SAND with rounded fine to coarse gravel, weakly cemented			
34					Very dense, moist, grays and browns, Silty, fine to coarse, angular to rounded GRAVEL with sand. No cobbles in sample, strongly cemented, (rock flour), clasts reduced in size by drilling			
	CC04-2 35-37							
36								
	CC04-2 37-39							
38				GM	-6 inch thick dark yellowish orange, silty sand, less rock flour/cementation below			
	CC04-2 39-40				-Increased rock flour/cementation below 40 feet			
40	CC04-2 40-42				-5 inch diameter, rounded cobble			
42	CC04-2 42-44				-Moist to wet below 43 feet, less cementation			
44	CC04-2 44-46							

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Figure A-2,
Log of Boring CC04 2, Page 3 of 10

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
46	CC04-2 46-47			GM	Very dense, moist to wet, mottled browns and oranges, Silty, fine to coarse, rounded to angular GRAVEL with sand. No cobbles in samples, weakly cemented, clasts reduced in size by drilling			
	CC04-2 47-49							
48								
	CC04-2 49-51							
50					-Rounded 5 inch cobble			
	CC04-2 51-52			SM	Dense, moist to wet, moderate brown, Silty, fine to coarse SAND with (predominantly) rounded fine gravel			
52	CC04-2 52-54			GM	Very dense, moist, browns, oranges and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. Clasts reduced in size by drilling, moderately cemented			
					-Rounded 5 inch cobble			
54	CC04-2 54-56							
					-Rounded 5 inch cobble, becomes moist to wet below 56 feet			
56	CC04-2 56-57							
	CC04-2 57-59							
58								
					-Rounded 5 inch cobble			
	CC04-2 59-61							

Figure A-2,
Log of Boring CC04 2, Page 4 of 10

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	CC04-2 61-63			GM	Very dense, moist to wet, browns and oranges, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented to weakly cemented. Rounded 4 inch cobble at 60 feet, wet from 63 to 64 feet, moist to wet below 64 feet			
62	CC04-2 63-64							
64	CC04-2 64-66							
66	CC04-2 66-68							
68	CC04-2 68-70							
70	CC04-2 70-72							
72	CC04-2 72-74				-6 inch thick, strongly cemented			
74	CC04-2 74-76							

Figure A-2,
Log of Boring CC04 2, Page 5 of 10

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
76	CC04-2 76-77			GM	Very dense, moist to wet, browns and oranges, Silty, fine to coarse, angular to rounded GRAVEL with sand, moderately to weakly cemented. No cobbles in samples, clasts reduced in size by drilling, strongly cemented and dry from 77 to 78.5 feet			
	CC04-2 77-79							
78								
	CC04-2 79-80			SM	Medium dense, moist to wet, predominantly light olive gray to yellowish gray, mottled dark yellowish orange and moderate brown, fine to medium SAND, weakly to non cemented			
80	CC04-2 80-82							
82	CC04-2 82-84				-Rounded gravel below 83.5 feet, strongly cemented			
84	CC04-2 84-86			GM	Very dense, moist to wet, browns, Silty, fine to coarse, angular to rounded GRAVEL with sand. Strongly cemented, 1 foot thick bed at 85 feet. No cobbles in samples, clasts reduced in size by drilling, weakly cemented			
86	CC04-2 86-87							
	CC04-2 87-89							
88								
	CC04-2 89-91							

Figure A-2,
Log of Boring CC04 2, Page 6 of 10

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
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BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
90	CC04-2 91-93			GM/SM	Very dense, moist to wet, browns, Silty, fine to coarse angular to rounded GRAVEL with sand/silty sand with gravel, weakly cemented. Rounded 4 inch cobble at 91 feet. Clasts reduced in size by drilling. Rounded 5 inch cobble at 93 feet. Strong cementation from 91 to 93 feet, abundant rock flour			
92	CC04-2 93-94			GM	Very dense, moist to wet, browns, Silty, fine to coarse angular to rounded GRAVEL with sand. Clasts reduced in size by drilling -Wet below 94 feet			
94	CC04-2 94-96				-6 inch thick, strongly cemented, dry layer, light gray			
96	CC04-2 96-98				-1 foot thick, strongly cemented, dry layer, light gray			
98	CC04-2 98-100				-2 rounded 4 to 5 inch cobbles -Predominantly rounded gravel below 98 feet			
100	CC04-2 100-102							
102	CC04-2 102-104				-Rounded 5 inch cobble			
104	CC04-2 104-106							

Figure A-2,
Log of Boring CC04 2, Page 7 of 10

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ▨ ... DISTURBED OR BAG SAMPLE
- ◧ ... STANDARD PENETRATION TEST
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PROJECT NO. 07390-22-01

BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
106	CC04-2 106-107.5			GM	Very dense, wet, browns, Silty, fine to coarse (predominantly) rounded GRAVEL with sand, weakly cemented. Clasts reduced in size by drilling			
108	CC04-2 107.5-110			SM/SC	**FRIARS FORMATION** Dense, wet, medium dark gray, Silty/Clayey SAND, non cemented with (predominantly) rounded gravel below 110 feet			
110	CC04-2 110-112							
112	CC04-2 112-114				-Rounded 4 inch cobble			
114	CC04-2 114-116							
116	CC04-2 116-117			GM	Very dense, wet, medium gray to medium dark gray, Silty, fine to coarse, angular to rounded GRAVEL with sand, weakly cemented. Clasts reduced in size by drilling, 5 inch rounded cobble at 117 feet			
118	CC04-2 117-119				-Strongly cemented below 119 feet			
	CC04-2 119-121							

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Figure A-2,
Log of Boring CC04 2, Page 8 of 10

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

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BORING CC04 2

ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
120				SC/SM	Dense, wet, medium dark gray, Silty/Clayey SAND with fine to coarse rounded gravel			
	CC04-2 121-122				Dense, wet, medium dark gray, Silty/Clayey GRAVEL with sand. Strongly cemented, dry below 123 feet			
122	CC04-2 122-124			GC/GM	-Non cemented below 124 feet			
124	CC04-2 124-125							
	CC04-2 125-127							
126								
	CC04-2 127-129.5			SM/SC	Dense, moist to wet, medium dark gray, Silty/Clayey SAND with rounded gravel			
128					-Rounded 5 inch cobble			
130	CC04-2 129.5-131			SM	Very dense, dry, light gray, SANDSTONE (rock), strongly cemented, fresh (unweathered), extremely hard, recovered as chips, rock flour. Rounded cobble at 130 feet			
	CC04-2 131-135			GM	Dense, wet to saturated, medium dark gray, Silty, rounded to angular, fine to coarse GRAVEL with sand			
132								
134								

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Figure A-2,
Log of Boring CC04 2, Page 9 of 10

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING CC04 2	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) 278' DATE COMPLETED 01-19-2005 EQUIPMENT SONIC DRILL			
					MATERIAL DESCRIPTION			
	CC04-2 135-138				Dense, wet, medium gray, Silty, fine to coarse (predominantly), rounded GRAVEL with sand. Larger clasts reduced in size by drilling			
136								
138	CC04-2 138-140							
140	CC04-2 140-142			GM				
142	CC04-2 142-144							
					-1 foot thick sandy clay bed			
144	CC04-2 144-146				-6 inch thick strongly cemented bed, dry			
					Dense, moist, medium dark gray to brownish gray, Silty/Clayey, fine to medium SAND, moderately cemented with rounded, fine to coarse gravel below 148 feet			
146	CC04-2 146-150							
148				SM/SC				
					BORING TERMINATED AT 150 FEET Backfilled with 17x50 lb. sack of bentonite grout (Approximately 55 cu. ft.)			

Figure A-2,
Log of Boring CC04 2, Page 10 of 10

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	CC04-3 0-4			SM/SC	**FILL** Loose, moist, moderate yellowish brown, Silty/Clayey SAND with rounded to angular, fine to coarse gravel			
2								
4	CC04-3 4-6							
6	CC04-3 6-8			GM	Loose, wet, moderate yellowish brown, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand			
8	CC04-3 8-10							
10	CC04-3 10-12							
12	CC04-3 12-14							
14	CC04-3 14-16				-4 inch cobble, rounded			

07390-22-01.GPJ

Figure A-3,
Log of Boring CC04 3, Page 1 of 14

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
16	CC04-3 16-18			GM/GC	**FILL** Dense, moist, moderate yellowish brown, dark yellowish orange and moderate brown, Silty/Clayey rounded to angular, fine to coarse GRAVEL. Clasts reduced in size by drilling			
					STADIUM CONGLOMERATE Very dense, moist, mottled browns and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. No cobbles in samples. Clasts reduced in size by drilling			
18	CC04-3 18-19							
	CC04-3 19-21							
20				GM				
	CC04-3 21-23							
22					-Moderately cemented below 23 feet			
	CC04-3 23-25							
24								
	CC04-3 25-27				Dense, moist, grayish orange, Silty, fine to medium SAND with 4 inch thick interbed of coarse, rounded gravel			
26				SM				
	CC04-3 27-29				Very dense, moist, mottled browns and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. Rounded 4 inch cobble at 28 feet. Clasts reduced in size by drilling			
28				GM				
	CC04-3 29-30				-5 inch rounded cobble			

Figure A-3,
Log of Boring CC04 3, Page 2 of 14

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	CC04-3 30-32				Very dense, moist, mottled browns, oranges and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand. 6 inch thick strongly cemented bed at 31 feet, dry and moderately cemented below 33 feet. Rounded 3 to 4 feet cobble at 33 feet			
32	CC04-3 32-34							
34	CC04-3 34-36				-Weakly cemented below 35 feet			
36	CC04-3 36-37			GM				
	CC04-3 37-39							
38	CC04-3 39-41				-Cored cobble or boulder			
40	CC04-3 41-43							
42	CC04-3 43-45							
44								

Figure A-3,
Log of Boring CC04 3, Page 3 of 14

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BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
46	CC04-3 45-47				Very dense, moist, mottled browns, oranges and grays, Silty, fine to coarse, angular to rounded GRAVEL with sand, weakly cemented. Clasts reduced in size by drilling			
48	CC04-3 47-49							
50	CC04-3 49-51							
52	CC04-3 51-52				-Moderately cemented, abundant rock flour below 51 feet			
	CC04-3 52-54			GM				
54	CC04-3 54-56							
56	CC04-3 56-57				-Weakly cemented and moist to wet below 56 feet			
	CC04-3 57-58							
58	CC04-3 58-60							

Figure A-3,
Log of Boring CC04 3, Page 4 of 14

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SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	CC04-3 60-62			GC/GM	Very dense, moist to wet, mottled browns, oranges and grays, Silty/Clayey, fine to coarse, rounded to angular GRAVEL with sand, weakly cemented. Rounded 4 inch cobble at 61 feet. Clasts reduced in size by drilling			
62	CC04-3 62-63							
	CC04-3 63-65				-Strongly cemented, dry, abundant rock flour, 63 to 64 feet			
64								
	CC04-3 65-66			SM/SC	Dense, moist, mottled browns and oranges, Silty/Clayey SAND with angular to rounded GRAVEL, weakly cemented. Angular to rounded 4 inch cobble at 67 feet			
66	CC04-3 66-68							
68	CC04-3 68-70			GM	Very dense, browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, moderately to strongly cemented, abundant rock flour. 5 inch rounded cobble at 69 feet			
70	CC04-3 70-72							
72	CC04-3 72-74							
74	CC04-3 74-75							

Figure A-3,
Log of Boring CC04 3, Page 5 of 14

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- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
	CC04-3 75-77				Very dense, moist, mottled browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, weakly to moderately cemented, some rock flour. Rounded 5 inch cobble at 78 feet			
76								
	CC04-3 77-79							
78					-Predominantly angular below 79 feet			
	CC04-3 79-80							
80	CC04-3 80-82				-1 foot thick moist to wet, silty sand			
82	CC04-3 82-83			GM/GC	-6 inch thick silty sand -Wet between 82 and 83 feet -Cored boulder/cobble			
	CC04-3 83-85				-5 inch rounded cobble, strongly cemented below 83 feet, abundant rock flour			
84								
	CC04-3 85-86				-Moist to wet below 85 feet, weakly cemented			
86	CC04-3 86-88				-Moist below 86 feet			
88	CC04-3 88-89							
	CC04-3 89-91							

Figure A-3,
Log of Boring CC04 3, Page 6 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
90	CC04-3 91-93			GM/GC	Very dense, moist, mottled browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented, some rock flour. 5 inch rounded cobble at 91 feet, clasts reduced in size by drilling			
92	CC04-3 93-95				-Weakly cemented below 93 feet			
94	CC04-3 95-97							
96	CC04-3 97-100			SM	Medium dense, moist, grayish orange to moderate yellowish brown, Silty, fine to medium SAND, weakly to moderately cemented			
98					-4 inch rounded cobble			
100	CC04-3 100-101			GM/GC	Very dense, dry to moist, brown, orange and gray, Silty/Clayey, fine to coarse angular to rounded GRAVEL with sand, strongly cemented, abundant rock flour. Clasts reduced in size by drilling			
102	CC04-3 101-102							
102	CC04-3 102-104			CL-MH	Hard, moist to wet, moderate yellowish brown, Gravelly CLAY/SILT with sand and Sandy CLAY/SILT with gravel			
104	CC04-3 104-106							

07390-22-01.GPJ

Figure A-3,
Log of Boring CC04 3, Page 7 of 14

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
106	CC04-3 106-108			GM/GC	Very dense, moist, browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented some rock flour. Clasts reduced in size by drilling			
108	CC04-3 108-110				-6 inch thick, silt			
110	CC04-3 110-111							
	CC04-3 111-112							
112	CC04-3 112-114			SM/SC	Dense, moist, browns, oranges and grays, Silty/Clayey SAND with rounded to angular, fine to coarse gravel, weakly cemented. Clasts reduced in size by drilling			
114	CC04-3 114-116							
116	CC04-3 116-118			SM	Medium dense, moist, medium light gray, mottled dark yellowish orange, Silty, fine to medium SAND, non cemented			
118	CC04-3 118-120							

Figure A-3,
Log of Boring CC04 3, Page 8 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
120	CC04-3 120-122				Medium dense, moist, medium light gray, mottled dark yellowish orange, Silty, fine to medium SAND, non cemented			
122	CC04-3 122-124			SM				
124	CC04-3 124-126							
					Very dense, moist, browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, moderately cemented, some rock flour, clasts reduced in size by drilling			
126	CC04-3 126-128							
				GM/GC	-6 inch thick silty sand			
128	CC04-3 128-130				-6 inch thick silty sand			
					-Rounded 5 inch cobble			
130	CC04-3 130-132				Dense, moist, moderate yellowish brown, Clayey SAND, non cemented with gravel below 132.5 feet, moderately cemented, some rock flour			
132	CC04-3 132-134			SC				
134	CC04-3 134-136							

07390-22-01.GPJ

Figure A-3,
Log of Boring CC04 3, Page 9 of 14

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
136	CC04-3 136-138				Very dense, moist to wet, mottled browns, oranges and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand, weakly to moderately cemented. Clasts reduced in size by drilling			
138	CC04-3 138-140							
140	CC04-3 140-141				-Strongly cemented below 140.5 feet, light gray, abundant rock flour, cored pieces, chunks of cemented GRAVEL up to 1 inch long			
	CC04-3 141-143			GM/GC				
142					-Weakly cemented below 142.5 feet			
	CC04-3 143-144				-Wet below 143 feet -4 inch rounded cobble			
144	CC04-3 144-146							
146	CC04-3 146-148							
148	CC04-3 148-150				Dense, moist, browns, oranges and grays, Silty/Clayey SAND with fine to coarse, angular to rounded gravel			
				SM/SC				

