

DOCKETED	
Docket Number:	24-OPT-02
Project Title:	Compass Energy Storage Project
TN #:	264480
Document Title:	Geotechnical Evaluation Report (TN #255561-6) References Part 3
Description:	N/A
Filer:	Erin Phillips
Organization:	Dudek
Submitter Role:	Applicant Consultant
Submission Date:	6/27/2025 12:40:22 PM
Docketed Date:	6/27/2025

MEMORANDUM

To: California Energy Commission Staff
From: Compass Energy Storage LLC
Subject: Geotechnical Evaluation Report (TN #255561-6) References
Date: June 26, 2025

Compass Energy Storage LLC (applicant) prepared a Geotechnical Evaluation Report for the proposed Compass Energy Storage Project, dated April 2024, titled Appendix 4-4A Geotechnical Evaluation Report Part 1, and docketed as Tracking Number 255561-6. The Geotechnical Evaluation Report referenced several geotechnical studies performed by prior projects and other studies performed by the applicant. As per California Energy Commission staff request, the following Geotechnical Evaluation Report references are being filed to the project docket (24-OPT-02). Each reference can be navigated via the bookmarks with the document. Page numbers are also provided below for navigation purposes. Due to file size requirements, the referenced reports are provided in three parts.

Referenced Reports	Location within this Document (PDF page number)
Part 1	
NMG Geotechnical, 2001. Geotechnical Due Diligence Investigation for Proposed Middle School, Rancho Capistrano, San Juan Capistrano, California, Project No. 01012-02, dated September 28, 2001.	Page 2-96
Part 2	
Leighton and Associates, Inc., 2009. Preliminary Geotechnical Investigation, The Orchards at Capistrano, San Juan Capistrano, Project No. 012383-001, dated April 30, 2009.	Page 2-486
Lowney and Associates performed an evaluation in 2003 consisting of excavation, sampling, and logging of one small diameter hollow stem boring and six large diameter borings.	Boring logs are available within Leighton and Associates, Inc. 2009 (Page 75-161)
Part 3	
Terracon, 2021. Geotechnical Engineering Report, Broad Reach Power Compass BESS, San Juan Capistrano, CA, Terracon Project No. 60211570, dated November 3, 2021.	Page 2-157
Geosyntec Consultants, Inc., 2021. Geotechnical and Geomorphic Evaluations, Compass Energy Storage Project, San Juan Capistrano, California, dated June 29, 2021.	Page 158-199
Corrosivity Study: HDR, 2023, Soil Corrosivity Study, Saddleback Valley Compass Substation, San Juan Capistrano, California, HDR#23-0169LAB, dated March 16, 2023.	Page 200-211
Hydrology study: Chang Consultants, 2024, Sediment Transport Analysis for the Compass Energy Storage Project, dated March 21, 2024.	Page 212-367
Thermal Resistivity study: Geotherm USA, 2023, Thermal Analysis of Native Soil Samples, San Juan Capistrano, California, PO No. 22011-01, dated March 7, 2023.	Page 368-372



Geotechnical Engineering Report

**Broad Reach Power Compass BESS
San Juan Capistrano, Orange County, CA**

November 3, 2021

Terracon Project No. 60215170

Prepared for:

Sargent & Lundy
Chicago, Illinois

Prepared by:

Terracon Consultants, Inc.
Tustin, California



November 3, 2021

Sargent & Lundy
55 E. Monroe
Chicago, Illinois 60603



Attn: Mr. Matthew A. Braet
P: (312) 269-2642
E: Matthew.A.Braet@SargentLundy.com

Re: Geotechnical Engineering Report
Broad Reach Power Compass BESS
San Juan Capistrano, Orange County, CA
Terracon Project No. 60215170

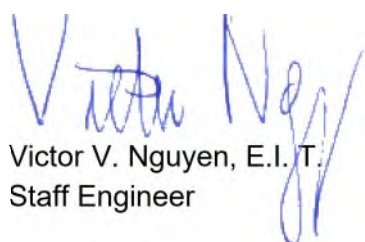
Dear Mr. Braet:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P60215170 dated June 30, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, access roads, and infiltration systems for the proposed project.

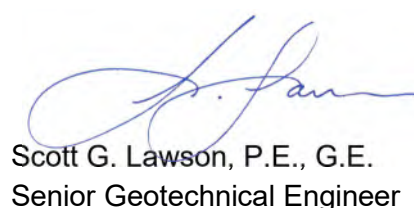
We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

A handwritten signature in blue ink, appearing to read "Victor V. Nguyen".

Victor V. Nguyen, E.I. T.
Staff Engineer

A handwritten signature in blue ink, appearing to read "Scott G. Lawson".

Scott G. Lawson, P.E., G.E.
Senior Geotechnical Engineer

APR Review by F. Fred Buhamdan, P.E



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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the [GeoReport](#) logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

SITE LOCATION AND EXPLORATION PLANS

EXPLORATION RESULTS (Boring Logs, Laboratory Data, and Electrical Resistivity Test Results)

SUPPORTING INFORMATION (Liquefaction Analyses Output, Drilled Shaft Axial Capacity, General Notes, and Unified Soil Classification System)

Geotechnical Engineering Report
Broad Reach Power Compass BESS
San Juan Capistrano, Orange County, CA
Terracon Project No. 60215170
November 3, 2021

INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed Compass Battery Energy Storage System (BESS) facility for Broad Reach Power to be located in San Juan Capistrano, Orange County, California. Approximate coordinates for the center of the site are 33.53205°N, 117.67753°W. The purpose of these services is to provide information and geotechnical engineering recommendations relative to subsurface conditions and construction of the proposed BESS and infiltration systems.

Terracon's geotechnical engineering scope of work for this project included the advancement of 30 test borings to approximate depths ranging between 5 and 101½ feet below existing ground surface (bgs) within and adjacent to the proposed BESS facility footprint.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The proposed project consists of design and construction of the new Compass BESS facility to be located in the City of San Juan Capistrano, Orange County, California. Approximate coordinates for the center of the site are 33.53205 °N, 117.67753 °W.
Existing Improvements	Site is mostly undeveloped with native grasses and trees. A garden center with several small buildings is located near the center of the site.
Current Ground Cover	Exposed soils with sparse vegetation, and denser vegetation on the hillside to the west.

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Broad Reach Power Compass BESS ■ San Juan Capistrano, Orange County, CA

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Item	Description
Existing Topography (from Google Earth Pro)	Within the footprint of the proposed facility, the eastern half is relatively flat with approximate elevations ranging from 206 to 212 feet above mean sea level (MSL). The western half has a gradual slope down towards the east with approximate elevations ranging from 230 feet to 212 feet MSL. Immediately to the west of the facility footprint are tall slopes ascending several hundred feet. Immediately to the east of the facility footprint is Oso Creek which steeply descends as much as 40 feet to an approximate bottom elevation of 169 feet MSL. Stability assessment of the eastern and western surrounding slopes is not included in our scope of work and is being evaluated by Sargent & Lundy (S&L) based on data provided by Terracon.

PROJECT DESCRIPTION

Item	Description
Proposed Structures	■ 138/34kV transformers supported on mat foundations. ■ Batteries supported on slabs or mat foundations. ■ A 138kV transmission line pole supported by a drilled pier may be included in the project, but the location is currently unknown. ■ A San Diego Gas & Electric (SDG&E) substation will be constructed within the project footprint, with equipment foundations similar to those described above. We understand that a “buried” retaining wall will be constructed near the eastern edge of the project site to limit the impact of erosion occurring along the banks of the adjacent Oso Creek. In addition, we understand based on discussions with S&L that other retaining walls are being considered to achieve final site grades. Details regarding these walls were not available at the time this report was prepared. We understand that geotechnical engineers with S&L will be responsible for the geotechnical design and evaluation of these walls, using geotechnical data and recommendations provided in this report.
Finished Grade Elevation	Finished grade elevation was not provided at the time of preparation of this report.
Grading	Grading plans were not provided at the time of preparation of this report. Based on our understanding of the conceptual site plan and the existing topography of the site, we anticipate that cuts as much as 20 feet and fill on the order of 5 may be required in order to reach final grade elevation.
Infiltration Systems	Based on our communications with S&L, infiltration systems (such as retention basins or bio-swales) are anticipated for on-site stormwater management.
Access Roads	We understand that unpaved roads will be constructed onsite to access BESS areas.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Geologic Conditions

The site is situated on a stream terrace west of and adjacent to Oso Creek in Orange County, California. Oso Creek forms a canyon that dissects a portion of the San Joaquin Hills - a coastal range of southern California. The hills are formed in layered sedimentary formations that include the Capistrano Formation. The Capistrano Formation consists of poorly-consolidated, fossiliferous, marine sandy-siltstone and mudstone. Capistrano beds are susceptible to landsliding as evidenced by landslide deposits mapped west of the site. The stream terrace area of the site is underlain by colluvium derived from adjacent hillsides and alluvial stream deposits of Oso Creek. A regional geologic map is included in the **Site Location** section.

Earthquake faults are not mapped within or projecting toward the site. The buried San Joaquin Hills thrust fault underlies the San Joaquin Hills approximately 5 kilometers northwest of the site. More distant faults include the Newport-Inglewood fault zone and the Elsinore fault zone located approximately 10 kilometers southwest and 29 kilometers northeast of the site, respectively.

Subsurface Conditions

Based on the results of the borings performed for our subsurface exploration, alluvial and colluvial soils were encountered extending to approximate boring depths of 26½ to 76½ feet bgs. Landslide deposits (QIs) were encountered in borings B-4, B-5, B-6, and B-11 extending to approximate depths of 10 to 50 feet bgs. Capistrano Formation (Tc) bedrock was encountered beneath alluvial/colluvial and landslide deposits beginning at approximate boring depths ranging from 26½ to 62 feet bgs. Soil deposits generally consisted of interbedded layers of soft to hard lean clay with variable amounts of sand and gravel, silt with varying amounts of sand, and silty clay with varying amounts of sand and gravel. Interbedded layers of loose to very dense sand with varying amounts of silt and clay were encountered in borings B-2, B-3, B-10, and B-17 from depths of approximately 31½ to 40, 51½ to 65, 51½ to 76½, and 50 to 76½ feet bgs, respectively. Materials of the Capistrano Formation were generally recovered as interbedded layers of very stiff to hard elastic silt with trace sand, lean clay with varying amounts of sand and silt, and silty clay with varying amounts of sand. The following table summarizes the approximate depth to Capistrano formational materials.

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Boring ID	Depth to Capistrano Formation Materials (ft, bgs)	Corresponding Elevation at Top of Formation (feet, MSL)	Boring Termination Depth (ft, bgs)
B-4	50	197	91½
B-5	62	192	76½
B-6	40	194	51
B-11	55	185	91½
B-12	40	192	76½
B-13	60	189	76½
B-14	30	194	51½
B-15	60	153	101½
B-19	26½	190½	51½
B-24	35	181	76½
B-25	41½	167½	76½

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Lab Results

Laboratory tests were conducted on selected soil formational material samples and the test results are presented in the **Exploration Results** section and on the boring logs. Atterberg limits test results indicate that the on-site soils generally have low to medium plasticity. A modified proctor test conducted in accordance with ASTM D1557 indicates that the near surface sandy lean clay soil tested has a maximum dry density of 120.8 pcf and corresponding optimum moisture content of 13.3 percent. Expansion index testing on near surface soils from borings B-1 and B-17 indicate that these soils have expansion indices of 39 and 64 corresponding to low to medium expansion potential as determined by ASTM D4829. Consolidation testing performed on four samples collected from borings within the upper 10 feet indicated negligible to moderate swell. R-value testing conducted on a near surface silty clay soil sample indicated an R-Value of 27.

The following tables summarize the results of direct shear and unconsolidated undrained triaxial testing. Additional information for these tests is provided in the **Exploration Results** section.

Direct Shear Strength Test Results

Boring ID	Depth (ft, bgs)	USCS Material Type	Friction Angle (degree) ¹	Cohesion (psf) ¹
B-10	10	CL	25	300
B-12	10	CL	33	650
B-13	10	CL	32	1,050

1. Values are peak values.

Unconsolidated Undrained Triaxial Test Results

Boring ID	Depth (ft, bgs)	USCS Material Type	Ultimate Undrained Shear Strength (ksf) ¹
B-5	60	CL-ML	4.16
B-13	30	CL	3.87
B-19	45	CL-ML ²	3.29

1. Unconsolidated undrained conditions.

2. Capistrano Formation material recovered as CL-ML.

Electrical Resistivity Testing

Terracon performed field measurements of soil electrical resistivity for the support of grounding design. Soil resistivity data was obtained along three traverses selected by the client and shown in the **Exploration Plan**. The testing was performed in general accordance with ASTM G57 - Wenner Four Electrode Method. The Wenner arrangement (equal electrode spacing) was used with the 'a'-spacing of 3, 5, 7, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, and 160 feet. The "a" spacing is generally considered to be the depth of influence of the test. The electrical resistivity test results are presented in **Exploration Results**.

Groundwater Conditions

Groundwater was encountered in 4 of the 30 borings advanced at the site. Boring specific groundwater observations can be found on the logs in the **Exploration Results** section of this report. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations.

Boring ID	Depth to Groundwater (feet, bgs)	Groundwater Elevation (feet, MSL)
B-3	70.4	139
B-10	47.3	162
B-17	47.0	161
B-19	47.5	170

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structures may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

In clayey soils with low permeability, the accurate determination of groundwater level may not be possible without long term observation. Long term observation after drilling could not be performed as borings were backfilled immediately upon completion due to safety concerns. Groundwater levels can best be determined by implementation of a groundwater monitoring plan.

Based on review of Plate 1.2 of the Seismic Hazard Zone Report (SHZP) for the San Juan Capistrano 7.5-Minute Quadrangle (CDMG)¹, historic shallow groundwater depth in the vicinity of the project site is reported at approximately 5 feet bgs in the area of the creek on the east side of the site. However, the creek level is approximately 40 feet below the elevation of the site.

SEISMIC CONSIDERATIONS

The 2019 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16 and 2019 CBC. The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." Based on our understanding of the proposed structures, it is our assumption that the

¹ California Department of Conservation Division of Mines and Geology (CDMG), "Seismic Hazard Zone Report for the San Juan Capistrano 7.5 Minute Quadrangle, Orange County, California", 2001.

exception in Section 11.4.8 applies to the proposed structures for this project. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 1613 of the 2019 CBC.

Description	Value
2019 California Building Code Site Classification (CBC) ¹	D
Site Latitude (°N)	33.53205
Site Longitude (°W)	117.67753
S_s Spectral Acceleration for a 0.2-Second Period	1.2
S_1 Spectral Acceleration for a 1-Second Period	0.431
F_a Site Coefficient for a 0.2-Second Period	1.02
F_v Site Coefficient for a 1-Second Period	1.872
¹ . Seismic site classification in general accordance with the 2019 California Building Code.	

Typically, a site-specific ground motion study may generate less conservative coefficients and acceleration values which may reduce construction costs. We recommend consulting with a structural engineer to evaluate the need for such study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Faulting and Estimated Ground Motions

The site is located in southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the San Joaquin Hills Fault, which is considered to have the most significant effect at the site from a design standpoint has a modelled earthquake magnitude of 7.53 and is located approximately 5 kilometers from the site.

Based on the SEAOC/OSHPD Seismic Design Maps Tool, using the American Society of Civil Engineers (ASCE 7-16) standard, the modified peak ground acceleration (PGA_M) at the project site is expected to be 0.563g. Based on the USGS Unified Hazard Tool, the project site has a deaggregated modal magnitude of 7.69. Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.²

² <https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/>.

LIQUEFACTION

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The California Geological Survey (CGS) has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

The site is located within a State-designated Seismic Hazard Zone for liquefaction potential. A seismic hazard map is included in the **Site Location** section.

Subsurface soils generally consisted of interbedded layers of soft to hard lean clay, silt with varying amounts of sand, and silty clay. An interbedded layer of loose silty sand was encountered in borings B-2 from a depth of approximately 31½ to 40 feet bgs, respectively. Materials encountered from the Capistrano Formation were generally recovered as interbedded layers of very stiff to hard elastic silt with trace sand, lean clay with varying amounts of sand and silt, and silty clay with varying amounts of sand.

We understand that liquefaction analysis for the project will be performed by Sargent & Lundy. Terracon performed a preliminary liquefaction analysis for the site in general accordance with the DMG Special Publication 117. The liquefaction study utilized the software “LiquefyPro” by CivilTech Software. This analysis was based on soil data from the borings B-2, B-3, B-7, and B-15. A PGA_M of 0.563 g and a modal magnitude of 7.69 for the project site were used. Calculations utilized a depth to groundwater of 45 feet bgs based on review of available data and the depth to groundwater encountered in our borings. Settlement analysis used the Tokimatsu, M-correction method and the fines percentage were corrected for liquefaction using the Stark/Olson method.

Based on calculation results, seismically induced settlement of saturated and unsaturated sands was found to occur in one of the four borings (B-2). Settlement at the location of boring B-2 is estimated to be approximately ½ inch or less. The detailed liquefaction potential analysis results are attached to this report in **Supporting Documents** section of the **Appendix**.

LANDSLIDE

Based on our review of a geologic hazards map designated by the California Geologic Survey, the battery and equipment pads do not appear to be located within a mapped seismically-induced landslide zone. However, landslide deposits are mapped directly west of the proposed pads. Landslide deposits were encountered in boring B-4, B-5, B-6, and B-11 extending to approximate depths of 10 to 50 feet bgs. A seismic hazard map is included in the **Site Location** section.

It is our understanding that stability assessment of the surrounding slopes is excluded from our scope of work and is being evaluated by Sargent & Lundy (S&L) based on data provided by Terracon.

CORROSIVITY

Results of laboratory soluble sulfate, soluble chloride, electrical resistivity, and pH testing are included in the **Exploration Results** section of this report. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary						
Boring	Sample Depth (ft)	USCS Material Type	Soluble Sulfate (ppm)	Chlorides (ppm)	Electrical Resistivity (Ω -cm)	pH
B-1	0-5	CL	50	27	1,867	8.0
B-3	0-5	CL/ML	46	40	2,215	8.0
B-12	0-5	CL	64	23	1,461	8.0
B-25	0-5	CL	91	36	1,313	8.1

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 19.3.1.1 of the ACI Design Manual. Concrete should be designed in accordance with the exposure class S0 provisions of the ACI Design Manual, Section 318, Chapter 19.

STORMWATER MANAGEMENT

Eight (8) in-situ percolation tests were performed from approximate depths of 0 to 5 and 5 to 10 feet bgs. A 2-inch thick layer of gravel was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. A 3-inch diameter perforated pipe was installed on top of the gravel layer in each boring. Gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period of 24 hours. Testing began after a pre-soak period. At the beginning of the test, the pipes were refilled with water and readings were taken at standardized time intervals. Percolation rates are provided in the following table:

TEST RESULTS				
Test Location (depth, feet bgs)	Soil Classification	Final Measured Percolation Rate (in/hr.)	Correlated Infiltration Rate ¹ (in/hr.)	Water Head (in)
P-1 (5 – 10)	Silty clay	1.4	0.03	97
P-2 (5 – 10)	Lean clay with sand	1.2	0.04	63
P-3 (0 – 5)	Silty clay with sand	3.1	0.41	14
P-4 (5 – 10)	Silty clay with sand	3.4	0.18	36
P-5 (0 – 5)	Silty clay	5.0	0.63	14
P-6 (5 – 10)	Silty clay	1.2	0.05	44
P-7 (0 – 5)	Silty clay with sand	7.2	0.97	31
P-8 (5 – 10)	Lean clay	1.4	0.04	66

¹If proposed infiltration system will mainly rely on vertical downward seepage, the correlated infiltration rates should be used. The infiltration rates were correlated using the Porchet method.

It is apparent that percolation rates were relatively higher in near surface soils within the upper 5 feet than the deeper soils. Infiltration within shallow systems will likely create perched water conditions on top on the underlying less permeable soils. Therefore, perched water could move laterally and manifest at the face of the descending slopes east of the site, which may cause scour and ultimately slope failures. We recommend that measures be taken to mitigate this type of occurrence, if onsite infiltration is implemented. In the event infiltration systems onsite will be utilized, the following paragraphs include design and construction considerations.

With time, the bottoms of infiltration systems tend to plug with organics, sediments, and other debris. Long term maintenance will likely be required to remove these deleterious materials to help reduce decreases in actual percolation rates.

The percolation tests were performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the stormwater infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials. A safety factor should be applied to these measured rates.

Based on the soils encountered in our borings, we expect the percolation rates of the soils could be different than measured in the field due to variations in fines and gravel content. The design elevation and size of the proposed infiltration system should account for this expected variability in infiltration rates.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located a minimum of 10 feet from any existing or proposed foundation system.

GEOTECHNICAL OVERVIEW

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the findings and recommendations presented in this report are incorporated into project design and construction.

The site is bounded from the east and west by steep slopes and mapped landslide potential areas. Stability assessment of the eastern and western surrounding slopes is not included in our scope of work and is being evaluated by Sargent & Lundy (S&L) based on the findings of this report.

Expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion; however, even if these procedures are followed, some movement and at least minor cracking in the structures should be anticipated. The severity of cracking and other cosmetic damage such as uneven floor slabs will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and cosmetic distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. We would be pleased to discuss other construction alternatives with you upon request.

Based on our explorations, review of geologic maps, and areas designated by the California Geologic Survey, landslide deposits were encountered in multiple borings extending to approximate depths of 10 to 50 feet bgs. Based on the provided outline of the proposed project, the landslide deposits were encountered outside the outline of the proposed structures. In the event additional structures will be constructed west of the outline of the project and within the landslide deposits area, these deposits should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Batteries, transformers, and associated equipment should be supported on a mat foundation system. Mat foundations should bear on a minimum of 2 foot of engineered fill beneath the bottom of the foundations, or 4 feet below existing grades, whichever is greater. Engineered fill supporting mat foundations should comprise of low volume change materials conforming to the specifications of our **Fill Materials and Placement** section of this report.

It is our understanding that a proposed 138kV transmission line pole will be supported on a drilled pier.

Estimated movements described in this report are based on effective drainage for the life of the structures and cannot be relied upon if effective drainage is not maintained. Exposed ground, extending at least 10 feet from the perimeter, should be sloped a minimum of 5% away from the structures to provide positive drainage away from the structures. Grades around the structures should be periodically inspected and adjusted as part of the structure's maintenance program.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of test borings, laboratory testing, engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

The following presents recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. The recommendations presented are for the design and construction of foundations and are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Strip and remove existing vegetation, debris, pavements and other deleterious materials from proposed building and roadway areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed building structures.

Demolition of the existing structures should include complete removal of all foundation systems and remaining underground utilities within the proposed construction area. This should include removal of any loose backfill found adjacent to existing foundations. All materials derived from the demolition of existing structures and pavements should be removed from the site and not be allowed for use as on-site fill, unless processed in accordance with the fill requirements included in this report.

Based on our explorations, review of geologic maps, and areas designated by the California Geologic Survey, landslide deposits were encountered in multiple borings extending to approximate depths of 10 to 50 feet bgs. Based on the provided outline of the proposed project, the landslide deposits were encountered outside the outline of the proposed structures. In the event additional

structures will be constructed west of the outline of the project and within the landslide deposits area, these deposits should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Although no evidence of fills, utilities, or underground facilities such as septic tanks, cesspools, basements, and utilities was observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills, utilities, or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

Strip and remove existing vegetation, debris, and other deleterious materials from proposed foundation areas.