Figure A-3,
Log of Boring CC04 3, Page 10 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
150	CC04-3 150-151							
	CC04-3 151-153			SC/GM	Dense, moist, browns, oranges and grays, Silty/Clayey, fine to coarse angular to rounded GRAVEL with sand, weakly cemented. Rounded 4 inch cobble and cored boulder/cobble at 152 feet. Clasts reduced in size by drilling			
152								
	CC04-3 153-155			SC	Dense, moist, brown, Clayey SAND with gravel, uncemented. Clasts reduced in size by drilling			
154								
	CC04-3 155-156				Medium dense, moist, moderate olive brown to olive gray, Clayey/Silty SAND			
156	CC04-3 156-158				-6 inch thick gravel layer			
158	CC04-3 158-160			SC/SM	-Light olive gray below 158 feet			
160	CC04-3 160-162				-With gravel below 160 feet			
162	CC04-3 162-164							
					Very dense, moist, browns and oranges, Silty/Clayey, rounded to angular, fine to coarse GRAVEL with sand, non cemented			
164	CC04-3 164-166			GM/GC				

Figure A-3,
Log of Boring CC04 3, Page 11 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
166	CC04-3 166-168			GM/GC	Dense, moist, browns and grays, Silty/Clayey, fine to coarse, angular to rounded GRAVEL with sand/Silty, Clayey SAND with gravel. Non cemented, Clasts reduced in size by drilling			
168	CC04-3 168-170				-6 inch thick, strongly cemented, abundant rock flour			
170	CC04-3 170-171				-6 inch thick, dark greenish gray clayey sand/sandy clay			
	CC04-3 171-173				-6 inch thick, strongly cemented, abundant rock flour			
172	CC04-3 173-174			GM/GC	Very dense, moist, browns, grays and oranges, Silty/Clayey, fine to coarse, rounded to angular GRAVEL with sand. 6 inch thick clayey sand at 173 feet, non cemented			
174	CC04-3 174-176				-6 inch thick strongly cemented bed			
176	CC04-3 176-178			CL	**FRIARS FORMATION** Hard, moist, olive gray, (predominantly) rounded Gravelly CLAY with sand			
178	CC04-3 178-180							

Figure A-3,
Log of Boring CC04 3, Page 12 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
180	CC04-3 180-181			CL-CH	Very stiff to hard, moist, olive gray to olive black, moderately to strongly cemented CLAY			
	CC04-3 181-183							
182								
	CC04-3 183-185			SM/SC	Dense, moist to wet, medium dark gray, Silty/Clayey SAND with scattered rounded fine and coarse gravel			
184								
	CC04-3 185-187			GM/GC	Dense, moist to wet, medium dark gray, Silty/Clayey GRAVEL with sand, uncemented			
186					-Wet below 87 feet			
	CC04-3 187-188				-Mottled black below 188 feet			
188	CC04-3 188-190							
190	CC04-3 190-192							
192	CC04-3 192-194			SM	Dense, wet, medium gray, Silty SAND with scattered rounded gravel			
194	CC04-3 194-196			GM	Dense, wet, medium gray, Silty GRAVEL with sand			

Figure A-3,
Log of Boring CC04 3, Page 13 of 14

07390-22-01.GPJ

SAMPLE SYMBOLS

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PROJECT NO. 07390-22-01

BORING CC04 3

ELEV. (MSL.) 344' DATE COMPLETED 01-24-2005

EQUIPMENT SONIC DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
196	CC04-3 196-198			GM	Dense, wet, medium gray, Silty GRAVEL with sand			
198	CC04-3 198-200							
200					BORING TERMINATED AT 200 FEET Backfilled with 28x50 lb. sack of bentonite grout (Approximately 75 cu. ft.)			

Figure A-3,
Log of Boring CC04 3, Page 14 of 14

07390-22-01.GPJ

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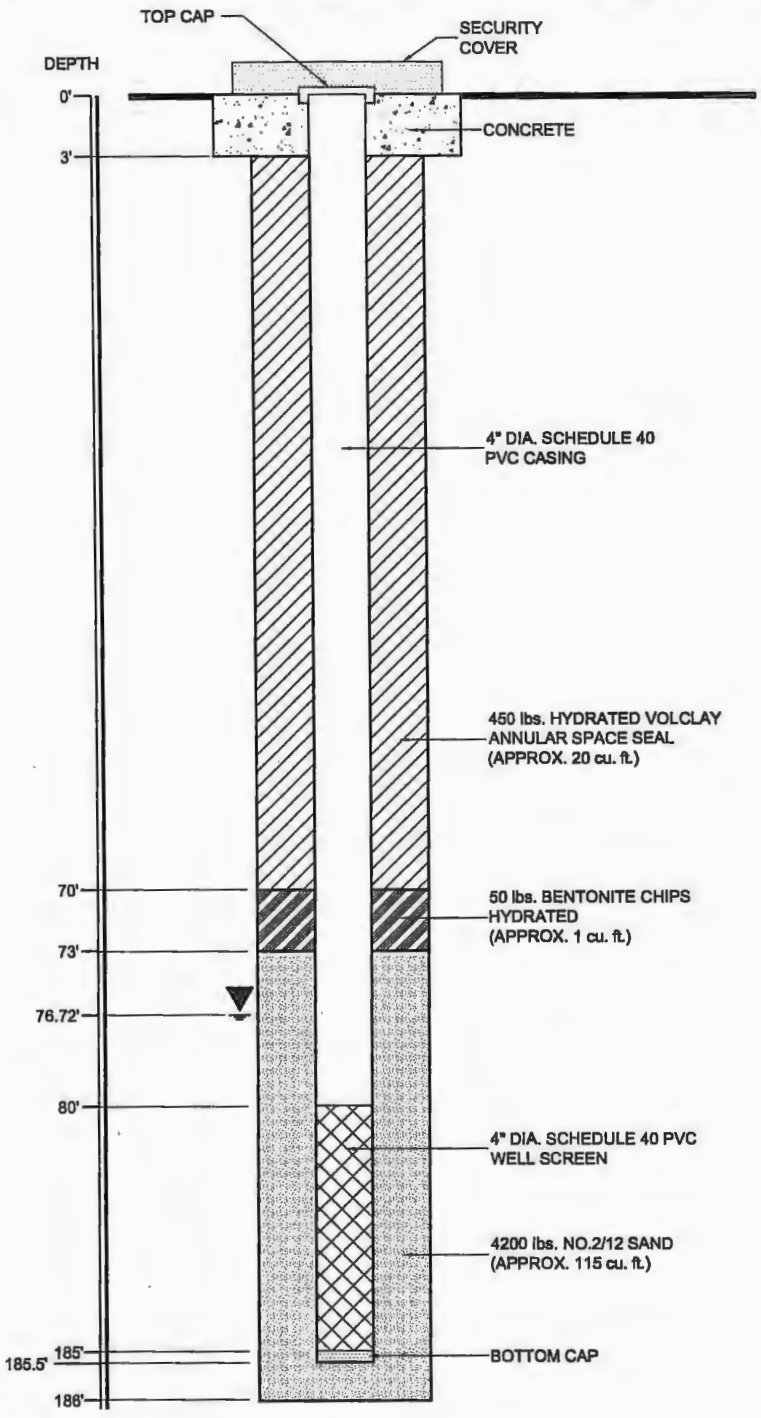


NO SCALE

WELL LOG FOR CC04 - 1

GEOCON
CONSULTANTS, INC.
ENVIRONMENTAL ■ GEOTECHNICAL ■ MATERIALS
6970 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE (858) 558-6100 - FAX (858) 558-8437

PD/RA		DSK/E0000

VULCAN CARROLL CANYON
SAN DIEGO, CALIFORNIA

DATE 1-27-2005	PROJECT NO. 07390 - 22 - 01	FIG. A-4

X:/R14TEMP/WELLLOG1/DWG.

Project No. 07524-32-02
September 4, 2013

BDS Engineering
6859 Federal Boulevard
Lemon Grove, California 91945

Attention: Mr. Tom Jones

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

Reference: *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated August 26, 2013.

Dear Mr. Jones:

This correspondence has been prepared to respond to comments contained in the City of San Diego's *Cycle 38 Review* dated July 22, 2013. The review comment followed by our response is presented below.

Comment 24: *Submit an addendum geotechnical report or update letter that specifically addresses the proposed revised mining and reclamation plans referenced above.*

Response: We have reviewed the referenced plans prepared by BDS Engineering. Revisions to the plan included raising the westerly pit bottom to enable storm water runoff to gravity flow into the existing creek drainage south of the property. A storm drain will be constructed at the low point in the pit bottom to convey water to the creek drainage.

Based on a review of the referenced plan, our opinions with respect to potential geologic hazards presented in our soil and geologic reconnaissance and subsequent update letters remain applicable.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

RCM:dmc

(2) Addressee
(e-mail) KLR Planning
Attention: Ms. Karen Ruggels
(e-mail) Vulcan Materials Company
Attention: Ms. Patty Schreibman

Project No. 07524-32-02
May 12, 2014

BDS Engineering
6859 Federal Boulevard
Lemon Grove, California 91945

Attention: Mr. Tom Jones

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

References:
1. *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated January 31, 2014.
2. *Stone Creek Vesting Tentative Map, No. 208328, P.T.S. No. 67943, City of San Diego*, prepared by BDS Engineering, Inc. dated January 31, 2014.

Dear Mr. Jones:

This correspondence has been prepared to respond to comments contained in the City of San Diego's *Cycle 47 Review* dated March 5, 2014. The review comment followed by our response is presented below.

Comment 26: *As previously requested, submit an addendum geotechnical report or update letter that specifically addresses the proposed revised mining and reclamation plans referenced above. If opinions regarding geologic hazards are provided, the addendum geotechnical report or update letter should be signed or sealed by a professional geologist.*

Response: We have reviewed the referenced plans prepared by BDS Engineering (Reference 1). Revisions to the plan included raising the westerly pit bottom to enable storm water runoff to gravity flow into the existing creek drainage south of the property. A storm drain will be constructed at the low point in the pit bottom to convey water to the creek drainage.

Based on a review of the referenced plan, our opinions with respect to potential geologic hazards presented in our soil and geologic reconnaissance and subsequent update letters remain applicable.

Comment 27: *Clarify if the soil and geologic reconnaissance report dated April 14, 2006 (Revised May 10, 2006) addresses all potential geologic impacts related to the*

currently proposed Stone Creek Vesting Tentative Map and Stone Creek Conditional Use Permit (Mining and Reclamation Plans).

Response: Based on a review of the referenced plans, it is our opinion that the report entitled Soil and Geologic Reconnaissance dated April 13, 2006, revised May 10, 2006, addresses potential geologic impacts from a reconnaissance perspective related to the currently proposed plans. In this regard, geologic hazards such as the potential for active faulting, landslides, seiches, liquefaction and seismically induced settlement have been addressed. It should be noted that, as development plans progress, additional evaluation of these hazards will be performed as part of a future geotechnical investigation.

Comment 28: *The Vesting Tentative Map shows the location of proposed storm water BMP's. If the proposed storm water BMP's result in active or passive storm water infiltration or percolations, the geotechnical consultant should address the BMP's in accordance with Appendix F of the City's Guidelines for Geotechnical Reports*.

Response: We have reviewed the BMP's on the referenced Vesting Tentative Map prepared by BDS Engineering (Reference 2). It is understood that fifteen underground and above ground basins of various sizes are proposed on the project, nine will be permanent water quality basins (hydro-modification) and six will be temporary sediment basins. Above ground bio-retention facilities and below grade hydrodynamic separators (sealed chambers) are also planned. Once the specific design is proposed during the construction document phase, Geocon will recommend lining the hydro-modification facilities with an impermeable membrane below the permeable soil mix to prevent saturation of the underlying soils based on unsuitable conditions of engineered, compacted fill per Appendix F of the City's Guidelines for Geotechnical Reports. With respect to passive infiltration, the temporary sediment basin will be evaluated on a case-by-case basis regarding their proximity to proposed improvements.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

David B. Evans
CEG 1860

RCM:DBE:dmc

(2) Addressee
(4/del) KLR Planning
Attention: Ms. Karen Ruggels
(e-mail) Vulcan Materials Company
Attention: Ms. Patty Schreibman

RESPONSE TO REVIEW COMMENTS

STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

BDS ENGINEERING
LEMON GROVE, CALIFORNIA

FEBRUARY 24, 2015
PROJECT NO. 07524-32-02

Project No. 07524-32-02
February 24, 2015

BDS Engineering
6859 Federal Boulevard
Lemon Grove, California 91945

Attention: Mr. Tom Jones

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

References:
1. *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated August 18, 2014.
2. *Stone Creek Vesting Tentative Map, No. 208328, P.T.S. No. 67943, City of San Diego*, prepared by BDS Engineering, Inc. dated August 18, 2014.

Dear Mr. Jones:

This correspondence has been prepared to respond to comments contained in the City of San Diego's *Cycle 63 Review* dated October 1, 2014. The review comment followed by our response is presented below.

Comment 31: *Provide a geologic map that shows the currently proposed Tentative Map, Reclamation Plan, and Mining Plan grades. Several maps could be necessary to clearly show the relationship of these plans with the site geology.*

Response: Please see Figure 1, map pocket.

Comment 32: *Provide representative geologic cross sections showing the proposed mining grades, reclamation grades, and tentative map grades in relationship with the site geology. Show groundwater conditions on the cross sections.*

Response: Please see Figure 2, map pocket.

Comment 33: *Note that California Public Resource Code 2772(c)(5) indicates that the reclamation plan shall include the following information: "a detailed description of the geology of the area in which surface mining is to be conducted."*

Response: The following information should be noted on the reclamation plan:

The dominant geologic unit in the area where the surface mining is to be conducted is the Stadium Conglomerate. This unit is primarily a mix of sand,

gravel and cobble-size particles. Portions of the Stadium Conglomerate are overlain by Very Old Paralic deposits formerly known as the Lindavista Formation. This unit is also a sand/gravel/cobble mix. The Very Old Paralic Deposits are exposed in the upper 5 to 15 feet of the ground surface and at the tops of the mined slopes and canyon walls. A relatively thin mantle of surficial deposits consisting of alluvium, colluvium and topsoil overlay the geologic bedrock units.

Comment 34: *Note that the site is partially located within Geology Hazard Category (GHC) 53 as shown on the San Diego Seismic Safety Study maps. GHC 53 is characterized as having adverse geologic structure. The consultant should address if the geologic structure of the site is adverse with respect to slope stability for the proposed mining, reclamation, or grading plan slopes."*

Response: A review of published geologic maps and previous geotechnical studies on the property reveal that the geologic bedrock units underlying the site consist of Stadium Conglomerate mantled by a relatively thin layer of Very Old Paralic deposits. Observation of significant exposures of these units on the property indicates that the Stadium Conglomerate is very dense with various percentages of sand, gravel and cobble. Intermittent "clean" sand lenses are also present. Significantly steep and high temporary slopes have been excavated in these materials to extract the resources and adverse geologic structure or slope instability has not been observed. Based on these observations, it is our opinion that adverse geologic structure is not present and the slopes constructed during mining, reclamation and the ultimate site grading will be generally stable.