Mat foundations should be supported on engineered fill extending 2 feet beneath the bottom of the foundations, or 4 feet below existing grades, whichever is greater. Engineered fill supporting mat foundations should consist of low volume change materials conforming to the specifications of our **Fill Materials and Placement** section of this report. The lateral extent of the overexcavation should extend a minimum of 2 foot beyond the edge of the foundation. Subsequent to the surface clearing and over-excavation efforts, the exposed subgrade soils which will support engineered fill areas constructed at grade, should be prepared to a minimum depth of 10 inches. Subgrade preparation should generally include scarification, moisture conditioning, and compaction. The moisture content and compaction of subgrade soils should be maintained until construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable. However, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

We recommend that the walls of the proposed excavations for the trenches be shored or sloped in conformance with OSHA excavation and trench safety standards. Based on the soils encountered onsite, it is our opinion that these soils can be classified as OSHA Type B or C, depending on the materials exposed during grading. If any excavation is extended to a depth of

more than 20 feet, it will be necessary to have the side slopes designed by a professional engineer.

Soils from the excavation should not be stockpiled higher than six 6 feet or within ten 10 feet of the edge of an open trench. Construction of open cuts adjacent to existing structures, including underground pipes, is not recommended within a 1½ H:1V plane extending beyond and down from the perimeter of the structure.

It may be necessary for the contractor to retain a geotechnical engineer to monitor the soils exposed in all excavations and provide engineering services for slopes. This will provide an opportunity to monitor the soils encountered and to modify the excavation slopes as necessary. It also offers an opportunity to verify the stability of the excavation slopes during construction.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than three inches in size. Pea gravel or other open-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Due to the on-site soil's expansion potential, they are not recommended for use as engineered fill beneath foundations. Such soils may be used as fill materials for the following:

- general site grading
- exterior slabs
- roadway areas

Imported low volume change soils should be used as engineered fill supporting shallow foundations.

Imported soils for use as fill material within proposed structure areas should conform to low volume change materials as indicated in the following specifications:

<u>Gradation</u>	<u>Percent Finer by Weight</u> <u>(ASTM C 136)</u>
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	10-30
■ Liquid Limit	30 (max)
■ Plasticity Index	15 (max)
■ Maximum Expansion Index*	20 (max)

*ASTM D4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
Approved imported low volume change fill soils:			
Beneath foundations:	90%	-2%	+2%
Utility trenches (structural areas)*:	90%	-2%	+2%
On-site native soils			
Beneath access roads:	95%	+1%	+4%
Utility trenches (Landscape areas):	90%	+1%	+4%
Exterior slabs:	90%	+1%	+4%
Miscellaneous backfill:	90%	+1%	+4%

* Upper 12 inches should be compacted to 95% within structural areas.

Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Backfill against foundations and in utility line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

We recommend a minimum horizontal setback distance of 10 feet from the perimeter of any building and the high-water elevation of the nearest storm-water retention basin.

Utility Trenches

It is anticipated that the on-site soils will provide suitable support for underground utilities and piping that may be installed. Any soft and/or unsuitable material encountered at the bottom of excavations should be removed and be replaced with an adequate bedding material. A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless allowed or specified otherwise by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches from one foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances. Imported low volume change soils should be used for trench backfill in structural areas.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. If trenches are placed beneath footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed, or these materials should be scarified, moisture conditioned, and recompacted prior to construction.

On-site clay and silt soils may pump and unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The use of light construction equipment would aid in reducing subgrade disturbance. The use of remotely operated equipment, such as a backhoe, would be beneficial to perform cuts and reduce subgrade disturbance.

Should unstable subgrade conditions develop stabilization measures will need to be employed. Stabilization measures may include placement of aggregate base and multi-axial geogrid. Use of lime, fly ash, kiln dust or cement could also be considered as a stabilization technique. Laboratory evaluation is recommended to determine the effect of chemical stabilization on subgrade soils prior to construction.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which

would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Construction Observation and Testing

The exposed subgrade and each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the geotechnical engineer's representative prior to placement of additional lifts. We recommend that each lift of fill be tested for density and moisture content at a frequency of one test for every 2,500 square feet of compacted fill in the structural areas. We recommend one density and moisture content test for every 50 linear feet of compacted utility trench backfill. This testing frequency criteria may be adjusted during construction as allowed by the geotechnical engineer of record.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations to the completed subgrade.

FOUNDATIONS

The proposed batteries, transformers, and associated equipment may be supported on mat foundations bearing on engineered fill. Recommendations for foundations for the proposed structures and related structural elements are presented in the following paragraphs.

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Mat Foundation Design Recommendations

DESCRIPTION	RECOMENDATION
Foundation Type	Mat foundations
Bearing Material³	A minimum 2-foot of engineered fill beneath the bottom of the foundations, or 4 feet below existing grades, whichever is greater. Low volume change materials should be used as engineered fill for support of proposed mat.
Allowable Bearing Pressure^{1,7}	1-inch settlement ■ 1,800 psf for mat foundation (Up to 10 feet wide) ■ 1,000 psf for mat foundation (Up to 20 feet wide) ■ 800 psf for mat foundation (Up to 30 feet wide) 2-inch settlement ■ 4,000 psf for mat foundation (Up to 10 feet wide) ■ 2,700 psf for mat foundation (Up to 20 feet wide) ■ 1,900 psf for mat foundation (Up to 30 feet wide)
Minimum Foundation Width	2 feet
Ultimate Coefficient of Sliding Friction⁴	0.30
Minimum Embedment Depth Below Finished Grade	12 inches
Estimated Total Settlement from Structural Loads²	See Allowable Bearing Pressure
Estimated Differential Settlement^{2,6}	½ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied.
2. Unsuitable or loose/soft, dry, and low-density soils should be removed and replaced per the recommendations presented in the **Earthwork**.
3. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
4. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
5. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. The designer should select an appropriate factor of safety during design.
6. Differential settlements are as measured over a span of 40 feet.
7. Maximum width is based on settlement analysis with allowable settlement of 1 and 2 inches.

Settlement calculations were performed utilizing Westergaard and Hough's methods⁵ to estimate the static settlement for various foundation widths with an allowable settlement of 1 and 2 inches.

⁵ FHWA Geotechnical Engineering Circular No. 6 – Shallow Foundations, FHWA-SA-02-054.

Since there are several factors that will control the design of mat foundations besides vertical load, Terracon should be consulted when the final foundation depth and width are determined to assist the structural designer in the evaluation of anticipated settlement.

For structural design of mat foundations, a modulus of subgrade reaction (K_v) of 120 pounds per cubic inch (pci) may be used. Other details including treatment of loose foundation soils, superstructure reinforcement and observation of foundation excavations as outlined in the Earthwork section of this report are applicable for the design and construction of a mat foundation at the site.

The subgrade modulus (K_v) for the mat is affected by the size of the mat foundation and would vary according the following equation:

$$K_v = K_{v1}/B$$

Where: K_v is the modulus for the size footing being analyzed
 B is the width of the mat foundation.

Shallow Foundation Design Considerations

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings.

The allowable foundation bearing pressure applies to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

DEEP FOUNDATIONS

The proposed transmission tower can be supported on drilled shafts. The location of the proposed transmission tower was not available at the time of preparation of this report. Based on correspondence with S&L, we understand that the transmission tower may be situated within the central area of the site. Design recommendations for foundations for the proposed structures and related structural elements are presented in the following paragraphs.

Total required embedment of the drilled shafts should be determined by the structural engineer based on structural loading and parameters provided in this report.

Drilled Shaft Axial Capacity

The allowable axial capacity for a range of drilled shafts diameters was evaluated and is presented in the graph provided in the **Supporting Documents** section of this report. The allowable total downward (compressive) capacity is based on a factor of safety of 2.5 for side resistance and 3.0 for end bearing. The analysis considered the depth to top of shaft to be 2 feet below existing ground surface. The depth below ground surface indicated in the graphs is referenced from the existing ground surface at the site at the time of the field exploration. The capacity presented is based on a minimum shaft spacing of 3 shaft diameters. Allowable tension capacity may be taken as 60 percent of the allowable compressive capacity, plus the weight of the shaft. Tensile reinforcement should extend to the bottom of shafts subjected to uplift loading.

Drilled Shaft Lateral Capacity

The required depths of shaft embedment should also be determined for design axial loads, lateral loads, and overturning moments to determine the most critical design condition. To support the designer, parameters for use in MFAD software have been tabulated and are presented in the following table.

MFAD 5.0 Recommended Engineering Properties of Soils				
Top Depth Bottom Depth	Effective Unit Weight (pcf)	MFAD Soil Group	Cohesion (psf)	MFAD Modulus of deformation (ksi)
2 10	115	CLAY	1,000	0.65
10 30				
30 45	120	CLAY	2,000	1.30
45 50				
45 50	63	CLAY	3,000	1.95
50				

It should be noted that the load capacities provided herein are based on the stresses induced in the supporting soils. The structural capacity of the shafts should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. Furthermore, the response of the drilled shaft foundations to lateral loads is dependent upon the soil/structure interaction as well as the shaft's actual diameter, length, stiffness and "fixity" (fixed or free-head condition).

Lateral and axial capacity of soils within the upper 2 feet should be neglected due to utilities and disturbance around piers. We recommend that Terracon review the final drilled shaft design to verify that sufficient embedment is achieved.

Drilled Shaft Construction Considerations

All shafts should be reinforced full-depth for the applied axial, lateral and uplift stresses imposed. If multiple shafts are proposed at the transmission tower location, special sequencing of drilled shaft construction should be specified when the center to center spacing between adjacent shafts is less than three diameters. A minimum of 24 hours should be allowed between placement of concrete and initiation of drilling in shafts less than five diameters (center to center spacing) apart from each other.

Drilling to design depths should be possible with conventional single flight power augers. Formation of mushrooms or enlargements at the tops of shafts should be avoided during shaft drilling. If mushrooms develop at the tops of the shafts during drilling, sono-tubes should be placed at the shaft tops to help isolate the shafts.

Groundwater was encountered in some of the exploratory borings. Therefore, seepage or groundwater may be encountered during drilling for the shafts. To control groundwater seepage, the use of temporary steel casing and/or slurry drilling procedures may be required for construction of the drilled shaft foundations. The drilled shaft contractor and foundation design engineer should be informed of these risks.

If shafts are constructed below the groundwater level, the “Wet” shafts should be constructed by slurry displacement techniques. In this process, the shaft excavation is filled with approved polymer-based slurry to counter-balance the hydraulic forces below the water level and stabilize the wall of the shaft. Concrete would then be placed using a tremie extending to within 6 inches of the shaft base of the slurry-filled excavation. The tremie remains inserted several feet into the fresh concrete as it displaces the slurry upward and until placement is complete. The slurry should have a sand content no greater than 1% at the time concrete placement commences. The maximum unit weight of the slurry should be established in consultation with Terracon.

For drilled shaft depths above the depth of groundwater, temporary steel casing may be required to properly drill and clean shafts prior to concrete placement. If disturbed soils are present at the bottom of the drilled shafts, the sloughed materials must be removed, and bottom should be cleaned.

If casing is used for foundation construction, it should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete to prevent caving or the creation of voids in pier concrete. Foundation concrete should have a relatively high fluidity when placed in cased pier holes or through a tremie. Foundation concrete with slump in the range of 6 to 8 inches is recommended when temporary casing is utilized.

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Foundation concrete should be placed immediately after completion of drilling and cleaning. If foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

Free-fall concrete placement in drilled shafts will only be acceptable if provisions are taken to avoid striking the concrete on the sides of the hole or reinforcing steel. The use of a bottom-dump hopper, or an elephant's trunk discharging near the bottom of the hole where concrete segregation will be minimized, is recommended.

Drilled shaft bearing surfaces must be cleaned prior to concrete placement. A representative of the geotechnical engineer should observe the bearing surface and foundation shaft configuration. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations may be required.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to evaluate that the soils encountered are consistent with the recommended design parameters.