Comment 35: *The consultant could consider updating their description of the site geology to be consistent with current regional geologic mapping (Kennedy and Tan, 2008).*

Response: This comment refers to the re-naming of the Linda Vista Formation to Very Old Paralic deposits. Figures 1 and 2 have been updated to reflect this change. The nomenclature used in the initial geotechnical reports will be modified during future updates.

Comment 36: *In addition to the geologic hazards previously described in the referenced geotechnical documents the consultant could consider addressing the following geologic hazards with respect to the proposed mining plan, reclamation plan, and tentative map.*

Response: Please see comments below. Most responses do not apply to the mining and reclamation plan since those grades represent a temporary condition (e.g. differential settlement).

Comment 37: *Address differential settlement/seismic compaction*

Response: The compression potential of properly compacted fill placed during site grading will be a consideration during the design and construction of future improvements. In this regard, anticipated settlements based on fill thickness and geometry will be considered in future foundation designs for structures. In addition, sharp transitions from bedrock to thick fills beneath buildings and

underground improvements (e.g. sewer, storm drain, etc.) will be softened during remedial grading by sloping steep bedrock surfaces.

Comment 38: *Address hydrocompaction/consolidation*.

Response: Please see response to Comment 37.

Comment 39: *Address gross and surficial slope stability*.

Response: Future site grading will consist of removing and compacting mining waste which primarily consists of sandy reject from the Stadium Conglomerate (i.e. yellow fill). Fill embankments including slopes will be constructed with this granular material. Slope excavations in the Stadium Conglomerate will expose dense granular bedrock. Based on our experience with these materials, the slopes will be stable with respect to gross and surficial instability. This opinion will be validated in future update reports.

Comment 40: *Address flooding due to possible dam collapse*.

Response: It is presumed that this comment pertains to a theoretical collapse of the Lake Miramar Dam located approximately 6,600 feet east of the eastern property boundary as the crow flies. Although a dam break analysis was not performed as part of our geotechnical studies, it is our opinion that the potential for significant flooding of the Stone Creek project from a dam break is relatively low. This opinion is based on the distance of the site from the dam and a qualitative evaluation of ground topography west of the dam. In this regard, several topographic depressions which would convey flood water from the dam area are interrupted by elevated topography mainly associated with Interstate 15. If floodwater was to make it to the project boundary it would likely follow the existing drainage features and be conveyed through the project in the designed channel.

Comment 41: *Address potential impacts, mitigation measures, and unmitigated significant effects*.

Response: The potential impacts of the geologic hazards described in Items 37 through 40 will be mitigated during site grading and foundation design (i.e. differential settlement, hydrocompaction, etc.). It is our opinion that there are no unmitigated significant effects that would impact development of the site as presently proposed.

Comment 42: *Indicate if the proposed mining, reclamation grading, or grading shown on the vesting tentative map will destabilize or result in settlement of adjacent property or right of way*.

Response: It is our opinion that the proposed mining, reclamation and tentative map grading will not destabilize or result in settlement of the adjacent properties or the right-of-way.

Comment 43: *The seismic design criteria provided in the referenced soil and geologic reconnaissance report are not applicable. The consultant could consider providing updated information.*

Response: Updated California Building Code information including seismic design criteria for the site will be provided in a future update geotechnical correspondence.

Comment 44: *As noted in the LDR-Engineering review comments (item 101), the analysis of permanent storm water BMP's cannot be deferred and must be addressed at this time. If the proposed storm water BMP's result in active or passive storm water infiltration or percolation, the geotechnical consultant should address the BMP's in accordance with Appendix F of the City's Guidelines for Geotechnical Reports.*

Response: We have reviewed the BMP's on the referenced Vesting Tentative Map prepared by BDS Engineering (Reference 2). It is understood that fifteen underground and above ground basins of various sizes are proposed on the project, nine will be permanent water quality basins (hydro-modification) and six will be temporary sediment basins. Above ground bio-retention facilities and below grade hydrodynamic separators (sealed chambers) are also planned. Geocon recommends lining the hydro-modification facilities with an impermeable membrane below the permeable soil mix to prevent saturation of the underlying soils based on unsuitable conditions of engineered, compacted fill per Appendix F of the City's Guidelines for Geotechnical Reports. With respect to passive infiltration, Geocon recommends lining the temporary sediment basins with an impermeable membrane where the potential exists for lateral migration of storm water to affect adjacent improvements.

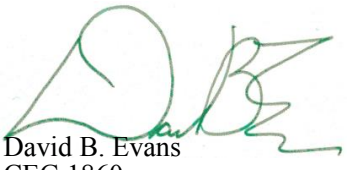
Comment 45: *The engineer of work should show proposed reclamation grades in the southern part of reclamation plan sheets 6 and 7, north and adjacent to the proposed quarry walls.*

Response: Please see the requested information on the civil plan.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

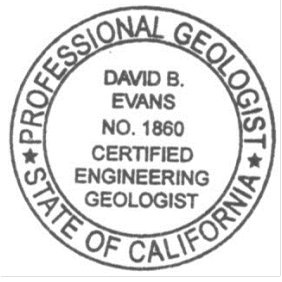
Very truly yours,

GEOCON INCORPORATED



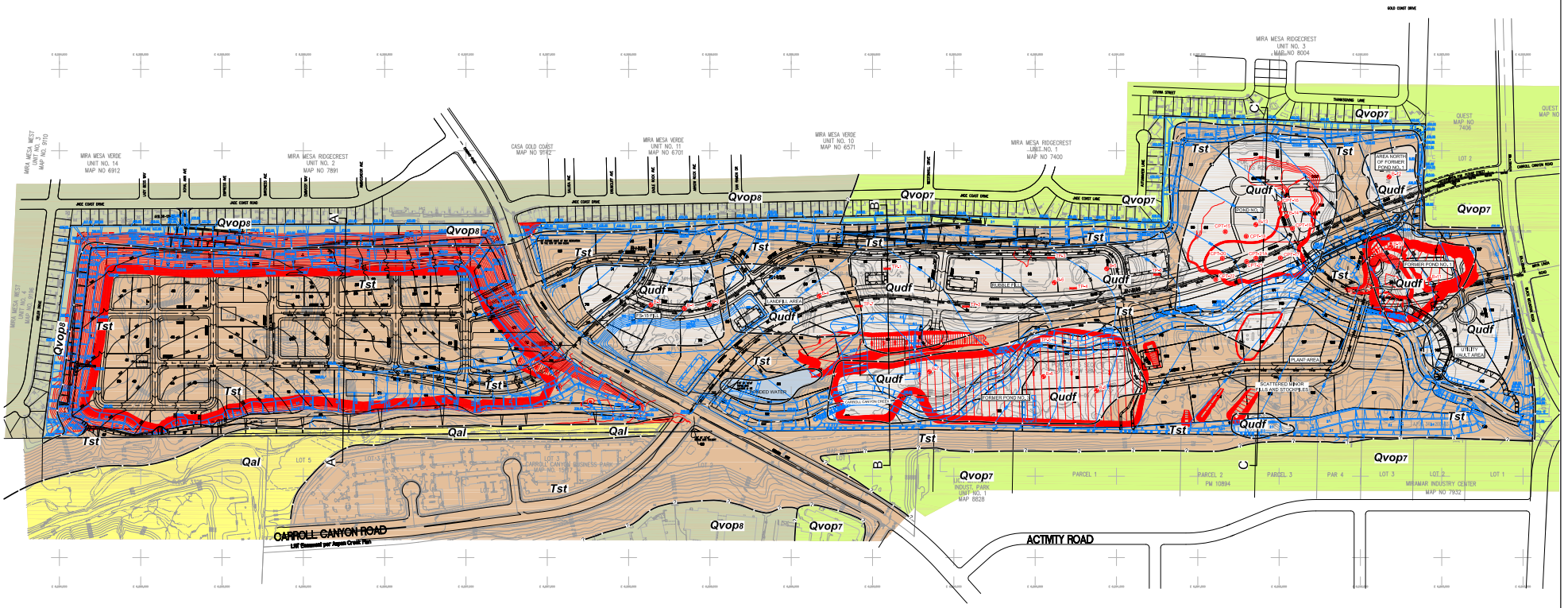
Rodney C. Mikesell
GE 2533

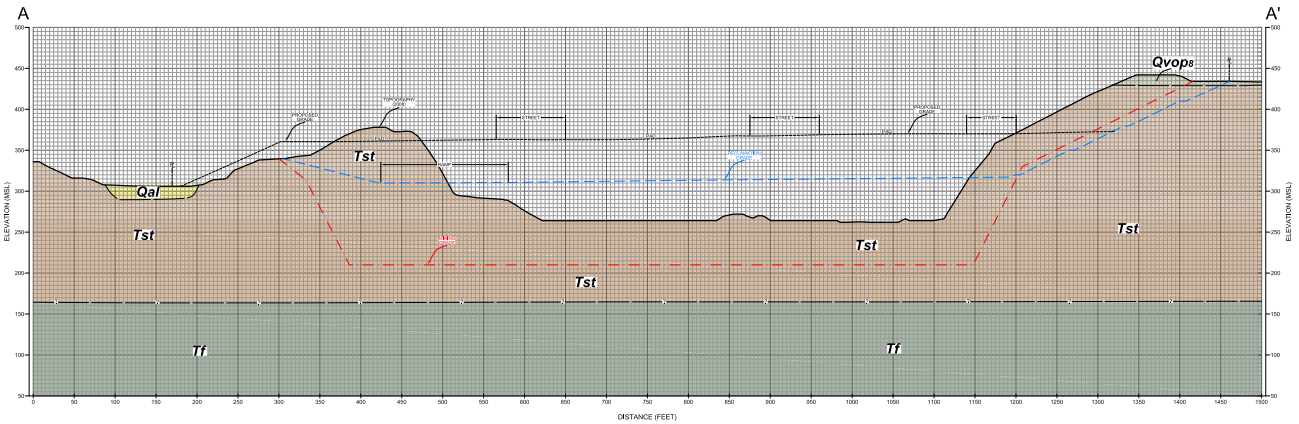
David B. Evans
CEG 1860



RCM:DBE:dmc

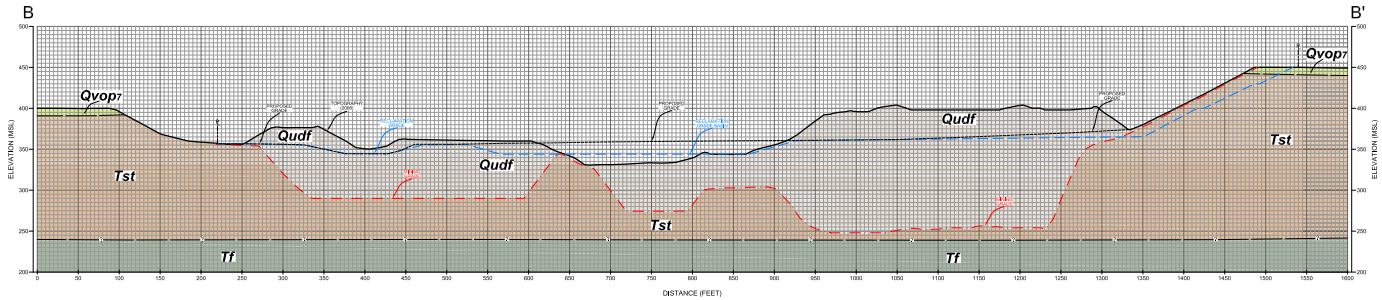
(2) Addressee
(4) KLR Planning
Attention: Ms. Karen Ruggels
(e-mail) Vulcan Materials Company
Attention: Ms. Patty Schreibman


CARROLL CANYON ROAD
LSF Comment per Jaques Creek Plan
ACTIVITY ROAD
Qvop8
Qvop7
Qudf
Qal
Tst
B
C
SCALE 1"= 200'
0' 100' 200' 300' 400' 600' 800'
GEOCON LEGEND
Qudf — UNDOCUMENTED FILL
Qal — ALLUVIUM
Qvop7 — VERY OLD PARALIC DEPOSITS - UNIT 7
Qvop8 — VERY OLD PARALIC DEPOSITS - UNIT 8
Tst — STADIUM CONGLOMERATE
APPROX. LOCATION OF EXPLORATORY TRENCH (Geocon Inc. 2005)
APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 2005)
APPROX. LOCATION OF CONE PENETROMETER TEST (Geocon Inc. 2005)
APPROX. LOCATION OF GEOLOGIC CONTACT
ALIGNMENT OF CARROLL CANYON CREEK AND TRIBUTARY
CARROLL CANYON TOPOGRAPHY (2008)
RECLAMATION GRADES
MINING GRADES
PROPOSED GRADES
GEOLOGIC MAP
STONE CREEK
SAN DIEGO, CALIFORNIA
GEOCON INCORPORATED
SCALE 1" = 200'
DATE 02 - 24 - 2015
PROJECT NO. 07524 - 52 - 02
FIGURE 1
SHEET 1 OF 1



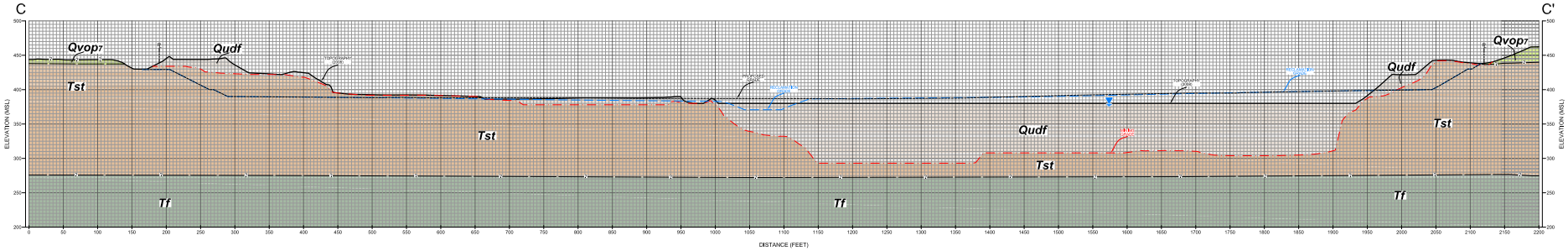
GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION B-B'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION C-C'

SCALE: 1" = 50' (Vert. = Horiz.)

GEOCON LEGEND

- Qudf — UNDOCUMENTED FILL
- Qal — ALLUVIUM
- Qvop7 — VERY OLD PARALIC DEPOSITS - UNIT 7
- Qvop8 — VERY OLD PARALIC DEPOSITS - UNIT 8
- Tst — STADIUM CONGLOMERATE
- Tf — FRIARS FORMATION
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT (Dashed Where Uncertain)
- SURFACE TOPOGRAPHY IN 2009
- RECLAMATION GRADE
- MINING GRADE
- PROPOSED GRADE
- SURFACE GROUNDWATER

GEOLOGIC CROSS - SECTIONS

STONE CREEK
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ● ENVIRONMENTAL ● MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE: 1" = 50'
DATE: 02 - 24 - 2015
PROJECT NO.: 07524 - 32 - 02
FIGURE: 2
SHEET: 1 OF 1

Project No. 07524-32-02
November 27, 2017

KLR Planning
926 Camino De La Reina
San Diego, California 92108

Attention: Ms. Karen Ruggles

Subject: RESPONSE TO REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328; PTS NO. 67943; W.O. NO. 42-2637
SAN DIEGO, CALIFORNIA

References:
1. *Stone Creek Conditional Use Permit, Reclamation Plan*, prepared by BDS Engineering, Inc., dated April 14, 2017.
2. *Stone Creek Vesting Tentative Map, No. 208328, P.T.S. No. 67943, City of San Diego*, prepared by BDS Engineering, Inc. dated April 14, 2017.

Dear Ms. Ruggles:

This correspondence has been prepared to respond to comments contained in the City of San Diego's *Cycle 63 and Cycle 90 Reviews* dated October 1, 2014, and June 2, 2017, respectively. The information was presented in a *Cycle Issues Draft* dated August 10, 2017. The review comments followed by our responses are presented below.

Comment 37: *Address differential settlement/seismic compaction.*

Response: The compression potential of properly compacted fill placed during site grading will be a consideration during the design and construction of future improvements. In this regard, anticipated settlements based on fill thickness and geometry, and the assumption that the fills will become fully saturated, will be considered in future foundation designs for the proposed structures.

Upon the completion of grading, the conditions beneath each structure will be evaluated and the type of foundation as well as reinforcement will be recommended based on the anticipated total and differential settlement that may occur if the supporting embankments become fully saturated. In addition, sharp transitions from bedrock to thick fills beneath buildings and underground improvements (e.g. sewer, storm drain, etc.) will be softened during remedial grading by sloping steep bedrock surfaces.

With respect to seismic settlement, the potential for adverse settlement is low. At the completion of grading, the site will be underlain by compacted fill and native formational bedrock soils. The fills will be compacted to at least 90 percent relative compaction and are not expected to experience significant settlement during a seismic event. The majority of the site is also not susceptible to liquefaction considering compressible soils will be removed and replaced as compacted fill within structural improvement areas. For those areas where compressible soils will be left in-place, recommendations will be provided in update studies to mitigate potential settlement based on planned site usage. Recommendations could include installation of wick drains and surcharge embankments.

Comment 38: *Address hydrocompaction/consolidation.*

Response: Please see response to Comment 37. In addition to the anticipated hydrocompaction (see discussion in response below to Comment 48), consolidation of saturated clay deposits that will be left in place beneath proposed embankments will be an important design consideration. Future update studies will address these areas and provide specific recommendations with respect to settlement and mitigation. Previous studies on the site by Geomatrix provided preliminary wick drain design information and surcharge recommendations to consider the consolidation of these soils.

Comment 43: *The seismic design criteria provided in the referenced soil and geologic reconnaissance report are not applicable. The consultant could consider providing updated information.*

Response: Presented below are updated seismic design criteria in accordance with the 2016 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class D. We evaluated the Site Class based our experience for the site sub surface soils that will be present at the completion of grading using Section 1613.3.2 of the 2016 CBC, and Table 20.3-1 of ASCE 7-10. The values presented in Table 1 are for the risk-targeted maximum considered earthquake (MCE_R).

Table 2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G). Conformance to the criteria in Tables 1 and 2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive.

TABLE 1
2016 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2016 CBC Reference
Site Class	D	Table 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	0.933g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.361g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.127	Table 1613.3.3(1)
Site Coefficient, F_V	1.677	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.051g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.606g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.701g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.404g	Section 1613.3.4 (Eqn 16-40)

TABLE 2
2016 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.364g	Figure 22-7
Site Coefficient, F_{PGA}	1.136	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.414g	Section 11.8.3 (Eqn 11.8-1)

Comment 48: *The mining operations have resulted in deep quarry pit excavations that currently retain surface water. These artificial basins will be filled with compacted fill as part of the proposed reclamation and development. The consultant should indicate if the compacted fill will become partially or fully saturated due to infiltration of water from rainfall, irrigation, Carroll Creek, or other sources.*

Response: The degree of saturation of a fill embankment over time depends on several factors such as the porosity and permeability of the soil, source and duration of water infiltration (e.g. meteoric, irrigation, etc.) and the ability of the embankment to drain or retain the moisture. Due to the unpredictability of whether or not an embankment will become partially or fully saturated over time, it is common practice in geotechnical engineering design to conservatively assume that all fills will eventually become fully saturated. In this regard, the magnitude of hydro-compression often used in design for

properly compacted embankments under saturated conditions typically ranges from 0.2 percent to 0.4 percent of the total embankment thickness. With granular soils, some of the anticipated settlement will occur during fill placement prior to building construction.

Comment 49: *The project's geotechnical consultant indicates that settlement on the order of 0.3 percent (approximately 2.5 inches of settlement for a 70-foot thick fill) may occur if the compacted fill becomes saturated. If impacts related to settlement of proposed compacted fill are indicated, recommend mitigation measures.*

Response: Please see the response to Comment 48 for a discussion on hydro-compression. The wetting front or moisture front that occurs when fills become saturated is typically a slow and gradual process. Consequently, the resulting compression is typically uniform and unperceivable. The foundation design recommendations provided upon completion of site grading considers the conditions beneath each proposed structure with respect to fill thickness and fill thickness differential. The recommended foundation type and reinforcing considers both of these factors and the magnitude of settlement that may occur in the event the fill becomes filly saturated.

Comment 50: *The project's geotechnical consultant indicates that full or partial infiltration BMP's in compacted fills should be considered infeasible. The consultant should indicate if the impacts associated with water infiltration can be mitigated to an acceptable level.*

Response: At the completion of grading, the site will be underlain by relative thick compacted fills and native formational bedrock of the Stadium Conglomerate. Infiltration into the compacted fills is not recommended. Impacts associated with soil settlement and/or heave on proposed structural improvements cannot be mitigated to an acceptable level.

Infiltration into the Stadium Conglomerate is also not feasible considering its dense and cemented nature. Based on our experience, seepage will perch on the Stadium Conglomerate and migrate latterly uncontrolled.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

REGISTERED PROFESSIONAL ENGINEER
RODNEY C. MIKESELL
No.2533
GEOTECHNICAL
STATE OF CALIFORNIA

David B. Evans
CEG 1860

PROFESSIONAL GEOLOGIST
DAVID B. EVANS
NO. 1860
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

DBE:RCM:dmc

(2) Addressee
(e-mail) Vulcan Materials Company
Attention: Ms. Patty Schreibman

RESPONSE TO LDR – ENGINEERING REVIEW COMMENTS

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

VULCAN MATERIALS COMPANY
SAN DIEGO, CALIFORNIA

OCTOBER 12, 2016
REVISED JANUARY 5, 2018
PROJECT NO. 07524-32-02

Project No. 07524-32-02
October 12, 2016
Revised January 5, 2018

Vulcan Materials Company, Western Division
Properties Office
7220 Trade Street, Suite 205
San Diego, California 92121

Attention: Ms. Patricia Schreibman

Subject: RESPONSE TO LDR-ENGINEERING REVIEW COMMENTS
STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

References:
1. *Soil and Geologic Reconnaissance, Stone Creek, Vulcan Materials Company, Carroll Canyon Facility, San Diego, California*, prepared by Geocon Incorporated, revision dated May 10, 2006 (Project No. 07524-42-01).
2. *Vesting Tentative Map No. 208328, Stone Creek, P.T.S. No. 67943, City of San Diego, California;* prepared by BDS Engineering, Inc., plot dated August 11, 2016 (Job No. 04-23).

Dear Ms. Schreibman:

This revised correspondence has been prepared to respond to comments contained in the June 28, 2016, *Cycle Issues* prepared by the City of San Diego LDR-Engineering review section. The comment along with our response is presented below. Our previous document titled *Response to LDR-Geology Review Comments*, dated October 12, 2016, referenced the original 2016 City of San Diego Storm Water standards manual. The information provided in this document is in accordance with the new storm water standards manual to be formally adopted soon.

Item No. 130: *The design of any LID or treatment control BMP which allows for infiltration of runoff shall be accompanied by a Geotechnical Investigation of the surrounding soils. A Geologic Investigation Report shall be attached to the Storm Water Quality Management Plan and prepared in accordance with the Appendix C and D of the City's Storm Water Standards. LDR _Geology will need to review the SWQMP and geotechnical report to confirm if the site has full, partial or no infiltration.*

Response: This document is intended to serve as the requested report. The intent of this document is to provide sufficient information to evaluate storm water BMP feasibility in accordance with the new City of San Diego Storm Water Standards manual to be formally adopted soon.

The subject site supports an active mining operation where the Stadium Conglomerate Formation is excavated and processed to remove the rock particles from the soil matrix. The rock is crushed to create aggregate products and the soil byproduct is disposed of within the on-site excavations. In addition, inert fill materials from offsite sources are accepted in some areas of the quarry and placed as undocumented fills. The western portion of the property contains the active mining operation exposing the Stadium Conglomerate and the eastern approximately two-thirds have been generally in-filled with undocumented materials. The ultimate site development will include removing and compacting the undocumented fills and performing excavations around the perimeter of the property. The resulting grading will yield fill thicknesses up to approximately one hundred feet. Due to the extent of remedial grading that will occur during site development, all of the basins will be underlain by properly compacted fill soil.

The scope of our study included performing four, in-situ permeability tests where the Stadium Conglomerate is exposed in the western portion of the property to aid in evaluating the feasibility of storm water BMP design considering the bedrock. In addition, to consider the compacted fill embankments that will result after remedial grading, four random soil samples were collected that may represent the future fill materials. These samples were remolded to ninety percent of their maximum dry density at near optimum moisture content and subjected to laboratory permeability testing. In addition, laboratory hydro-consolidation testing on these samples was performed to evaluate the volume change (settlement/heave) that would occur if water is allowed to infiltrate the soil. The following information is provided to support storm water BMP design in accordance with the *new City of San Diego Storm Water Standards Manual.*

A geotechnical investigation, including field and laboratory testing, slope stability, remedial grading recommendations, seismic design, foundation and retaining wall design, etc., has not been performed. The following information is intended to evaluate the feasibility of on-site storm water mitigation. A complete geotechnical investigation will be prepared as project plans progress.

STORM WATER MANAGEMENT INVESTIGATION

We understand storm water management devices are being proposed in accordance with the new City of San Diego Storm Water Standards Manual. If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not

performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

TABLE 1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The subject site has historically and is currently being used as a mining operation to extract aggregate from the underlying Stadium Conglomerate in order to manufacture aggregate products for the San Diego region. The proposed storm water basins will be founded in compacted fill placed over Stadium Conglomerate. The compacted fill and formational materials should be classified as Soil Group D. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil. Table 2 presents the information from the USDA website. The Hydrologic Soil Group Map presents output from the USDA website showing the limits of the soil units.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (Inches/ Hour)
Gravel Pit	GP	17.6	---	---
Redding gravelly loam	RdC	28.5	D	0.00 – 0.06
Redding cobbly loam	ReE	17.1	D	0.00 – 0.06
Redding cobbly loam	RfF	15.6	D	0.00 – 0.06
Riverwash	Rm	16.4	D	5.95 – 19.98
Terrace Escarpments	TeF	4.7	---	---

In-Situ Testing

We performed four in-situ Soil Moisture, Inc. Aardvark Permeameter tests at the locations shown on the attached *Site Plan*, Figure 2. The test borings were generally 10 to 12 inches in diameter due to large cobble content. The results of the tests provide parameters regarding the saturated hydraulic conductivity and infiltration characteristics of on-site soil and geologic units. Table 3 presents the results of the field saturated hydraulic conductivity/infiltration rates obtained from the Aardvark Permeameter tests. The data sheets are also attached herein in Appendix A. We applied a feasibility factor of safety of 2 to the infiltration test results. Soil infiltration rates from in-situ tests can vary significantly from one location to another due to the non-homogeneous characteristics inherent to most soil.

TABLE 3
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	Geologic Unit	Test Depth (feet, below grade)	Field-Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Field Infiltration Rate (inch/hour)
P-1	Tst	1.0	0.06	0.03
P-2	Tst	1.0	0.13	0.07
P-3	Tst	1.33	0.44	0.22
P-4	Tst	1.08	0.11	0.06

Laboratory Testing

Laboratory hydraulic conductivity testing was performed on 4 remolded soil samples in accordance with ASTM Test Method D5084. The samples were remolded to approximately 90 percent of the applicable maximum dry density at or slightly above optimum moisture content. The objective of this

testing was to evaluate the permeability characteristics of proposed compacted fill that may be placed across the site to achieve proposed grades. The laboratory test results are summarized in Table 4 below and presented in Appendix B. A feasibility factor of safety of 2 was applied to the laboratory test results to determine the infiltration rate.

TABLE 4
LABORATORY HYDRAULIC CONDUCTIVITY TEST RESULTS
ASTM D5084

Test No.	Soil Type	Initial Dry Density, pcf	Initial Moisture Content (%)	Final Dry Density, pcf	Final Moisture Content (%)	Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Field Infiltration Rate (inch/hour)
1	SM	119.8	7.7	117.1	15.0	0.38	0.19
2	SM	119.6	7.7	117.6	15.0	0.10	0.05
3	SM	114.6	10.1	111.9	18.4	0.14	0.07
4	SM	114.3	10.0	111.9	18.2	0.19	0.10

Laboratory hydro-consolidation testing was also performed on two of the four soil samples collected that may represent the ultimate compacted fill. The samples were remolded to approximately 90 percent of the applicable maximum dry density at near optimum moisture content. The samples were loaded and wetted as shown on Figures B-1 through B-4 in Appendix B. The consolidation test results indicate that the proposed compacted fill, derived from on-site soils, may hydro-consolidate approximately 0.2 to 0.3 percent of the total thickness when water is allowed to soak into the soil. In addition, at lighter overburden loads (500 psf), both samples swelled between 0.4 and 1.2 percent. The results of this testing indicate that a 70-foot thick compacted fill may potentially settle on the order of 2.5 inches if water is allowed to infiltrate over time. The upper approximately 5 feet could heave on the order of 0.75 inches.

STORM WATER MANAGEMENT CONCLUSIONS

The *Site Plan*, Figure 2, presents the existing and proposed topography, proposed improvements, and the locations of the in-situ infiltration test locations.

Infiltration Rates

The results of the unfactored infiltration rates obtained from in-situ field testing (i.e. field saturated hydraulic conductivity) show ranges of 0.06 to 0.44-inches per hour. After applying a feasibility factor of safety of 2.0, the infiltration rates range between 0.03 to 0.22-inches per hour. The infiltration test results show the on-site soil is variable across the site. A single design rate for an area could not be accurate based on the variability. The results of the unfactored infiltration rates obtained

from the laboratory testing on remolded samples (i.e. field saturated hydraulic conductivity of proposed compacted fill) show ranges of 0.10 to 0.38-inches per hour. After applying a feasibility factor of safety of 2.0, the infiltration rates range between 0.05 to 0.19-inches per hour. Therefore, based on the results of the field and laboratory infiltration tests, anticipated grading, and our experience, full infiltration should be considered infeasible. The results of the permeability testing are presented in Appendix A.

Based on the results of the hydro-consolidation testing, the upper approximately 5 feet of compacted fill may heave when additional water is added. The test results also indicate that settlement could occur, generally on the order of 0.3 percent of the fill thickness, or a 70-foot thick fill may settle approximately 2.5 inches as the result of saturated conditions. Therefore, full and partial infiltration should be considered infeasible for storm water BMP's founded in compacted fill.