The contractor should check for gas and/or oxygen deficiency prior to any workers entering the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

LATERAL EARTH PRESSURES

Design Parameters

For engineered fill comprised of on-site soils or imported low volume change materials (required behind retaining walls) above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are:

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ITEM	VALUE ^{a, b}
Active Case	38 psf/ft ^c
Passive Case	375 psf/ft
At-Rest Case	58 psf/ft
Surcharge Pressure	0.32 x (Surcharge)
Coefficient of Friction	0.35

^aNote: The values are based on low volume change engineered fill materials used as backfill behind retaining walls.

^bNote: Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 120 pcf.

^cNote: Earth pressures should be increased by 40 percent for a slope of 2H:1V behind walls and should be increased by 120 percent for a slope of 1.5H:1V.

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Total lateral earth pressures acting on the wall, where it is retaining greater than 6 feet, during a seismic event should include the active static forces and a dynamic increment. The active dynamic increment should be applied to unrestrained walls as a resultant force acting at 0.6H height from the base of the wall. Such increment should be added to the static earth pressures. The dynamic lateral earth resultant force (for a 0.56g peak ground acceleration estimated based on the current 2019 California Building Code) is $13H^2$ (in units of pounds per linear foot (plf)), where H (in units of feet) is the height of the soil behind the wall.

Adequate drainage should be provided behind the retaining walls to collect water from irrigation, landscaping, surface runoff, or other sources, to achieve a free-draining backfill condition. The wall back drain should consist of Class 2 permeable materials³ that are placed behind the entire wall height to within 18 inches of ground surface at the top of the wall. As a minimum, the width of Class 2 permeable materials behind the wall should be two feet. As an alternative, drainage panels/mats may be used in lieu of the Class 2 permeable materials. Water collected by the back drain should be directed to an appropriate outlet, such as perforated pipes or weep holes, for disposal.

Fill against foundation and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

³ In accordance with the requirements and specifications of the State of California Department of Transportation.

The design of any shoring system should consider surcharge loads imposed by the existing structures and vehicular loads in the vicinity of the shoring. In general, surcharge loads should be considered where they are located within a horizontal distance behind the shoring equal to the height of the shoring.

Surcharge loads acting at the top of the shoring should be applied to the shoring over the backfill as a uniform pressure over the entire shoring height and should be added to the static earth pressures. Surcharge stresses due to point loads, line loads, and those of limited extent, such as compaction equipment, should be evaluated using elastic theory.

The design of the shored excavation should be performed by an engineer knowledgeable and experienced with the on-site soil conditions. The contractor should be aware that slope height, slope inclination or excavation depths should in no case exceed those specified in local, state or federal safety regulations, e.g. OSHA Health and Safety Standards for Excavation, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if not followed, the owner or the contractor could be liable for substantial penalties.

ACCESS ROADWAYS

Compacted Native Soils Access Road Design Recommendations

Based upon the soil conditions encountered in the test borings, the use of on-site soils for construction of on-site roads is considered acceptable. Without the use of asphalt concrete or other hardened material to surface the roadways, there is an increased potential for erosion and deep rutting of the roadway to occur, however, post construction traffic is anticipated to only consist of pickup trucks for operations and maintenance personnel. Therefore, construction of the un-surfaced native roadways should consist of a minimum of 10-inches of compacted on-site soils.

It is our understanding that proposed compacted native roadway grades will match adjacent existing grades so that the existing natural drainage patterns are generally unchanged. The un-surfaced roads are expected to function with periodic maintenance.

Aggregate Surface Roadway Design Recommendations

Aggregate surface roadway design was conducted in general accordance with the Army Corps of Engineers (ACOE) Technical Manual TM-5-822, Design of Aggregate Surface Roads and Airfields (1990). The design was based on Category III, traffic containing as much as 15% trucks, but with not more than 1% of the total traffic composed of trucks having three or more axles (Group 3 vehicles), and Road Class G (Under 70 vehicles per day). This assumed traffic loading is for the operations of the proposed facility but not for construction traffic. Based on the Category and Road Class, a Design Index of 1 was utilized, along with a correlated CBR of 5. Terracon should be contacted if significant changes in traffic loads or in the characteristics described are anticipated.

As a minimum, the aggregate surface course should have a minimum thickness of 6 inches and should be constructed over a minimum of 10 inches of scarified, moisture conditioned, and compacted native soils to 90% of the maximum dry density using ASTM D 1557. The recommended thicknesses should be measured after full compaction. The width of the roadway should extend a minimum distance of 1 foot on each side of the desired surface width.

It is our understanding that aggregate surfaced roads and parking areas will be utilized during the construction of this project. Aggregate materials should conform to the specifications of Class II aggregate base in accordance with the requirements and specifications of the State of California Department of Transportation (Caltrans), or other approved local governing specifications.

Positive drainage should be provided during construction and maintained throughout the life of the roadways. Proposed roadway design should maintain the integrity of the road and eliminate ponding.

Roadway Design and Construction Considerations

Regardless of the design, un-surfaced roadways will display varying levels of wear and deterioration. We recommend an implementation of a site inspection program at a frequency of at least once per year to verify the adequacy of the roadways. Preventative measures should be applied as needed for erosion control and re-grading. An initial site inspection should be completed approximately three months following construction.

Preventative maintenance should be planned and provided for through an on-going management program to enhance future roadway performance. Preventative maintenance activities are intended to slow the rate of deterioration, and to preserve the roadway investment.

Surfacing materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of roadways to reduce lateral moisture transmission into the subgrade.

If rut depths become excessive as construction work progresses, re-grading and re-compaction should be performed as necessary. Care should be taken to reduce or eliminate trafficking of the unpaved access road when the subgrade is wet as this will result in accelerated rutting conditions. Scarification, moisture treatment as necessary, and re-compaction of the roadways will likely be necessary as the roadways deteriorate.

Materials and construction of roadways for the project should be in accordance with the requirements and specifications of the California Department of Transportation or the applicable local governing body.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. The findings and recommendations presented in this report were prepared in a manner consistent with the standards of care and skill ordinarily exercised by members of its profession completing similar studies and practicing under similar conditions in the geographic vicinity and at the time these services have been performed. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Boring ID	Depth (feet)	Location
B-1 to B-3, B-7 to B-10, B-15 to B-17, B-20, B-21, B-25	41½ to 101½	Battery storage and transformer areas
P-1 to P-8	5 to 10	Potential infiltration areas
B-4 to B-6, B-11 to B-14, B-19, B-24	51 to 91½	On or along existing hillside

Note: Proposed borings B-18, B-22, B-23, and B-26 were not drilled based on direction from the client.

Boring Layout and Elevations: Boring layout was provided by S&L. Several locations were shifted by Terracon during site reconnaissance based on drill rig accessibility. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and elevations are based on a site topographic KMZ file (1-foot contours) provided by S&L. If a more precise boring layout is desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with a truck-mounted drill rig using hollow stem augers. Four samples were generally obtained in the upper 10 feet of the borings and at intervals of 5 feet thereafter. A standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 3-inch O.D. split-barrel sampling spoon with 2.5-inch I.D. ring lined sampler was also used for sampling. Ring-lined, split-barrel sampling procedures are similar to standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 18 inches of penetration. We observed and recorded groundwater levels during drilling and sampling.

In accordance with Orange County well permit requirements, all borings extending beyond 50 feet or into groundwater regardless of depth were backfilled cement grout slurry. All other borings were backfilled with auger cuttings. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our field geologist prepared field boring logs as part of the excavation operations. These field logs include visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil and rock strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing
- ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
- ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
- ASTM D4829 Standard Test Method for Expansion Index of Soils
- ASTM D2844 Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils
- ASTM D2850 Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils
- Corrosivity testing included pH, chlorides, sulfates, and electrical lab resistivity

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

SITE LOCATION

Broad Reach Power Compass BESS ■ San Juan Capistrano, CA
November 3, 2021 ■ Terracon Project No. 60215170