Groundwater Elevations

Groundwater was not encountered during reclamation grading/mining. Several ponds have formed due to surface water, rainfall, and on-site mining activities. Based on review of monitoring well data obtained from www.water.ca.gov, groundwater to the west of the site was shown at an elevation of approximately 80 feet (msl). The proposed basins will be situated at elevations ranging between approximately 350 feet (msl) to 410 ft (msl), therefore groundwater should be expected several hundred feet below the site and is not expected to be a factor. Groundwater mounding is caused when infiltration is allowed and the lateral hydraulic conductivity is relatively low causing an increase in the groundwater table. Groundwater mounding could occur if full infiltration was considered. For partial infiltration, groundwater mounding is not likely given the expected low volume of water to infiltrate vertically into the ground.

Soil or Groundwater Contamination

Based on review of the Geotracker website, no active cleanup sites exist on or adjacent to the subject site. In addition, we are not aware of any contaminated soils or shallow groundwater on the site that would preclude storm water infiltration. An environmental assessment was not part of our scope of work.

Slopes

Infiltration BMP's adjacent to fill slopes should be avoided to prevent daylight water seepage and slope instability.

Storm Water Management Devices

Based on the discussion above, both the field and laboratory infiltration tests did not meet the feasibility criteria for full infiltration. Because the proposed storm water basins will be supported by approximately 20 to 100 feet of compacted fill, infiltration BMP's are considered infeasible. As such, a subdrain is recommended to prevent over-flow of the system. An impermeable liner, such as a 30 mil PVC or HDPE, should be used for any portion of a storm water BMP founded in compacted fill. The subdrain should be perforated, installed near the base of the excavation, be at least 4-inches in diameter and consist of Schedule 40 PVC pipe. The final segment of the subdrain outside the limits of the storm water BMP should consist of solid pipe and connected to a proper outlet.

Storm Water Standard Worksheets

The Storm Water Standard manual stipulates the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1) worksheet information to help evaluate the potential for infiltration on the property. Worksheet C.4-1 is presented in Appendix C.

The regional storm water standards also have a worksheet (Worksheet D.5-1) that helps the project civil engineer estimate the factor of safety based on several factors. Table 5 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 5
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Based on the geotechnical testing and the previous table, Table 6 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE 6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	3	0.75
Predominant Soil Texture	0.25	2	0.50
Site Soil Variability	0.25	3	0.75
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.25

[1] The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data provided above. Additional information is required to evaluate the design factor of safety.

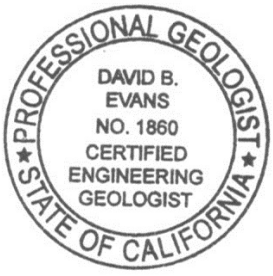
If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

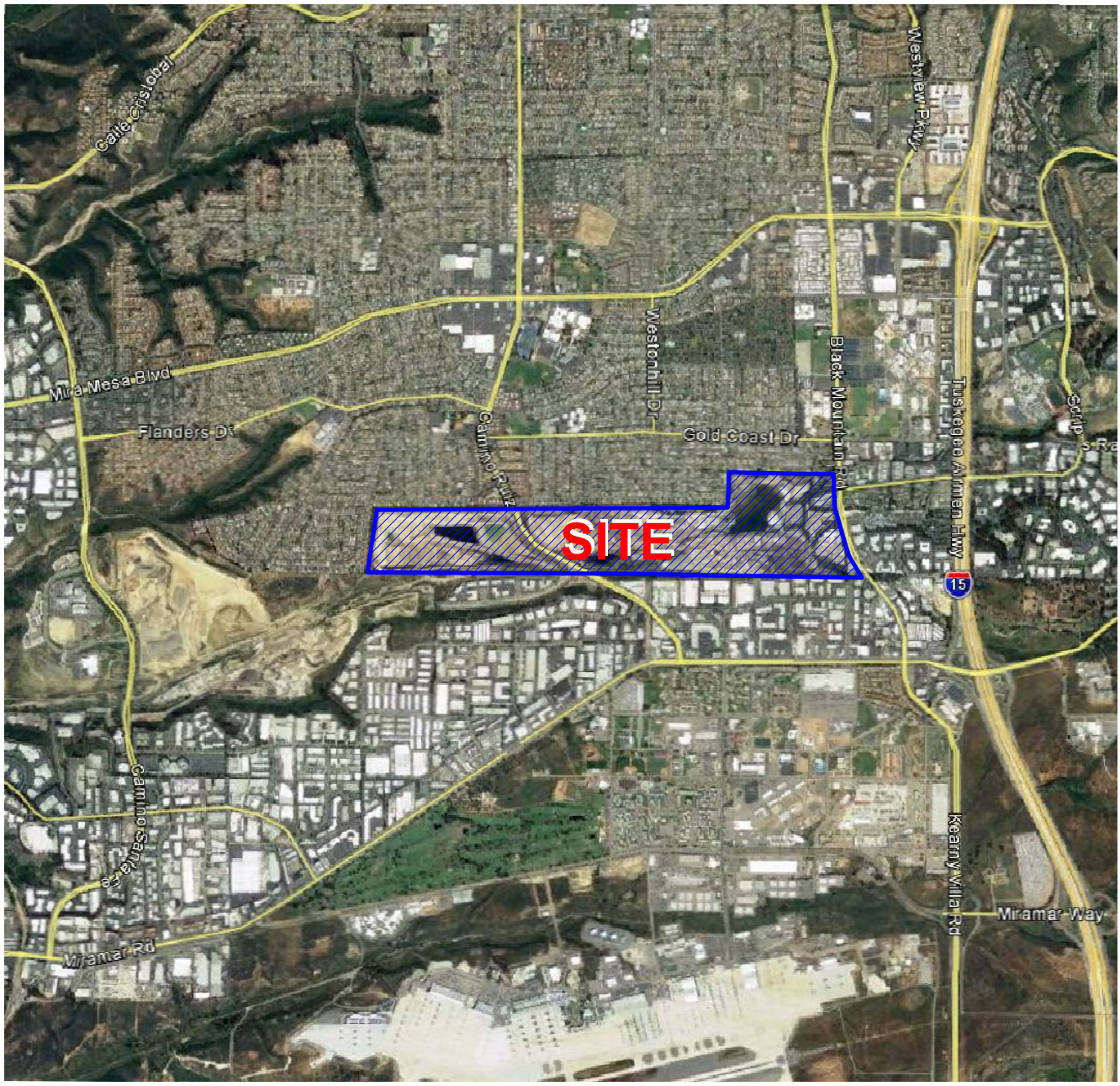
Trevor E. Myers
RCE 63773

David B. Evans
CEG 1860



TEM:DBE:dmc

(e-mail) Addressee
(e-mail) BDS Engineering
Attention: Mr. Tom Jones
(e-mail) KLR Planning
Attention: Ms. Karen Ruggels



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N

NO SCALE

VICINITY MAP

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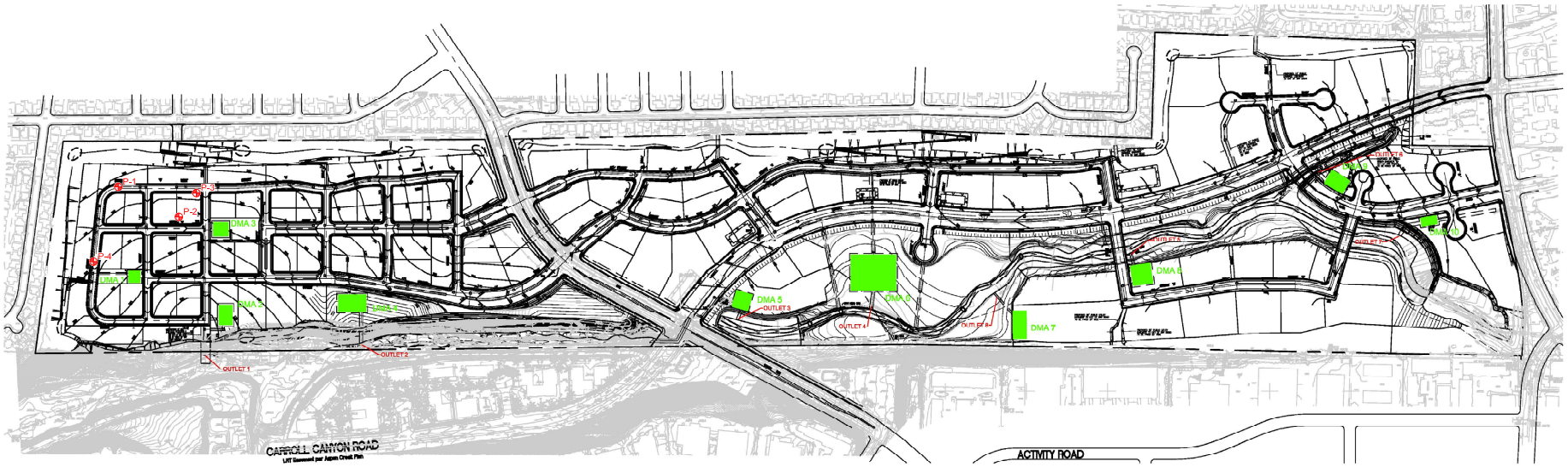
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

RM / AML		DSK/GTYPD

STONE CREEK
SAN DIEGO, CALIFORNIA

DATE 01 - 05 - 2018	PROJECT NO. 07524 - 32 - 02	FIG. 1

Plotted:01/05/2018 7:28AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\07524-32-02 STONE CREEK\DETAILS\07524-32-02 Vic Map.dwg



GRAPHIC SCALE
0' 150' 300' 450' 600' 900' 1200'
SCALE 1"=300' (on 36x24)

GEOCON LEGEND

P-2 ..... APPROX. LOCATION OF INFILTRATION TEST

SITE PLAN

STONE CREEK
SAN DIEGO, CALIFORNIA

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PHONE 858 558-6900 - FAX 858 558-6159

SCALE	1" = 300'
DATE	01 - 05 - 2018
PROJECT NO.	07524 - 32 - 02
FIGURE	2
SHEET	1 OF 1

APPENDIX A

APPENDIX A

AARDVARK PERMEAMETER TEST RESULTS

FOR

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

PROJECT NO. 07524-32-02

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Stone Creek	Date:	9/13/2016
Project Number:	07524-32-02	By:	TM
Borehole Location:	P-1	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

Borehole Diameter (inches):	10.00
Borehole Depth, **H** (feet):	1.00
Distance Between Reservoir & Top of Borehole (feet)	2.33
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	1.00

Wetted Area, **A** (in^2): 223.23

Distance Between Resevoir and APM, **D** (feet):	2.64
Head Height, **h** (inches):	4.61
Distance Between Constant Head and Water Table, **L** (inches):	1193

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			22.250			
2	10.00	10.00		21.540	0.71	0.71	1.97
3	30.00	20.00		21.120	0.42	1.13	0.58
4	50.00	20.00		20.795	0.32	1.46	0.45
5	70.00	20.00		20.560	0.24	1.69	0.33
6	80.00	10.00		20.445	0.11	1.81	0.32
7	90.00	10.00		20.330	0.12	1.92	0.32
8	100.00	10.00		20.220	0.11	2.03	0.30
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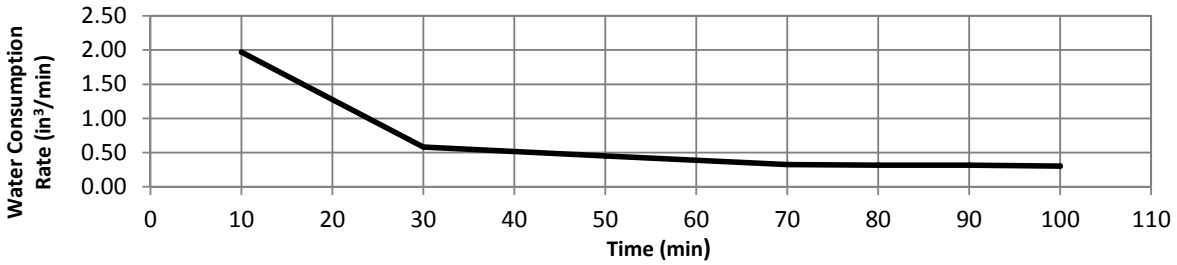
Steady Flow Rate, Q (in^3/min): 0.30



Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0010 in/min 0.06 in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Stone Creek	Date:	9/13/2016
Project Number:	07524-32-02	By:	TM
Borehole Location:	P-2	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

Borehole Diameter (inches):	10.00
Borehole Depth, **H** (feet):	1.00
Distance Between Reservoir & Top of Borehole (feet)	2.33
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	1.00

Wetted Area, **A** (in^2): 223.23

Distance Between Resevoir and APM, **D** (feet):	2.64
Head Height, **h** (inches):	4.61
Distance Between Constant Head and Water Table, **L** (inches):	1193

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			21.290			
2	10.00	10.00		20.945	0.34	0.34	0.96
3	30.00	20.00		20.345	0.60	0.95	0.83
4	40.00	10.00		20.050	0.29	1.24	0.82
5	50.00	10.00		19.765	0.29	1.53	0.79
6	60.00	10.00		19.495	0.27	1.80	0.75
7	70.00	10.00		19.230	0.27	2.06	0.73
8	80.00	10.00		18.980	0.25	2.31	0.69
9	90.00	10.00		18.730	0.25	2.56	0.69
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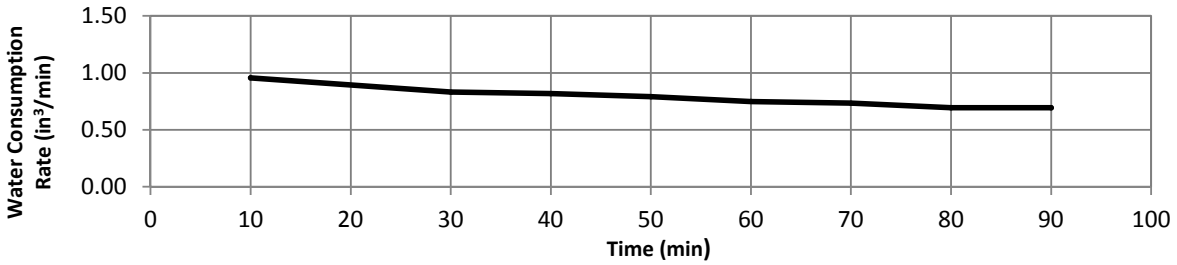
Steady Flow Rate, Q (in^3/min): 0.69



Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0022 in/min 0.13 in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Stone Creek	Date:	9/13/2016
Project Number:	07524-32-02	By:	TM
Borehole Location:	P-3	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

Borehole Diameter (inches):	12.00
Borehole Depth, **H** (feet):	1.33
Distance Between Reservoir & Top of Borehole (feet)	2.17
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	1.00

Wetted Area, **A** (in^2): 286.98

Distance Between Resevoir and APM, **D** (feet):	2.81
Head Height, **h** (inches):	4.61
Distance Between Constant Head and Water Table, **L** (inches):	1189