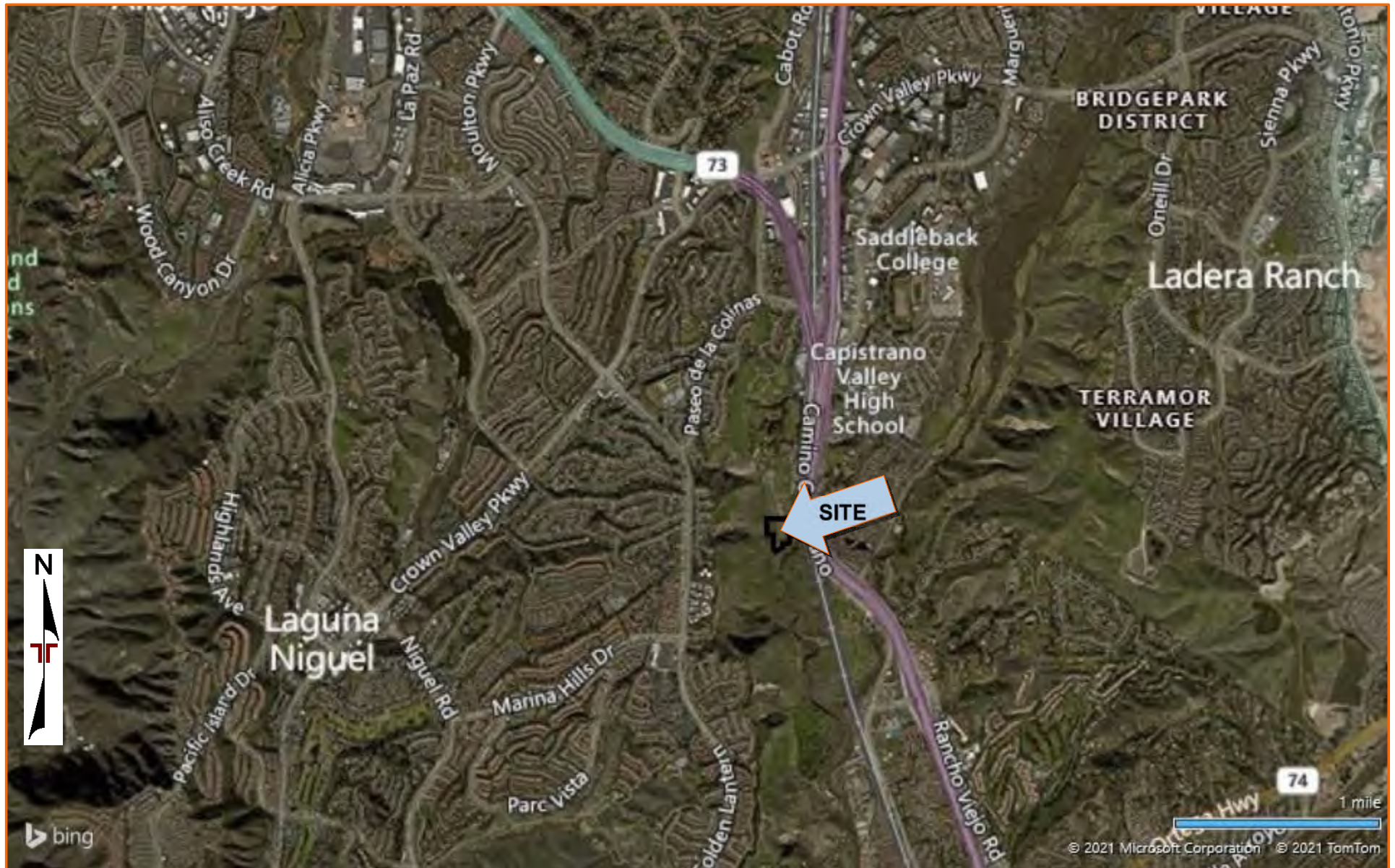
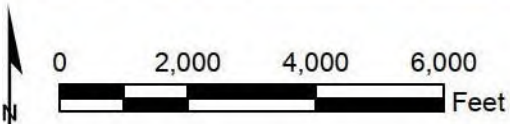
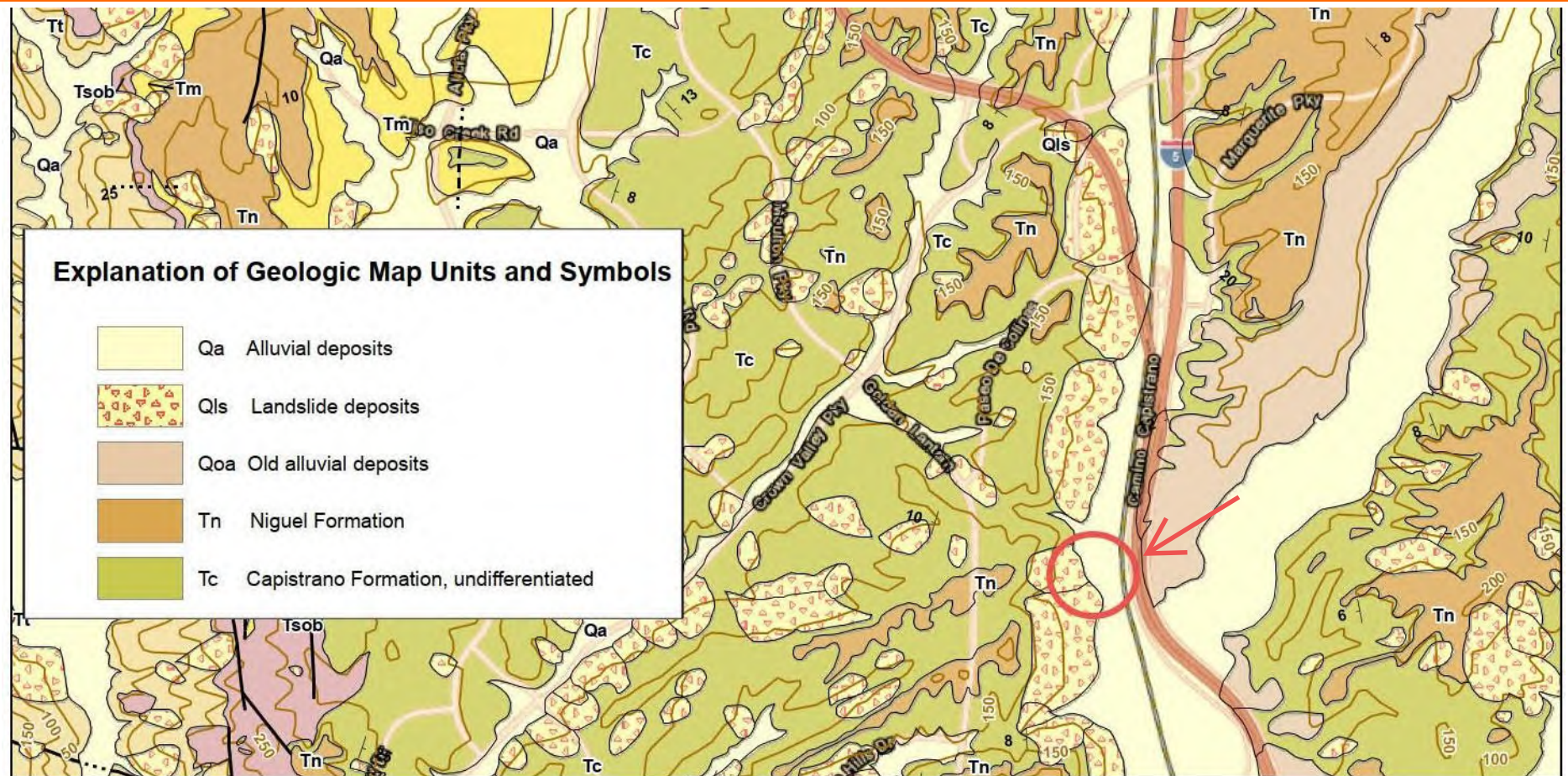


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT
INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: SAN JUAN CAPISTRANO, CA (1/1/1981).

REGIONAL GEOLOGIC MAP

Broad Reach Power Compass BESS ■ San Juan Capistrano, Orange County, CA
November 3, 2021 ■ Terracon Project No. 60215170



From: Morton and Miller, 2006, Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles, California: U.S. Geological Survey, Open-File Report 2006-1217, version 1.0, scale 1:100,000

EARTHQUAKE ZONES OF REQUIRED INVESTIGATION

Broad Reach Power Compass BESS ■ San Juan Capistrano, CA
November 3, 2021 ■ Terracon Project No. 60215170

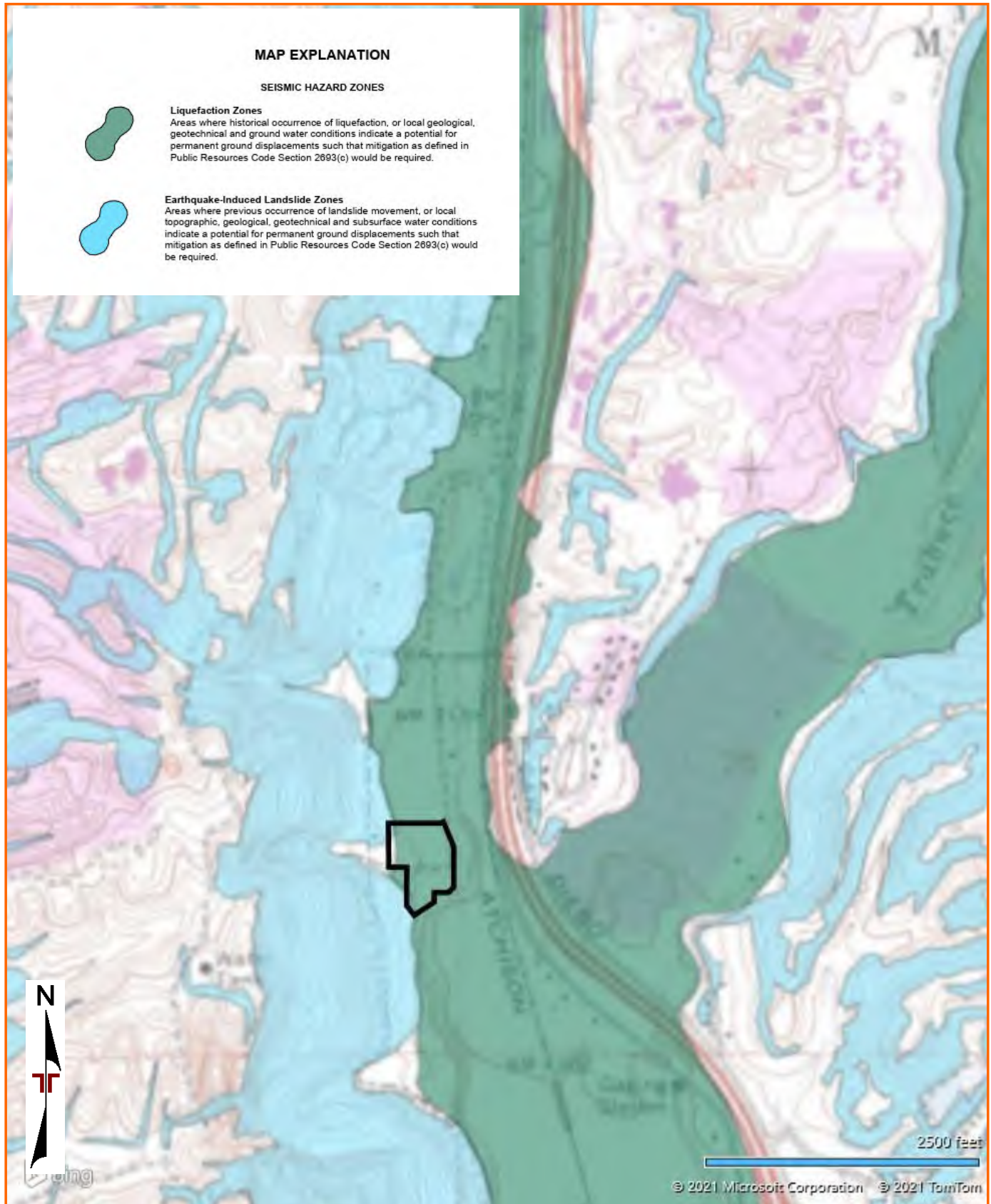


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED
BY MICROSOFT BING MAPS

EXPLORATION PLAN

Broad Reach Power Compass BESS ■ San Juan Capistrano, CA
November 3, 2021 ■ Terracon Project No. 60215170

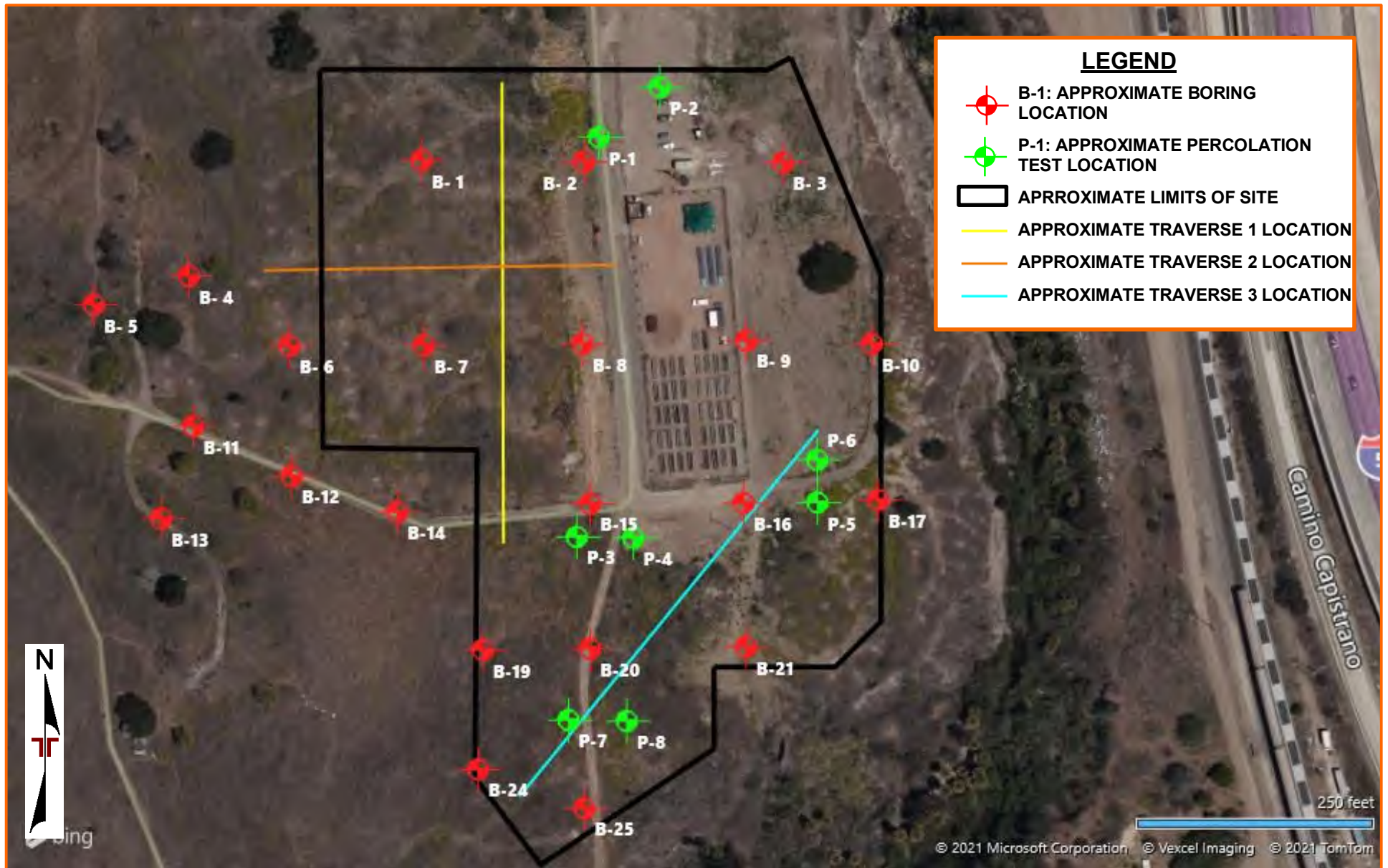


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT
INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY
MICROSOFT BING MAPS

EXPLORATION RESULTS

Page 1 of 2

CLIENT: Sargent & Lundy LLC
Chicago, IL

[illegible]

Hammer Type: Automatic

Project No.: 60215170

Page 2 of 2

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH	ELEVATION (Ft.)						TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	LEAN CLAY WITH SAND (CL) , olive-brown to brown (<i>continued</i>) medium stiff to stiff		30			2-2-6 N=8								
	wet, stiff					2-4-6 N=10								
	medium stiff					1-3-4 N=7								
	stiff					2-4-5 N=9								
	41.5					175.5								
Boring Terminated at 41.5 Feet														

Hammer Type: Automatic

Project No.: 60215170

Page 1 of 2

CLIENT: Sargent & Lundy LLC
Chicago, IL

[illegible]

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B- 2

Page 2 of 2

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5328° Longitude: -117.6776° Surface Elev.: 210 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) medium stiff	30			2-3-4 N=7								
	SILTY SAND (SM) , gray-brown loose	35			2-3-4 N=7								25
	LEAN CLAY (CL) , trace sand, olive-brown to gray-brown, stiff	40			3-4-6 N=10								
	Boring Terminated at 41.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon

1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Boring Completed: 09-17-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 3

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5328° Longitude: -117.6769° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILT WITH SAND (ML) , trace clay, olive-brown to light-brown	2.5											
	LEAN CLAY WITH SAND (CL) , olive-brown to dark-brown, very stiff	206.5			9-16-16								
		5			5-8-12					17.4	103		
		7.5			10-13-15							34-22-12	
	LEAN CLAY (CL) , white mottling trace silt and sand, olive-brown to dark-brown, very stiff	201.5			8-13-20					22.5	101		
		15			5-8-10 N=18								
		20			9-7-12								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

At completion of drilling

Terracon

1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Boring Completed: 09-17-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 3

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5328° Longitude: -117.6769° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) , white mottling (<i>continued</i>) stiff			X	4-5-7 N=12								
		30		Δ	4-6-8					33.6	88		
		35		X	2-2-3 N=5								
	and gray-brown, medium stiff												
		40		Δ	4-6-6								
	stiff												
		45		X	2-2-5 N=7								
	wet, medium stiff												
		50.0											
		159											
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

 At completion of drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Boring Completed: 09-17-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 3

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5328° Longitude: -117.6769° Surface Elev.: 209 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SANDY LEAN CLAY (CL) , gray-brown, stiff				5-8-8								
	51.5	157.5											
	POORLY GRADED SAND WITH SILT (SP-SM) , gray-brown												
	medium dense	55			7-7-4 N=11								10
	trace clay	60			9-14-15								
	65.0	144			1-2-3 N=5								
	SANDY LEAN CLAY (CL) , dark-brown to gray-brown, medium stiff	65											
	stiff	70			4-7-9								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

At completion of drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Boring Completed: 09-17-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 3

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5328° Longitude: -117.6769° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SANDY LEAN CLAY (CL) , dark-brown to gray-brown, medium stiff (<i>continued</i>)			X	2-5-5 N=10								
	Boring Terminated at 76.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

 At completion of drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-17-2021

Driller: 2R Drilling

BORING LOG NO. B-4

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5325° Longitude: -117.6789° Surface Elev.: 247 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LANDSLIDE DEPOSITS (Qls), SILTY CLAYEY SAND , trace gravel, light brown, loose												
	5.0	242			4-5-7					5.3			
	LANDSLIDE DEPOSITS (Qls), SILT , trace sand, olive-brown to gray-brown, very stiff				5-15-15							39-26-13	
	white mottling and orange rust staining				11-16-24								90
	10				9-14-21					16.7	99		
	15.0	232			9-15-22								
	LANDSLIDE DEPOSITS (Qls), SILTY CLAY (CL-ML) , trace sand, olive-brown with white mottling and orange rust staining, very stiff												
	20.0	227			2-3-8 N=11								
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown, stiff												
	25.0	222											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS GPJ TERRACON DATATEMPLATE GDT 10/19/21

BORING LOG NO. B-4

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5325° Longitude: -117.6789° Surface Elev.: 247 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH	ELEVATION (Ft.)											
	SILTY CLAY (CL-ML) , olive-brown, very stiff												
	30.0	217	30	X	8-14-21								
	LEAN CLAY (CL) , trace sand, light-gray to gray-brown with white mottling, very stiff												
			35	X	4-10-11 N=21								
			40	X	9-16-25								
			45	X	2-6-11 N=17								
			50.0	X	11-17-23					22.8	104		
		197	50										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 4

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5325° Longitude: -117.6789° Surface Elev.: 247 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH	ELEVATION (Ft.)											
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND, dark-brown to dark-gray very stiff			X	3-10-20 N=30								
	hard	55		X	35-50/4"								
		60		X	9-19-27 N=46								
		65		X	42-50/3"								
		70		X	10-20-29 N=49								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B- 4

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5325° Longitude: -117.6789° Surface Elev.: 247 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND, dark-brown to dark-gray (<i>continued</i>) hard	80			27-50/5"								
					15-19-29 N=48								
		85			30-50/5"								
		90			17-23-35 N=58								
	Boring Terminated at 91.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 5

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5324° Longitude: -117.6793° Surface Elev.: 254 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LANDSLIDE DEPOSITS (Qls), LEAN CLAY trace silt and sand, gray-brown to olive-brown												
	very stiff				5-8-11								
		5			8-13-16					10.9	103		
					9-12-14								
	light-brown to olive-brown with white mottling	10			5-8-12					12.4	97		
	medium stiff	15			1-2-4 N=6							42-23-19	
	very stiff	20			4-9-12					20.2	97		
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 5

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5324° Longitude: -117.6793° Surface Elev.: 254 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LANDSLIDE DEPOSITS (QIs), LEAN CLAY (continued) olive-brown with white mottling, medium stiff			X	1-2-4 N=6								
		30		Δ	4-7-9								
		35		X	1-2-3 N=5								
		40		Δ	3-8-14								
		45		X	2-3-8 N=11								
	LANDSLIDE DEPOSITS (QIs), SILTY CLAY trace sand, olive-brown to light-gray with white mottling and orange rust stains, stiff	50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 5

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5324° Longitude: -117.6793° Surface Elev.: 254 (Ft.)	DEPTH (FL) ELEVATION (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES																																																																																			
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI																																																																																				
	SILTY CLAY (CL-ML) , trace sand, dark-gray to dark-brown with white mottling and orange rust stains, very stiff	62.0			9-14-22																																																																																											
														stiff to very stiff	55																																																																																	
																																				gray-brown, hard	60																																																											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

Page 4 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan	Latitude: 33.5324° Longitude: -117.6793° Surface Elev.: 254 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
								TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
DEPTH	ELEVATION (FL)													
	76.5	177.5			X	11-21-43 N=64								
Boring Terminated at 76.5 Feet														

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B- 6

Page 1 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6786° Surface Elev.: 234 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LANDSLIDE DEPOSITS (Qis), LEAN CLAY, trace silt and sand, olive-brown												
	orange rust staining, stiff				2-4-6					13.2	97		
	very stiff	5			8-8-12					15.1	101		
					9-13-16								
					7-11-18								
	SILTY CLAY (CL-ML) trace sand, olive-brown, very stiff	10											
	medium stiff to stiff	15			2-4-4 N=8								
	white mottling, very stiff	20			6-12-13								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 6

Page 2 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6786°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SILTY CLAY (CL-ML) (continued) medium stiff to stiff			X	1-3-5 N=8								
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling and orange rust staining, very stiff	30		X	10-15-20								
	stiff	35		X	2-3-6 N=9								
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND , dark-brown to dark-gray, hard	40		X	20-50/5"								
		45		X	11-13-19 N=32								
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

Page 3 of 3

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6786° Surface Elev.: 234 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
		DEPTH 50.9			15-50/5"								
	Boring Terminated at 50.9 Feet												

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B-7

Page 1 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6781° Surface Elev.: 222 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAYEY SAND (SC-SM) , olive-brown	2.5											
	LEAN CLAY (CL) , trace silt and sand, olive-brown with orange rust staining, stiff	219.5			3-4-6					11.8	91		
		5			3-4-6					16.5	99		
		10			4-8-9					14.7	104		
		15			5-8-9					13.4	104		
	white mottling	20.0			3-6-9								
	SILTY CLAY (CL-ML) trace sand, olive-brown to gray-brown with white mottling and orange rust staining, soft to medium stiff	202			1-2-2 N=4								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 7

Page 2 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6781° Surface Elev.: 222 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH												
				X	1-1-2 N=3								
		30		X	1-2-2 N=4								
		35		X	1-2-2 N=4								
		40		X	1-2-3 N=5								
		45		X	1-3-5 N=8								
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-10-2021

Boring Completed: 09-10-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

Page 3 of 3

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6781° Surface Elev.: 222 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	AT TERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
medium stiff													
51.5	170.5				1-2-4 N=6								
Boring Terminated at 51.5 Feet													

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B- 8

Page 1 of 2

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6776° Surface Elev.: 211 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILT (ML) , with clay, trace sand, light-brown to olive-brown	2.5											
	LEAN CLAY (CL) trace sand, light-brown to olive-brown, stiff	208.5			5-7-8							37-22-15	
	trace silt, olive-brown to gray-brown	5			6-6-6					17.8	105		
					4-5-6					19.6	99		
	white mottling	10			3-5-5								
	medium stiff	15			3-3-3								
	soft	20			1-1-2 N=3								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-17-2021

Boring Completed: 09-17-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

Page 2 of 2

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6776° Surface Elev.: 211 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	LEAN CLAY (CL) (continued) medium stiff	30		X	1-2-3 N=5								
				X	1-2-3 N=5								
				X	3-4-5 N=9								
stiff		35		X	3-4-5 N=9								
41.5	169.5	40		X	2-4-6 N=10								
Boring Terminated at 41.5 Feet													

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B- 9

Page 1 of 2

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6770° Surface Elev.: 208 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SILT (ML) , with clay, olive-brown to brown												
	very stiff				7-8-12					18.0	93		
	LEAN CLAY (CL) trace silt and sand, olive-brown to dark-brown very stiff	5			8-11-11					17.9	104		
					10-13-16								
	olive-brown to gray-brown	10			6-10-12								
	orange rust staining, stiff	15			3-6-6								
	medium stiff to stiff	20			3-3-5 N=8								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B- 9

Page 2 of 2

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6770° Surface Elev.: 208 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) white mottling, stiff			X	2-4-5 N=9								
	medium stiff	30		X	2-3-4 N=7								
	stiff	35		X	2-4-6 N=10								
	medium stiff	40		X	2-3-4 N=7								
	41.5	166.5											
	Boring Terminated at 41.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-10

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6766° Surface Elev.: 209 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY WITH SAND (CL) , olive-brown												
	very stiff				9-11-10							35-21-14	
	olive-brown to gray-brown, stiff	5			5-7-7					8.8	97		
					5-5-6								
		10			4-8-9					36.3	79		
	LEAN CLAY (CL) trace silt and sand, olive-brown to gray-brown to dark-brown, stiff												
		15			5-7-9								
	white mottling	20			3-6-8 N=14								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-10