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			23.470			
2	20.00	20.00		19.475	4.00	4.00	5.54
3	40.00	20.00		16.855	2.62	6.62	3.63
4	50.00	10.00		15.805	1.05	7.67	2.91
5	60.00	10.00		14.785	1.02	8.69	2.83
6	70.00	10.00		13.775	1.01	9.70	2.80
7	80.00	10.00		12.785	0.99	10.69	2.74
8	90.00	10.00		11.815	0.97	11.66	2.69
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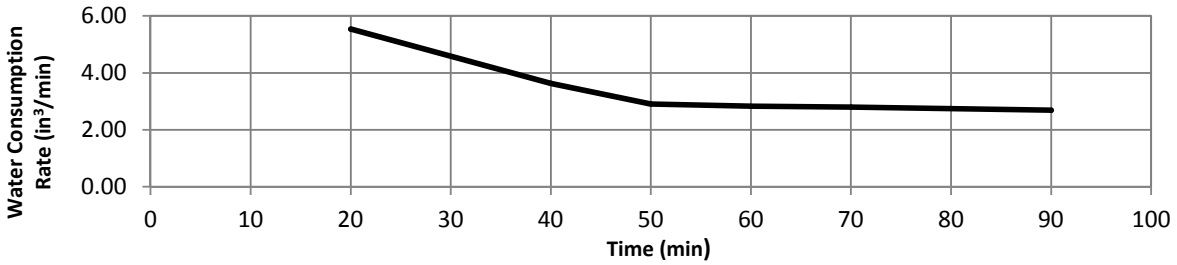
Steady Flow Rate, Q (in^3/min): 2.69



Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0074 in/min 0.44 in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Stone Creek	Date:	9/13/2016
Project Number:	07524-32-02	By:	TM
Borehole Location:	P-4	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

Borehole Diameter (inches):	12.00
Borehole Depth, **H** (feet):	1.08
Distance Between Reservoir & Top of Borehole (feet)	2.33
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	1.00

Wetted Area, **A** (in^2): 286.85

Distance Between Resevoir and APM, **D** (feet):	2.72
Head Height, **h** (inches):	4.61
Distance Between Constant Head and Water Table, **L** (inches):	1192

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			22.200			
2	15.00	15.00		21.080	1.12	1.12	2.07
3	20.00	5.00		20.830	0.25	1.37	1.39
4	25.00	5.00		20.645	0.18	1.56	1.03
5	30.00	5.00		20.475	0.17	1.73	0.94
6	35.00	5.00		20.305	0.17	1.90	0.94
7	40.00	5.00		20.175	0.13	2.03	0.72
8	45.00	5.00		20.030	0.15	2.17	0.80
9	50.00	5.00		19.880	0.15	2.32	0.83
10	55.00	5.00		19.760	0.12	2.44	0.67
11	60.00	5.00		19.640	0.12	2.56	0.67
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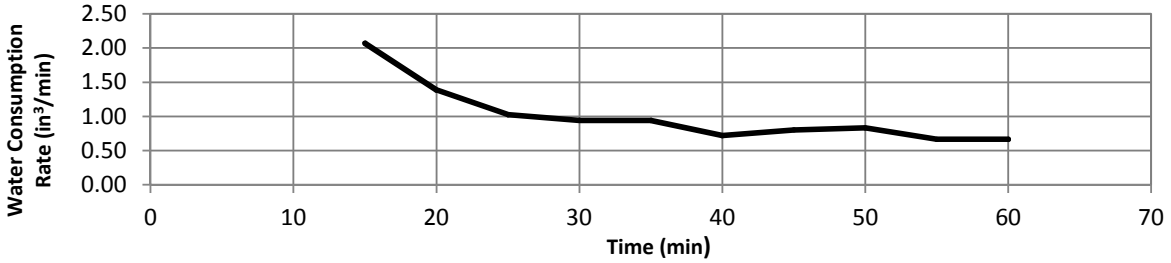
Steady Flow Rate, Q (in^3/min): 0.67



Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0018 in/min 0.11 in/hr

APPENDIX B

APPENDIX B

LABORATORY TEST RESULTS

FOR

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

PROJECT NO. 07524-32-02

Hydraulic Conductivity
(ASTM D5084)

Project Name:	Stone Creek		
Project Number:	07524-32-02	Cell Pressure (psi)	52
Beginning Test Date:	9/26/2016	In Pressure (psi)	50
Ending Test Date:	9/26/2016	Out Pressure (psi)	50
Sample ID:	#1	Burette area (cm^2)	0.872
Sample Description:	brown SM with trace clayey SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.65		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	3.029	3.029	3.025	3.03	7.69
Final Height (in.)	3.049	3.048	3.049	3.05	7.74
Initial Diameter (in.)	2.362	2.365	2.365	2.36	6.00
Final Diameter (in.)	2.388	2.377	2.384	2.38	6.05
Initial Area				4.39	28.32
Initial Volume (ft^3)	0.00769	Final Volume (ft^3)		0.00787	
Initial Volume (cm^3)	217.8	Final Volume (cm^3)		222.8	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	450.25	**7.7**	129.1	**119.8**	0.380	53.8
Final	480.71	15.0	134.7	117.1	0.412	96.5
Dry	417.97					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Outflow (ml)	Inflow (ml)	Outflow to Inflow Ratio	Permeability (cm/s)
9/26/16 10:37 AM			23.70	2.35	-	3.2	24.5					
	9/26/16 10:38 AM	60	22.25	3.75	-	2.8		21.2	1.45	1.40	1.04	2.83E-04
9/26/16 10:38 AM		60	22.25	3.75	-	2.8	21.2					
	9/26/16 10:39 AM	60	21.05	4.95	-	2.4		18.5	1.20	1.20	1.00	2.74E-04
9/26/16 10:39 AM		120	21.05	4.95	-	2.4	18.5					
	9/26/16 10:40 AM	60	20.00	6.00	-	2.1		16.1	1.05	1.05	1.00	2.76E-04
9/26/16 10:40 AM		180	20.00	6.00	-	2.1	16.1					
	9/26/16 10:41 AM	60	19.05	6.95	-	1.8		13.9	0.95	0.95	1.00	2.88E-04
9/26/16 10:41 AM		240	19.05	6.95	-	1.8	13.9					
	9/26/16 10:42 AM	60	18.25	7.75	-	1.6		12.0	0.80	0.80	1.00	2.80E-04
9/26/16 10:42 AM		300	18.25	7.75	-	1.6	12.0					
	9/26/16 10:43 AM	60	17.55	8.45	-	1.4		10.4	0.70	0.70	1.00	2.82E-04
		360										

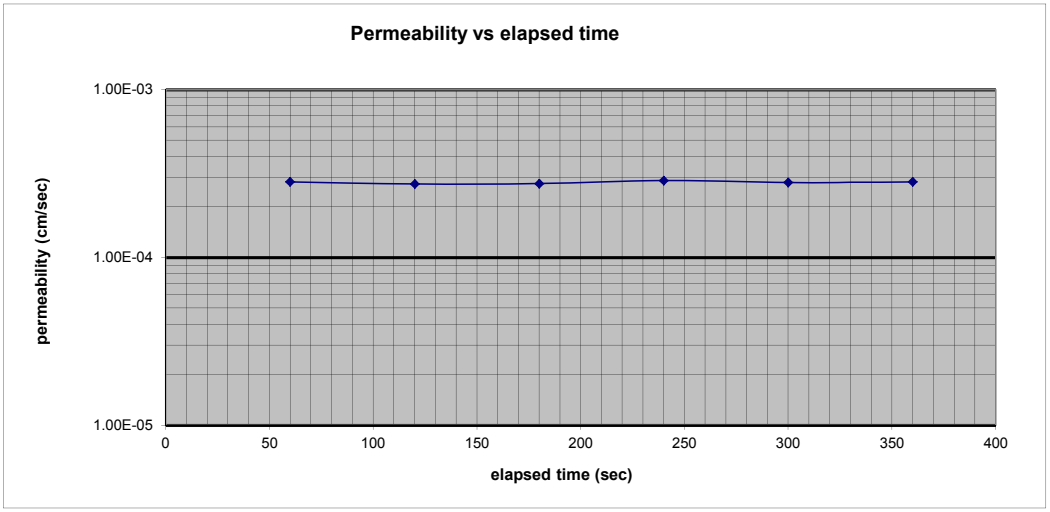
Average Permeability (cm/s):		**2.81E-04**
Permeability @ 20°C		**2.65E-04**
	in/hr:	**3.75E-01**

Notes: spec remolded to 90% of ASTM D1557 at optimum moisture

Average temperature during test °C = 22.6

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: TM



Hydraulic Conductivity
(ASTM D5084)

Project Name:	Stone Creek		
Project Number:	07524-32-02	Cell Pressure (psi)	72
Beginning Test Date:	9/26/2016	In Pressure (psi)	70
Ending Test Date:	9/26/2016	Out Pressure (psi)	70
Sample ID:	#2	Burette area (cm^2)	0.872
Sample Description:	brown SM with trace clayey SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.65		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	3.000	3.010	3.009	3.01	7.64
Final Height (in.)	3.036	3.020	3.025	3.03	7.69
Initial Diameter (in.)	2.367	2.370	2.364	2.37	6.01
Final Diameter (in.)	2.384	2.369	2.382	2.38	6.04
Initial Area				4.40	28.39
Initial Volume (ft^3)	0.00766	Final Volume (ft^3)		0.00778	
Initial Volume (cm^3)	216.8	Final Volume (cm^3)		220.4	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	447.35	**7.7**	128.8	**119.6**	0.383	53.5
Final	477.61	15.0	135.3	117.6	0.406	98.1
Dry	415.27					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Outflow (ml)	Inflow (ml)	Outflow to Inflow Ratio	Permeability (cm/s)
9/26/16 12:15 PM			23.88	1.20	-	3.4	26.0					
	9/26/16 12:17 PM	120	22.95	2.10	-	3.1		23.9	0.93	0.90	1.03	8.22E-05
9/26/16 12:17 PM		120	22.95	2.10	-	3.1	23.9					
	9/26/16 12:19 PM	120	22.15	2.90	-	2.9		22.1	0.80	0.80	1.00	7.80E-05
9/26/16 12:19 PM		240	22.15	2.90	-	2.9	22.1					
	9/26/16 12:21 PM	120	21.35	3.60	-	2.7		20.4	0.80	0.70	1.14	7.93E-05
9/26/16 12:21 PM		360	21.35	3.60	-	2.7	20.4					
	9/26/16 12:23 PM	120	20.70	4.30	-	2.5		18.8	0.65	0.70	0.93	7.73E-05
9/26/16 12:23 PM		480	20.70	4.30	-	2.5	18.8					
	9/26/16 12:25 PM	120	20.10	4.95	-	2.3		17.4	0.60	0.65	0.92	7.75E-05
9/26/16 12:25 PM		600	20.10	4.95	-	2.3	17.4					
	9/26/16 12:27 PM	120	19.50	5.50	-	2.1		16.1	0.60	0.55	1.09	7.72E-05
		720										

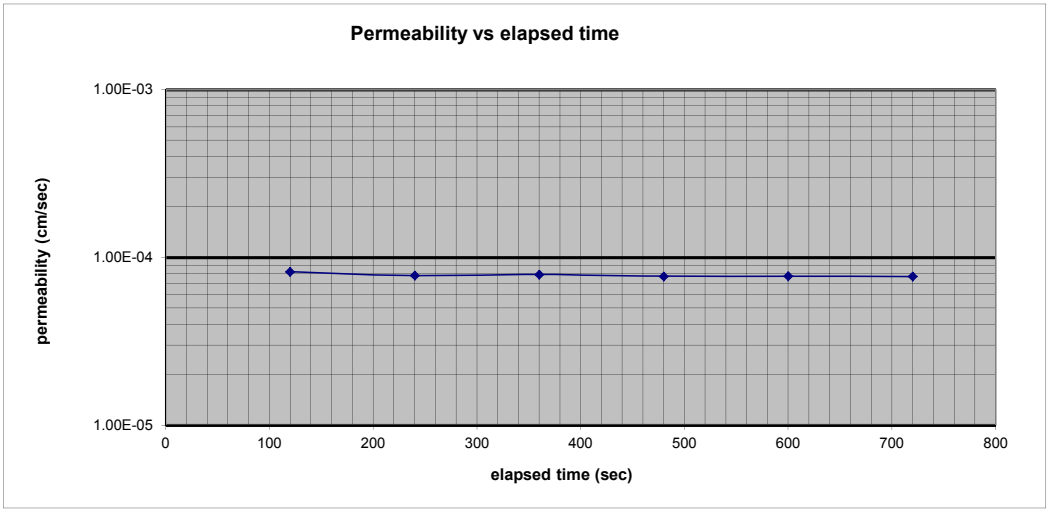
Average Permeability (cm/s):		**7.78E-05**
Permeability @ 20°C		**7.36E-05**
	in/hr:	**1.04E-01**

Notes: spec remolded to 90% of ASTM D1557 at optimum moisture

Average temperature during test °C = 22.3

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: TM



Hydraulic Conductivity
(ASTM D5084)

Project Name:	Stone Creek		
Project Number:	07524-32-02	Cell Pressure (psi)	72
Beginning Test Date:	9/26/2016	In Pressure (psi)	70
Ending Test Date:	9/26/2016	Out Pressure (psi)	70
Sample ID:	#3	Burette area (cm^2)	0.872
Sample Description:	brown SM with trace gravel	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.70		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.980	2.980	2.986	2.98	7.57
Final Height (in.)	3.025	3.006	3.018	3.02	7.66
Initial Diameter (in.)	2.380	2.385	2.385	2.38	6.05
Final Diameter (in.)	2.397	2.402	2.396	2.40	6.09
Initial Area				4.46	28.78
Initial Volume (ft^3)	0.00770	Final Volume (ft^3)		0.00789	
Initial Volume (cm^3)	218.0	Final Volume (cm^3)		223.3	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	440.76	**10.1**	126.2	**114.6**	0.470	58.1
Final	474	18.4	132.5	111.9	0.506	98.4
Dry	400.25					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Outflow (ml)	Inflow (ml)	Outflow to Inflow Ratio	Permeability (cm/s)
9/26/16 12:16 PM			23.90	1.20	-	3.4	26.0					
	9/26/16 12:18 PM	120	22.68	2.40	-	3.1		23.3	1.22	1.20	1.02	1.08E-04
9/26/16 12:18 PM		120	22.68	2.40	-	3.1	23.3					
	9/26/16 12:20 PM	120	21.60	3.45	-	2.7		20.8	1.08	1.05	1.03	1.06E-04
9/26/16 12:20 PM		240	21.60	3.45	-	2.7	20.8					
	9/26/16 12:22 PM	120	20.65	4.40	-	2.5		18.6	0.95	0.95	1.00	1.06E-04
9/26/16 12:22 PM		360	20.65	4.40	-	2.5	18.6					
	9/26/16 12:24 PM	120	19.80	5.25	-	2.2		16.7	0.85	0.85	1.00	1.06E-04
9/26/16 12:24 PM		480	19.80	5.25	-	2.2	16.7					
	9/26/16 12:26 PM	120	19.05	6.00	-	2.0		15.0	0.75	0.75	1.00	1.04E-04
9/26/16 12:26 PM		600	19.05	6.00	-	2.0	15.0					
	9/26/16 12:28 PM	120	18.40	6.68	-	1.8		13.4	0.65	0.68	0.96	1.03E-04
		720										

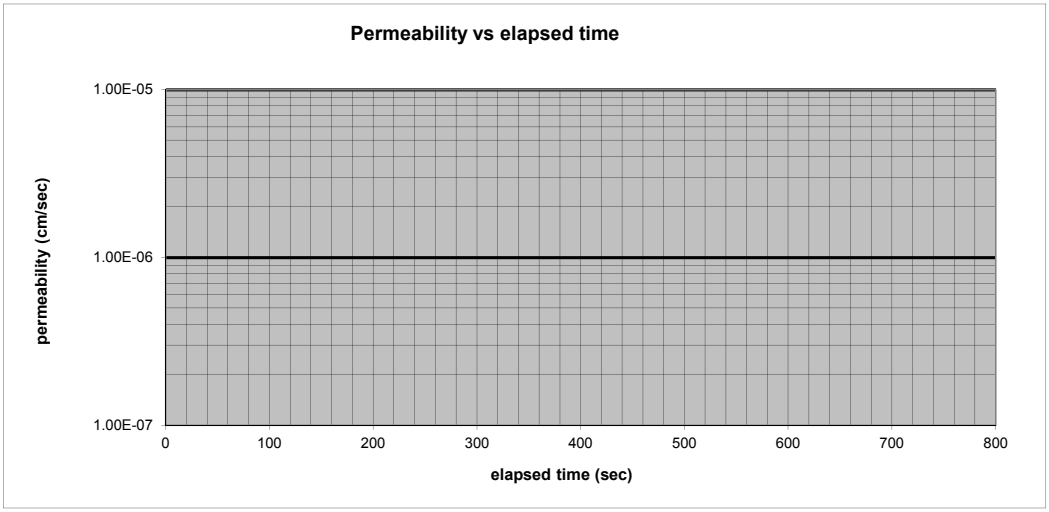
Average Permeability (cm/s):	**1.05E-04**
Permeability @ 20°C	**9.90E-05**
in/hr:	**1.40E-01**

Notes: spec remolded to 90% of ASTM D1557 at optimum moisture

Average temperature during test °C = 22.3

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: TM



Hydraulic Conductivity
(ASTM D5084)

Project Name:	Stone Creek		
Project Number:	07524-32-02	Cell Pressure (psi)	102
Beginning Test Date:	9/26/2016	In Pressure (psi)	100
Ending Test Date:	9/26/2016	Out Pressure (psi)	100
Sample ID:	#4	Burette area (cm^2)	0.872
Sample Description:	brown SM with trace gravel	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.70		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.980	2.986	2.986	2.98	7.58
Final Height (in.)	3.019	3.017	3.011	3.02	7.66
Initial Diameter (in.)	2.385	2.385	2.385	2.39	6.06
Final Diameter (in.)	2.396	2.405	2.391	2.40	6.09
Initial Area				4.47	28.82
Initial Volume (ft^3)	0.00771	Final Volume (ft^3)		0.00788	
Initial Volume (cm^3)	218.5	Final Volume (cm^3)		223.1	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	440.1	**10.0**	125.8	**114.3**	0.474	57.2
Final	472.9	18.2	132.3	111.9	0.505	97.5
Dry	399.94					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Outflow (ml)	Inflow (ml)	Outflow to Inflow Ratio	Permeability (cm/s)
9/26/16 1:16 PM			24.00	1.25	-	3.4	26.1					
	9/26/16 1:17 PM	60	23.10	2.10	-	3.2		24.1	0.90	0.85	1.06	1.53E-04
9/26/16 1:17 PM		60	23.10	2.10	-	3.2	24.1					
	9/26/16 1:18 PM	60	22.30	2.90	-	2.9		22.3	0.80	0.80	1.00	1.51E-04
9/26/16 1:18 PM		120	22.30	2.90	-	2.9	22.3					
	9/26/16 1:19 PM	60	21.60	3.60	-	2.7		20.6	0.70	0.70	1.00	1.43E-04
9/26/16 1:19 PM		180	21.60	3.60	-	2.7	20.6					
	9/26/16 1:20 PM	60	20.95	4.20	-	2.5		19.2	0.65	0.60	1.08	1.38E-04
9/26/16 1:20 PM		240	20.95	4.20	-	2.5	19.2					
	9/26/16 1:21 PM	60	20.35	4.80	-	2.4		17.8	0.60	0.60	1.00	1.42E-04
9/26/16 1:21 PM		300	20.35	4.80	-	2.4	17.8					
	9/26/16 1:22 PM	60	19.75	5.40	-	2.2		16.5	0.60	0.60	1.00	1.53E-04
		360										

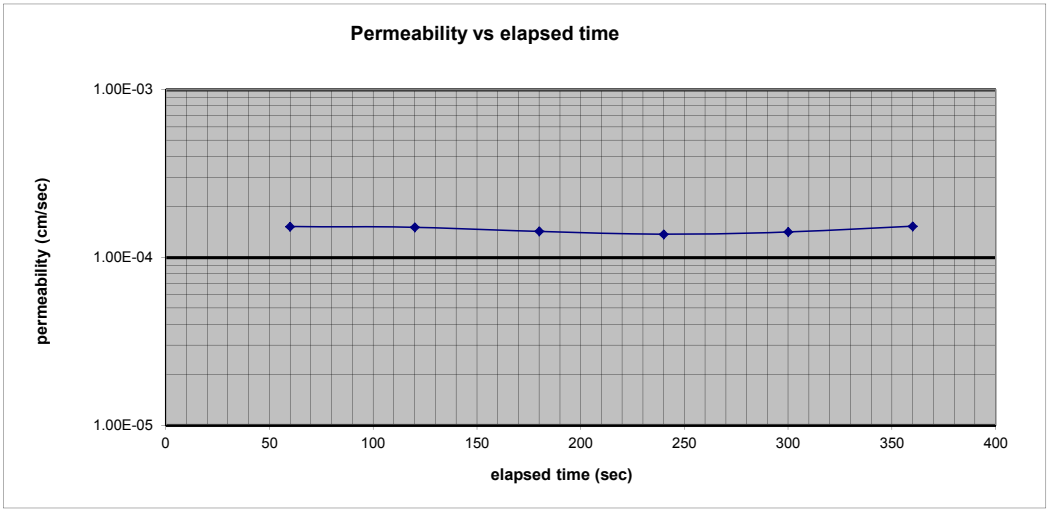
Average Permeability (cm/s):		**1.44E-04**
Permeability @ 20°C		**1.34E-04**
	in/hr:	**1.90E-01**

Notes: spec remolded to 90% of ASTM D1557 at optimum moisture

Average temperature during test °C = 23.0

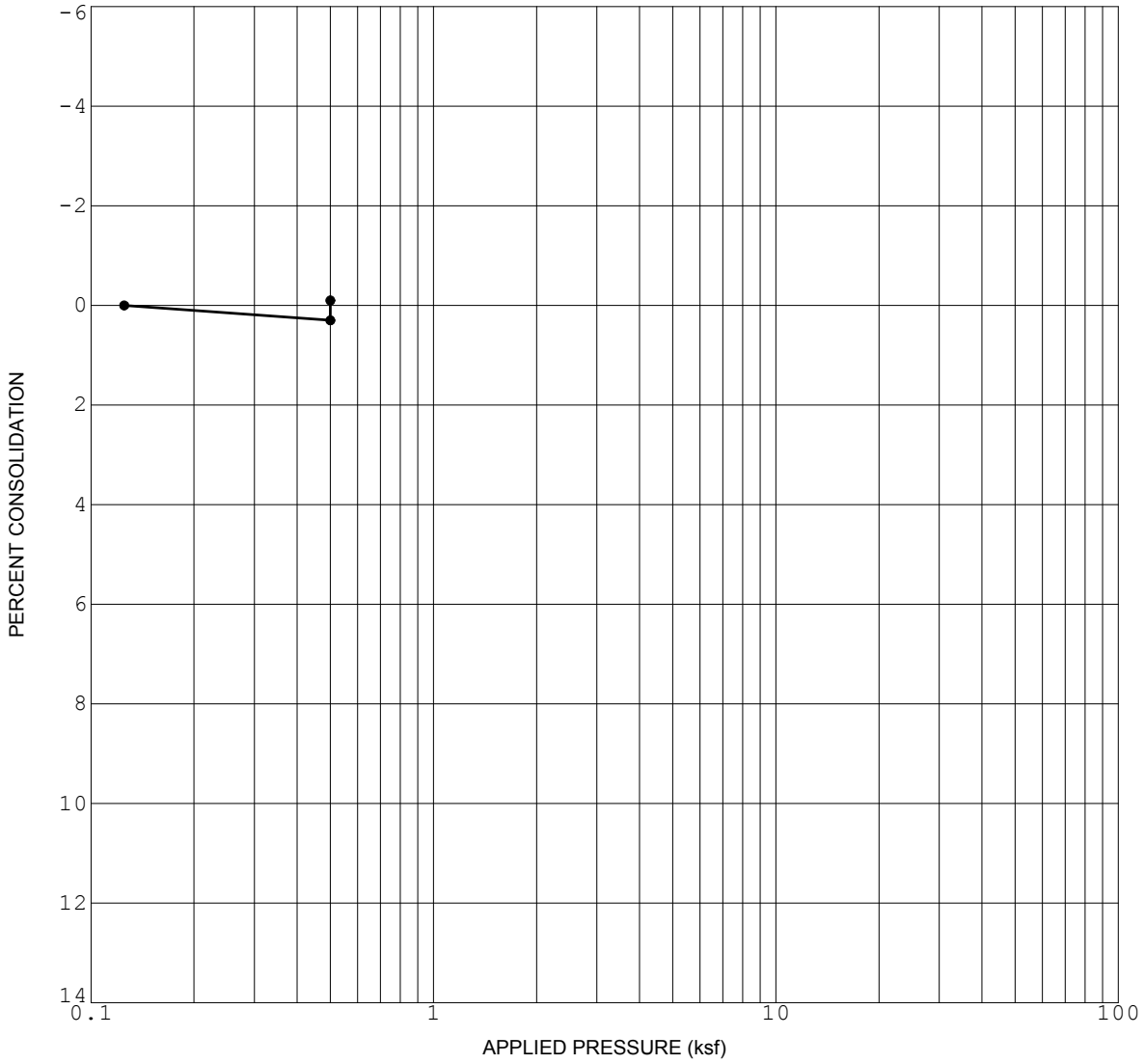
Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: TM



PROJECT NO. 07524-32-02

SAMPLE NO. 1@0.5K



Initial Dry Density (pcf)	122.0	**Initial Saturation (%)**	49.6
Initial Water Content (%)	6.7	**Sample Saturated at (ksf)**	.5

CONSOLIDATION CURVE

STONE CREEK

SAN DIEGO, CALIFORNIA

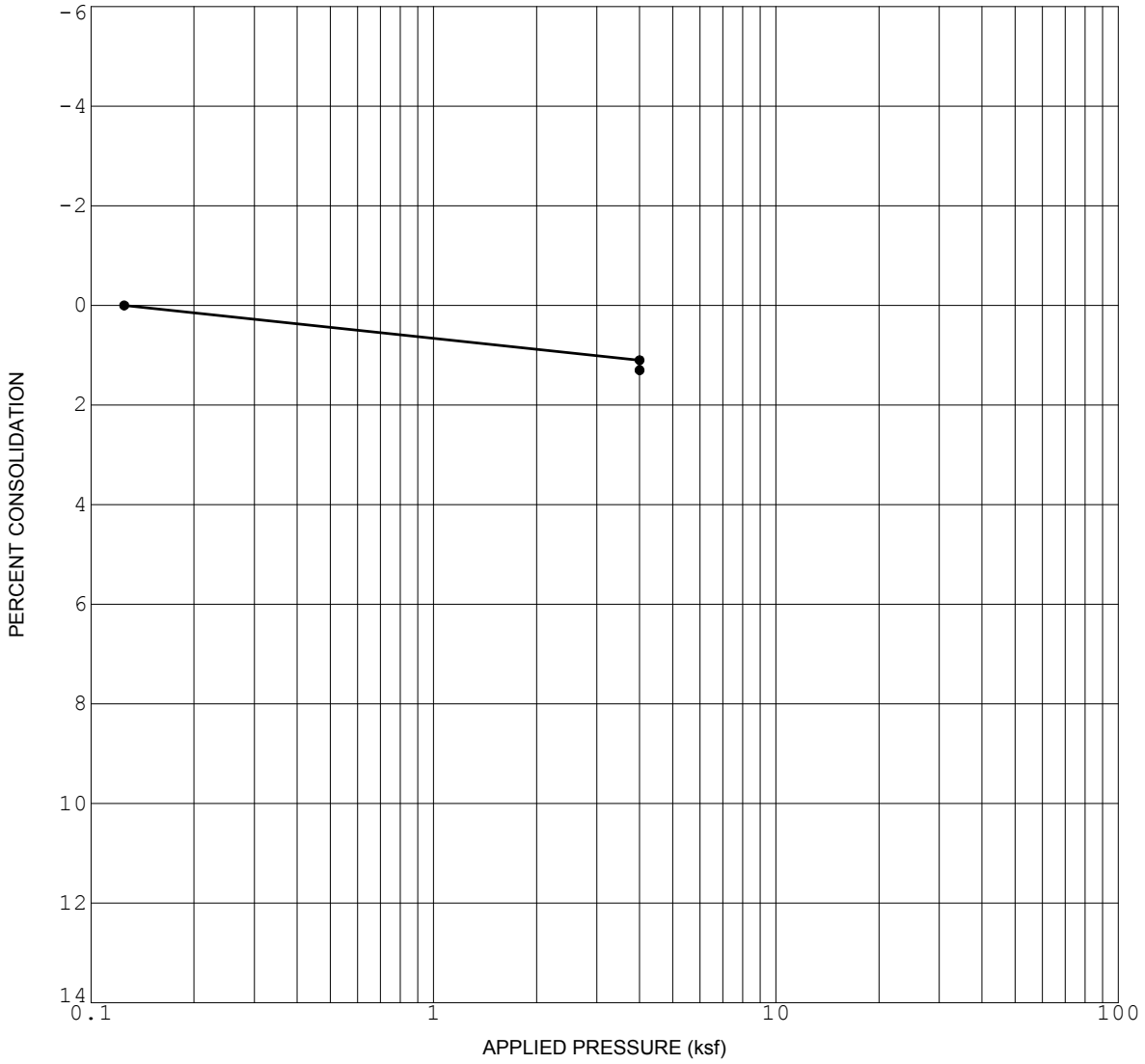
07524-32-02.GPJ

Figure B-1

GEOCON

PROJECT NO. 07524-32-02

SAMPLE NO. 1@4.0K



Initial Dry Density (pcf)	122.0	**Initial Saturation (%)**	49.6
Initial Water Content (%)	6.7	**Sample Saturated at (ksf)**	4.0