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6766° Surface Elev.: 209 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH												
	LEAN CLAY (CL) (continued) very stiff				10-10-13								
	stiff	30		X	3-3-6 N=9								
		35		X	3-6-7								
	medium stiff	40		X	3-3-3 N=6								
	and light-gray, very stiff	45		X	4-9-11								
		50		▽									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

▽ While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-10

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5323° Longitude: -117.6766°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY (CL) (continued) medium stiff	51.5		X	3-3-4 N=7								
	SILTY SAND (SM) , gray-brown												
	medium dense	55		X	5-13-33					19.4	105		
		60		X	9-12-15 N=27								16
	very dense	65		X	9-32-50/4"								
	medium dense	70		X	7-8-11 N=19								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

Page 4 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

[illegible]

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

 While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-11

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5321° Longitude: -117.6789° Surface Elev.: 240 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LANDSLIDE DEPOSITS (QIs), LEAN CLAY (CL) , trace silt and sand, gray-brown to olive-brown very stiff												
		5			7-16-16								
					6-9-14					12.7	96		
					7-11-14							38-22-16	
	10.0	230			7-10-14					13.0	105		
		15			5-8-9								
		20			2-3-4 N=7								
	25.0	215											
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-11

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5321° Longitude: -117.6789° Surface Elev.: 240 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	DEPTH ELEVATION (Ft.)												
	LANDSLIDE DEPOSITS (Qis), LEAN CLAY trace silt and sand, olive-brown, very stiff				4-8-11								
	soft	30		X	1-1-2 N=3								
	stiff	35		X	4-7-9								
	medium stiff	40		X	1-2-4 N=6							45-24-21	
	45.0	45		X	4-9-15								
	SILTY CLAY (CL-ML) trace sand, olive-brown to gray-brown with white mottling and orange rust staining, very stiff	195											
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-11

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5321° Longitude: -117.6789° Surface Elev.: 240 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAY (CL-ML) (continued) stiff	55.0		X	2-4-9 N=13								
					26-50/5"								
					11-21-36 N=57								
					49-50/3"								
	CAPISTRANO FORMATION (Tc) recovered as LEAN CLAY with trace SAND , dark-gray to dark-brown, hard	60		X	9-18-36 N=54								
		65											
		70											
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon

1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-11

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5321° Longitude: -117.6789° Surface Elev.: 240 (Ft.) DEPTH
-------------	---

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-08-2021

Boring Completed: 09-08-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-12

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6786° Surface Elev.: 232 (Ft.) DEPTH
-------------	---

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

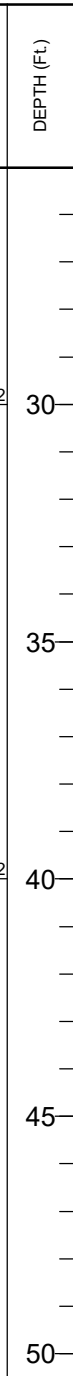
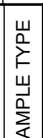
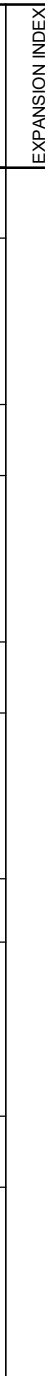
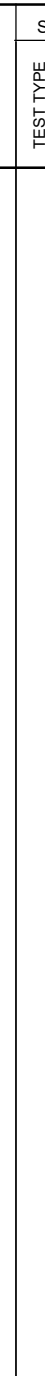
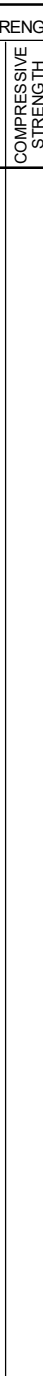
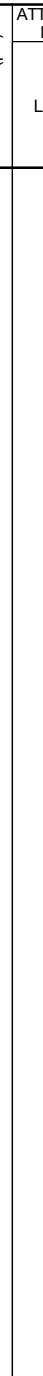
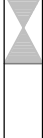
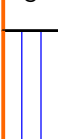
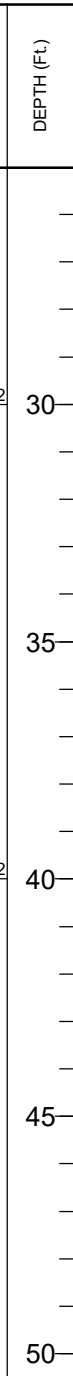
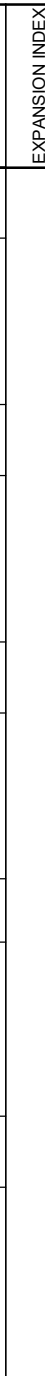
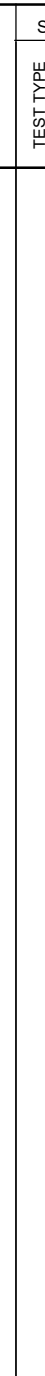
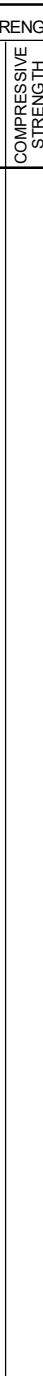
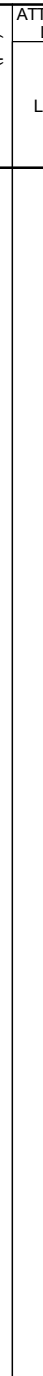
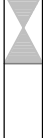
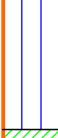
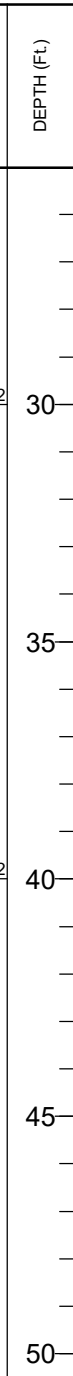
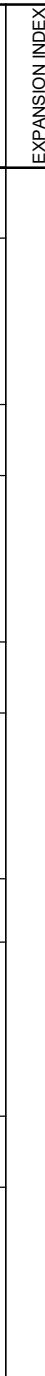
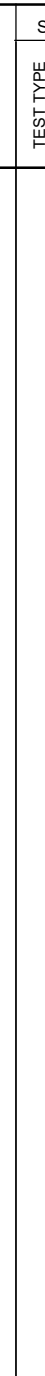
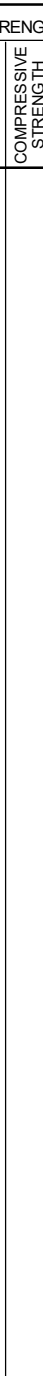
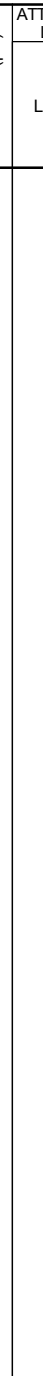
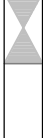
Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

Page 2 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6786° DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	SILT (ML) (continued) medium stiff				1-3-4 N=7								
													
													
													
													
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with orange rust staining, very stiff white mottling, stiff				8-11-14								
													
													
													
													
	CAPISTRANO FORMATION (Tc) recovered as ELASTIC SILT with trace SAND. dark-brown to dark-gray, hard				25-47-50/4"								
													
													
													
													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

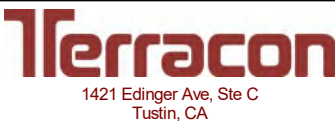
Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See **Supporting Information** for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATTEMPLATE.GDT 10/19/21

BORING LOG NO. B-12

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6786° Surface Elev.: 232 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	CAPISTRANO FORMATION (Tc) recovered as ELASTIC SILT with trace SAND. dark-brown to dark-gray, hard (<i>continued</i>)				30-50/4"								
		55		X	12-17-34 N=51								
		60			39-50/4"								
		65		X	9-17-32 N=49							53-34-19	
		70			30-50/5"								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

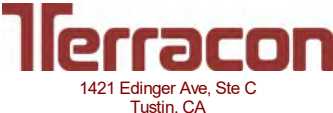
BORING LOG NO. B-12

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6786° Surface Elev.: 232 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	76.5	155.5		X	10-19-32 N=51								
Boring Terminated at 76.5 Feet													
Stratification lines are approximate. In-situ, the transition may be gradual.													
Hammer Type: Automatic													
Advancement Method: Hollow Stem Auger		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).				Notes:							
Abandonment Method: Boring backfilled with cement-grout upon completion.		See Supporting Information for explanation of symbols and abbreviations.											
WATER LEVEL OBSERVATIONS <i>Groundwater not encountered</i>		 1421 Edinger Ave, Ste C Tustin, CA				Boring Started: 09-09-2021		Boring Completed: 09-09-2021					
						Drill Rig: CME-75		Driller: 2R Drilling					
						Project No.: 60215170							

BORING LOG NO. B-13

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5318° Longitude: -117.6790° Surface Elev.: 249 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) , trace silt, olive-brown to gray-brown with white mottling, very stiff			X	4-6-12 N=18								
	and light-gray, hard	30		X	10-20-25		UU						
	very stiff, thin interbedded layers of silty sand	35		X	10-11-11 N=22								
		40.0											
	SILTY CLAY (CL-ML) , white mottling trace sand, gray-brown to light-gray, hard	40		X	8-17-26								
	very stiff	45		X	4-7-12 N=19								
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-13

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5318° Longitude: -117.6790° Surface Elev.: 249 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAY (CL-ML) , white mottling (continued) hard very stiff	55			11-19-25								
	CAPISTRANO FORMATION (Tc) recovered as LEAN CLAY with trace SILT and SAND. dark-brown to dark-gray, hard very stiff hard	60 65 70 75			13-26-33								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-13

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5318° Longitude: -117.6790° Surface Elev.: 249 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH hard 76.4	ELEVATION (Ft.) 172.5		X	10-20-50/5"								
Boring Terminated at 76.4 Feet													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem AugerSee [Exploration and Testing Procedures](#) for a
description of field and laboratory procedures used
and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.See [Supporting Information](#) for explanation of
symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

Page 1 of 3

CLIENT: Sargent & Lundy LLC
Chicago, IL

[illegible]

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. B-14

Page 2 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5318° Longitude: -117.6782° Surface Elev.: 224 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling, stiff			X	2-3-6 N=9								
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND , dark-brown to dark-gray, very stiff	30		X	4-8-16 N=24								
	hard	35		X	9-14-21 N=35								
		40		X	9-16-32 N=48								
		45		X	10-19-26 N=45								
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-09-2021

Boring Completed: 09-09-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

Page 3 of 3

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	hard 51.5 Boring Terminated at 51.5 Feet	172.5	-	X	9-18-32 N=50								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

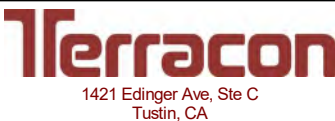
See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 09-09-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-09-2021

Driller: 2R Drilling

BORING LOG NO. B-15

Page 1 of 5

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6775° Surface Elev.: 213 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SANDY SILTY CLAY (CL-ML) , olive-brown to brown stiff	5.0			6-8-8					11.6	93		
					4-7-10								
	LEAN CLAY (CL) trace silt, olive-brown to gray-brown, stiff orange rust staining, very stiff	10			7-10-12								
					6-8-12								
	white mottling, stiff	15			4-7-8								
	medium stiff	20			1-2-3 N=5								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon

1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-15

Page 2 of 5

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6775° Surface Elev.: 213 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) medium stiff medium stiff to stiff stiff	30 40 45 50			1-2-3 N=5								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-15

Page 3 of 5

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6775°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY (CL) (continued)			X	4-6-8 N=14								
	very stiff, thin interbedded layers of silty sand	55		X	5-7-9 N=16								
	60.0	153		X	6-8-13 N=21								
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND , dark-brown to dark-gray with white mottling, very stiff												
		65		X	6-10-13 N=23								
	white mottling no longer apparent	70		X	7-13-17 N=30								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-15