CONSOLIDATION CURVE

STONE CREEK

SAN DIEGO, CALIFORNIA

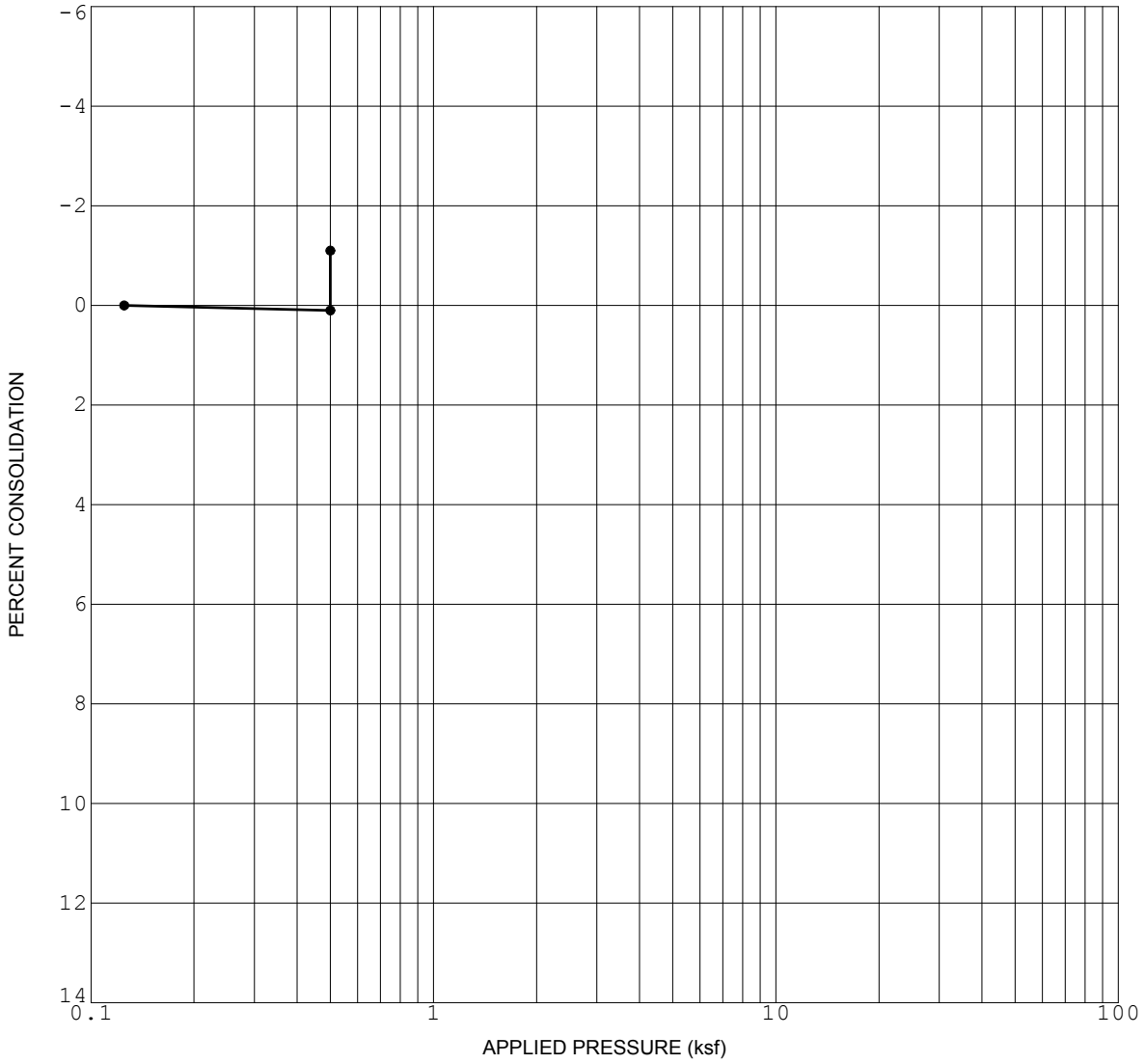
07524-32-02.GPJ

Figure B-2

GEOCON

PROJECT NO. 07524-32-02

SAMPLE NO. 4@0.5K



Initial Dry Density (pcf)	114.3	**Initial Saturation (%)**	55.0
Initial Water Content (%)	9.4	**Sample Saturated at (ksf)**	.5

CONSOLIDATION CURVE

STONE CREEK

SAN DIEGO, CALIFORNIA

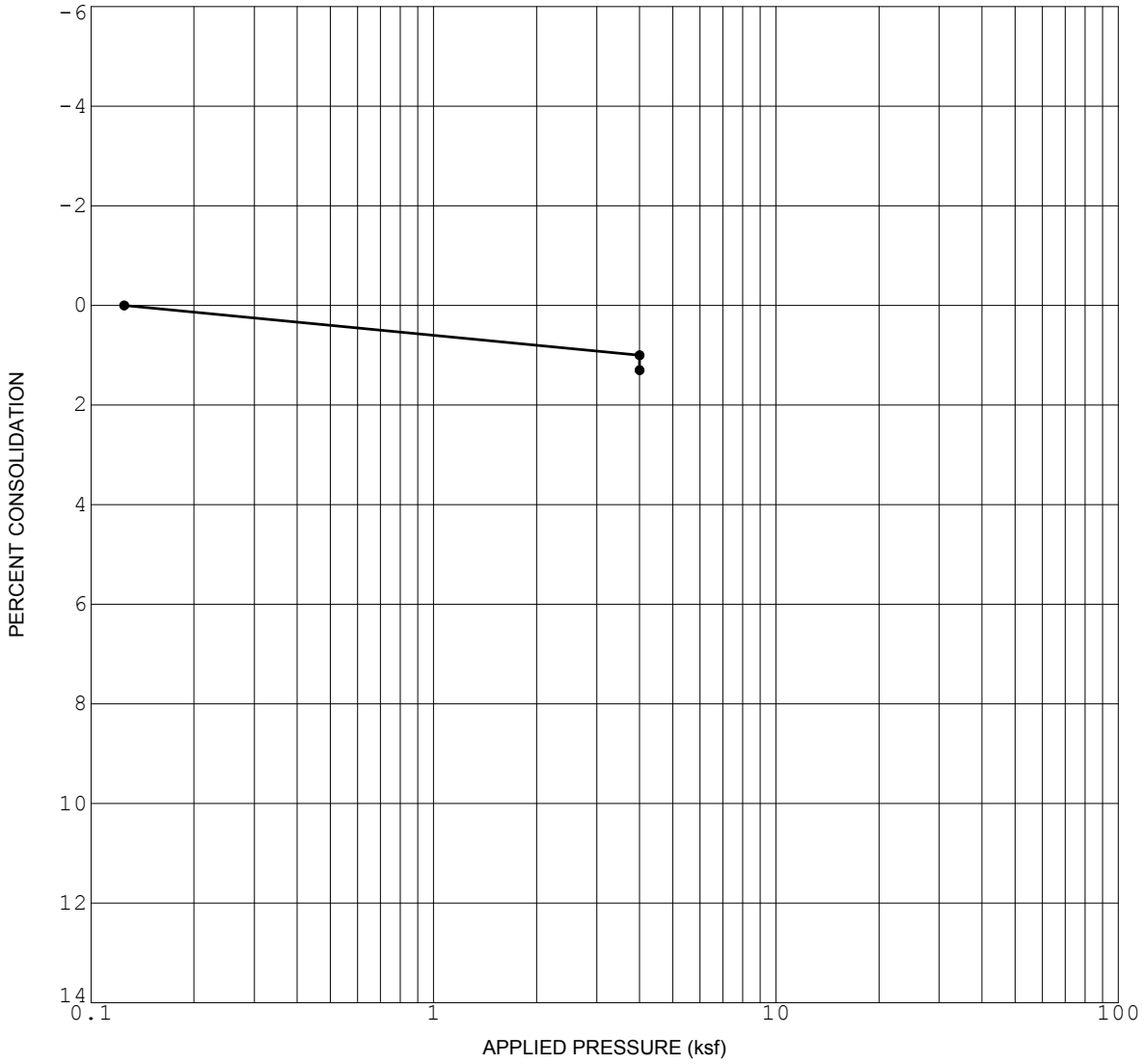
07524-32-02.GPJ

Figure B-3

GEOCON

PROJECT NO. 07524-32-02

SAMPLE NO. 4@4.0K



Initial Dry Density (pcf)	115.3	**Initial Saturation (%)**	48.0
Initial Water Content (%)	7.9	**Sample Saturated at (ksf)**	4.0

CONSOLIDATION CURVE

STONE CREEK

SAN DIEGO, CALIFORNIA

07524-32-02.GPJ

Figure B-4

GEOCON

APPENDIX C

APPENDIX C

WORKSHEET C.4-1

FOR

STONE CREEK
VESTING TENTATIVE MAP NO. 208328
P.T.S. NO. 67943
SAN DIEGO, CALIFORNIA

PROJECT NO. 07524-32-02

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		**Project Phase:**
DMA 1-10		PLANNING
Criteria 1: Infiltration Rate Screening		
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☒ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).	
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☐ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.	
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☐ No; full infiltration is not required. Answer "No" to Criteria 1 Result.	
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.	

Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I- 8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

The USDA Web Soil Survey website indicates the underlying soils should be classified as Hydrologic Soil Group D, which are not conducive to infiltration. See attached information. We measured the field saturated hydraulic conductivity (Ksat) of the underlying formational materials in 4 locations using an Aardvark constant head permeameter, which was placed inside a 10 to 12-inch diameter boring. The unfactored infiltration rates ranged between 0.06 inches per hour (iph) and 0.44 iph. After applying a feasibility factor of safety of 2, the infiltration rate ranged between 0.03 iph and 0.22 iph. See Appendix A. Laboratory permeability testing indicated similar rates for proposed compacted fill, i.e. infiltration rates ranging between 0.05 iph and 0.19 iph. See attached laboratory test results in Appendix B. The proposed BMP's are expected to expose compacted fill with very low permeability. The field and laboratory test results are attached. In accordance with the Riverside County storm water procedures, which reference the United States Bureau of Reclamation Well Permeameter Method (USBR 7300), the saturated hydraulic conductivity (Ksat) is equal to the unfactored infiltration rate.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A–1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐ Yes	☒ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B–1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐ Yes	☒ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening[12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐ Full infiltration Condition ☒ Complete Part 2

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I- 8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
DMA 1-10	PLANNING

Criteria 3: Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ No; infiltration testing is conducted (refer to Table D.3–1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☒ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☒ Yes; Continue to Criteria 4. ☐ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

The USDA Web Soil Survey website indicates the underlying soils should be classified as Hydrologic Soil Group D, which are not conducive to infiltration. See attached information. We measured the field saturated hydraulic conductivity (Ksat) of the underlying formational materials in 4 locations using an Aardvark constant head permeameter, which was placed inside a 10 to 12-inch diameter boring. The unfactored infiltration rates ranged between 0.06 inches per hour (iph) and 0.44 iph. After applying a feasibility factor of safety of 2, the infiltration rate ranged between 0.03 iph and 0.22 iph. See Appendix A. Laboratory permeability testing indicated similar rates for proposed compacted fill, i.e. infiltration rates ranging between 0.05 iph and 0.19 iph. See attached laboratory test results in Appendix B. The proposed BMP's are expected to expose compacted fill with very low permeability. The field and laboratory test results are attached. In accordance with the Riverside County storm water procedures, which reference the United States Bureau of Reclamation Well Permeameter Method (USBR 7300), the saturated hydraulic conductivity (Ksat) is equal to the unfactored infiltration rate.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A–1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐ Yes	☒ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B–1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No

Summarize findings and basis; provide references to related reports or exhibits.

The USDA Web Soil Survey website indicates the underlying soils should be classified as Hydrologic Soil Group D, which are not conducive to infiltration. See attached information. We measured the field saturated hydraulic conductivity (Ksat) of the underlying formational materials in 4 locations using an Aardvark constant head permeameter, which was placed inside a 10 to 12-inch diameter boring. The unfactored infiltration rates ranged between 0.06 inches per hour (iph) and 0.44 iph. After applying a feasibility factor of safety of 2, the infiltration rate ranged between 0.03 iph and 0.22 iph. See Appendix A. Laboratory permeability testing indicated similar rates for proposed compacted fill, i.e. infiltration rates ranging between 0.05 iph and 0.19 iph. See attached laboratory test results in Appendix B. The proposed BMP's are expected to expose compacted fill with very low permeability. The field and laboratory test results are attached. In accordance with the Riverside County storm water procedures, which reference the United States Bureau of Reclamation Well Permeameter Method (USBR 7300), the saturated hydraulic conductivity (Ksat) is equal to the unfactored infiltration rate.

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☒ No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Soil Map—San Diego County Area, California
(Stone Creek, San Diego, CA)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

San Diego County Area, California (CA638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
GP	Gravel pits	49.5	17.6%
RdC	Redding gravelly loam, 2 to 9 percent slopes	79.9	28.5%
ReE	Redding cobbly loam, 9 to 30 percent slopes	48.1	17.1%
RfF	Redding cobbly loam, dissected, 15 to 50 percent slopes	43.8	15.6%
Rm	Riverwash	46.1	16.4%
TeF	Terrace escarpments	13.3	4.7%
Totals for Area of Interest		**280.7**	**100.0%**

San Diego County Area, California

RdC—Redding gravelly loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hbfy
Elevation: 100 to 1,500 feet
Mean annual precipitation: 14 to 25 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Redding and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redding

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 15 inches: gravelly loam
H2 - 15 to 30 inches: gravelly clay loam, gravelly clay
H2 - 15 to 30 inches: indurated
H3 - 30 to 45 inches:

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: ACID CLAYPAN (Claypan Mesas - 1975) (R019XD062CA)

Hydric soil rating: No

Minor Components

Unnamed, ponded
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Oliventain
Percent of map unit: 2 percent
Hydric soil rating: No

Huerhuero
Percent of map unit: 2 percent
Hydric soil rating: No

Chesterton
Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 2 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

San Diego County Area, California

ReE—Redding cobbly loam, 9 to 30 percent slopes

Map Unit Setting

National map unit symbol: hbfz
Elevation: 130 to 1,000 feet
Mean annual precipitation: 14 to 25 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Redding and similar soils: 85 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redding

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 10 inches: cobbly loam
H2 - 10 to 20 inches: cobbly clay loam, cobbly clay
H2 - 10 to 20 inches: indurated
H3 - 20 to 30 inches:

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: ACID CLAYPAN (Claypan Mesas - 1975) (R019XD062CA)

Hydric soil rating: No

Minor Components

Oliventain
Percent of map unit: 5 percent
Hydric soil rating: No

Huerhuero
Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, ponded
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

San Diego County Area, California

RfF—Redding cobbly loam, dissected, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: hbg0
Elevation: 130 to 1,000 feet
Mean annual precipitation: 14 to 25 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Redding and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redding

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 10 inches: cobbly loam
H2 - 10 to 20 inches: cobbly clay loam, cobbly clay
H2 - 10 to 20 inches: indurated
H3 - 20 to 30 inches:

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: ACID CLAYPAN (Claypan Mesas - 1975) (R019XD062CA)

Hydric soil rating: No

Minor Components

Oliventain

Percent of map unit: 10 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

San Diego County Area, California

Rm—Riverwash

Map Unit Setting

National map unit symbol: hbg6
Elevation: 700 to 2,900 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 110 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Drainageways
Parent material: Sandy, gravelly, or cobbly alluvium derived from mixed sources

Typical profile

H1 - 0 to 6 inches: gravelly coarse sand
H2 - 6 to 60 inches: stratified extremely gravelly coarse sand to gravelly sand

Properties and qualities

Slope: 0 to 4 percent
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 60 to 72 inches
Frequency of flooding: Occasional
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

San Diego County Area, California

TeF—Terrace escarpments

Map Unit Composition

Terrace escarpments: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terrace Escarpments

Setting

Landform: Escarpments
Landform position (three-dimensional): Riser

Typical profile

H1 - 0 to 60 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015