Page 4 of 5

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6775° Surface Elev.: 213 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND , dark-brown to dark-gray with white mottling, very stiff (<i>continued</i>) hard	80		X	8-12-18 N=30								
				X	13-19-23 N=42								
				X	17-21-30 N=51								
		85		X	16-26-28 N=54								
				X	12-19-31 N=50								
		95		X									
		100											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

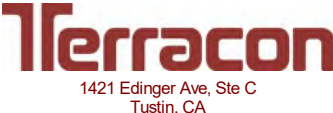
BORING LOG NO. B-15

Page 5 of 5

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6775° Surface Elev.: 213 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	101.5	111.5		X	11-17-25 N=42								
Boring Terminated at 101.5 Feet													
Stratification lines are approximate. In-situ, the transition may be gradual.													
Hammer Type: Automatic													
Advancement Method: Hollow Stem Auger		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).				Notes:							
Abandonment Method: Boring backfilled with cement-grout upon completion.		See Supporting Information for explanation of symbols and abbreviations.											
WATER LEVEL OBSERVATIONS <i>Groundwater not encountered</i>		 1421 Edinger Ave, Ste C Tustin, CA				Boring Started: 09-16-2021		Boring Completed: 09-16-2021					
						Drill Rig: CME-75		Driller: 2R Drilling					
						Project No.: 60215170							

BORING LOG NO. B-16

Page 1 of 2

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6770° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAY (CL-ML) , olive-brown to brown												
	stiff				6-8-8					8.2	96		
	orange rust staining	5			6-8-9					22.2	94		
	LEAN CLAY (CL) trace silt, olive-brown to gray-brown, very stiff				7-12-15					15.8	105		
	white mottling	10			9-12-15					15.3	108		
	stiff	15			5-7-9								
	medium stiff	20			2-3-4 N=7								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-16

Page 2 of 2

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6770° Surface Elev.: 209 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) medium stiff to stiff medium stiff thin lens of silty sand present thin lens of silty sand present	30		X	3-4-4 N=8								
					2-3-4 N=7								
		35		X	1-2-3 N=5								
		40		X	2-3-4 N=7								
	41.5	167.5											
	Boring Terminated at 41.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-17

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6765° Surface Elev.: 208 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY WITH SAND (CL) , trace gravel, olive-brown to brown												
	light brown, very stiff				5-10-10	39				19.2	88	30-20-10	
		5			6-9-11					22.2	95		
	olive-brown to gray-brown, stiff				5-5-7					20.4	93		
		10			5-9-10								
	LEAN CLAY (CL) trace silt and sand, olive-brown to gray-brown, very stiff												
		15			4-8-11 N=19								
	orange rust staining	20			9-12-15								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-17

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6765° Surface Elev.: 208 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) stiff			X	3-6-7 N=13								
		30		Δ	7-10-12					32.1	88		
		35		X	2-4-7 N=11								
	stiff												
		40		Δ	6-6-8								
		45		X	3-7-7 N=14								
			▽										
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

▽ While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-17

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6765° Surface Elev.: 208 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	POORLY GRADED SAND WITH CLAY (SP-SC) , gray-brown, wet, medium dense				5-12-21								
	very dense	55			10-31-50/5"								9
	CLAYEY SAND (SC) , gray-brown, wet, medium dense	60			10-13-11								
	POORLY GRADED SAND WITH CLAY (SP-SC) , gray-brown, wet, medium dense	65			4-9-12 N=21								
	very dense	70			14-29-50/2"								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-17

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6765° Surface Elev.: 208 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	POORLY GRADED SAND WITH CLAY (SP-SC) (continued) 76.5 dense 131.5			X	8-17-29 N=46								
	Boring Terminated at 76.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

 While drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-15-2021

Boring Completed: 09-15-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-19

Page 1 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6779° Surface Elev.: 217 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY (CL) , trace silt and sand, olive-brown												
	very stiff				5-9-13								
	gray-brown to light-gray with orange rust staining	5			2-10-10					19.3	108		
	7.5	209.5											
	SILT (ML) , with clay, light olive to light gray-brown with white mottling, hard				12-24-29							37-27-10	
	10.0	207											
	SILTY CLAY WITH SAND (CL-ML) , light olive to light gray-brown, hard, thin interbedded layers of silty sand	10			14-25-31					14.9	109		
	15.0	202											
	LEAN CLAY (CL) trace silt and sand, olive-brown with white mottling and orange rust staining, very stiff	15			12-14-20								
	stiff	20			5-5-9 N=14								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- While drilling
- At completion of drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-19

Page 2 of 3

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6779° Surface Elev.: 217 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) hard	26.5			13-22-50/6"								
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND (CL-ML) , dark-gray to dark-brown with white mottling, very stiff	190.5											
		30			9-13-16 N=29								
		35			23-50/6"								
		40			10-19-25 N=44								
		45			26-40-40		UU						
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- While drilling
- At completion of drilling

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

Page 3 of 3

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

[illegible]

Hammer Type: Automatic

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATTEMPLATE.GDT 10/19/21

BORING LOG NO. B-20

Page 1 of 2

PROJECT: Broad Reach Power Compass BESS

**CLIENT: Sargent & Lundy LLC
Chicago, IL**

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6775° Surface Elev.: 211 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SANDY SILT (ML) , with clay, light gray-brown												
	stiff				5-6-9					11.6	92		
5.0	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown, stiff	5			4-6-6							37-22-15	
	white mottling and orange rust staining, very stiff				7-8-11					17.6	98		
		10			6-12-15								
15.0	SILTY CLAY (CL-ML) trace sand, olive-brown to gray-brown with white mottling, stiff	15			4-6-9								
	medium stiff to stiff	20			3-3-5 N=8								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-20

Page 2 of 2

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6775° Surface Elev.: 211 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAY (CL-ML) (continued) medium stiff			X	2-3-4 N=7								
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling, medium stiff	30		X	2-3-4 N=7								
	stiff	35		X	4-4-5 N=9								
		40		X	3-4-5 N=9								
	Boring Terminated at 41.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

Page 1 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

[illegible]

Hammer Type: Automatic

Project No.: 60215170

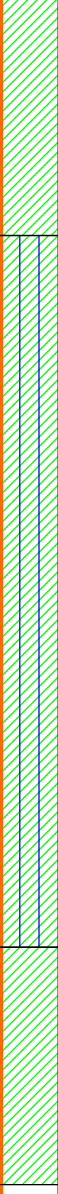
BORING LOG NO. B-21

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6770° Surface Elev.: 206 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) medium stiff to stiff			X	3-4-4 N=8								
	SILTY CLAY (CL-ML) , trace sand, olive-brown to gray-brown, wet, medium stiff, thin silty sand lens present	30		X	3-3-4 N=7								
		35		X	2-3-3 N=6								
	medium stiff to stiff	40		X	3-4-4 N=8								
		45		X	2-4-5 N=9								
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling, wet, stiff			X									
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-21

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6770° Surface Elev.: 206 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SANDY LEAN CLAY (CL) , gray-brown, wet, very stiff			X	6-10-16 N=26								
	medium stiff	55		X	2-3-4 N=7								
	60.0	60		X	4-7-8 N=15								
	LEAN CLAY (CL) trace silt and sand, olive-brown to gray-brown with white mottling, wet, stiff to very stiff												
	very stiff	65		X	5-8-11 N=19								
		70		X	6-9-11 N=20								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

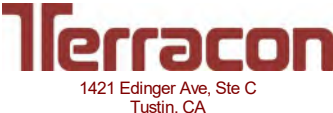
BORING LOG NO. B-21

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5314° Longitude: -117.6770° Surface Elev.: 206 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	LEAN CLAY (CL) (continued) dark-gray to dark-brown, very stiff			X	4-8-9 N=17								
	76.5 129.5												
Boring Terminated at 76.5 Feet													
Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Automatic													
Advancement Method: Hollow Stem Auger		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).				Notes:							
Abandonment Method: Boring backfilled with cement-grout upon completion.		See Supporting Information for explanation of symbols and abbreviations.											
WATER LEVEL OBSERVATIONS <i>Groundwater not encountered</i>		 1421 Edinger Ave, Ste C Tustin, CA				Boring Started: 09-14-2021		Boring Completed: 09-14-2021					
						Drill Rig: CME-75		Driller: 2R Drilling					
						Project No.: 60215170							

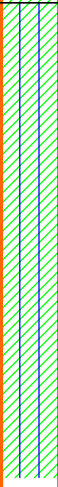
BORING LOG NO. B-24

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5311° Longitude: -117.6779° Surface Elev.: 216 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown												
	hard				13-25-27								
		5			17-28-30					11.1	120		
	very stiff				13-17-16								
	white mottling and orange rust staining	10			10-13-16					13.2	110		
	15.0	201											
	SILTY CLAY (CL-ML) olive-brown to light-gray with white mottling and orange rust staining, very stiff	15			6-8-9 N=17								
	thin lens of silty sand	20			11-15-20								
		25											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

Page 2 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

[illegible]

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-13-2021

Driller: 2R Drilling

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATTEMPLATE.GDT 10/19/21

BORING LOG NO. B-24

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5311° Longitude: -117.6779° Surface Elev.: 216 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	CAPISTRANO FORMATION (Tc) recovered as ELASTIC SILT with trace SAND. dark-gray to dark-brown, stiff (<i>continued</i>)	55		X	33-50/3"								
		60		X	14-22-27 N=49								
		65		X	17-50/5"								
		70		X	12-20-25 N=45							56-36-20	
		75		X	17-50/6"								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-13-2021

Boring Completed: 09-13-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON.DATATEMPLATE.GDT 10/19/21

Page 4 of 4

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

[illegible]

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-grout upon completion.

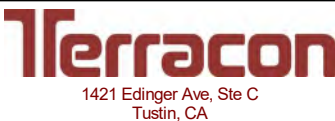
See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 09-13-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-13-2021

Driller: 2R Drilling

BORING LOG NO. B-25

Page 1 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5310° Longitude: -117.6776° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SANDY LEAN CLAY (CL) , trace silt, olive-brown stiff	5.0			6-9-9					14.0	96		
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling, stiff very stiff	5			5-7-11					17.6	109		
		10			7-12-16								
		15			10-16-17								
		20			8-11-15								
		25			3-4-5 N=9								
	25.0	184	25										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-25

Page 2 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5310° Longitude: -117.6776° Surface Elev.: 209 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	DEPTH ELEVATION (Ft.)												
	SILTY CLAY (CL-ML) , trace sand, olive-brown to gray-brown with white mottling and orange rust staining, stiff			X	3-5-6 N=11								
		30		X	4-6-8 N=14								
	trace gravel												
	35.0	174		X	4-5-7 N=12								
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown with white mottling, stiff												
	very stiff			X	5-10-12 N=22								
	41.5	167.5		X	8-13-16 N=29								
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND dark-brown to dark-gray, very stiff												
		45		X									
		50											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

BORING LOG NO. B-25

Page 3 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5310° Longitude: -117.6776° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	CAPISTRANO FORMATION (Tc) recovered as SILTY CLAY with trace SAND (continued) hard			X	13-19-23 N=42								
		55		X	9-14-19 N=33								
		60		X	13-16-24 N=40								
		65		X	14-23-25 N=48								
		70		X	13-21-28 N=49								
		75											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Boring Completed: 09-14-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

BORING LOG NO. B-25

Page 4 of 4

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5310° Longitude: -117.6776° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	76.5 hard 132.5			X	14-20-27 N=47								
Boring Terminated at 76.5 Feet													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem AugerAbandonment Method:
Boring backfilled with cement-grout upon completion.See [Exploration and Testing Procedures](#) for a
description of field and laboratory procedures used
and additional data (if any).See [Supporting Information](#) for explanation of
symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-14-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-14-2021

Driller: 2R Drilling

BORING LOG NO. P-1

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5329° Longitude: -117.6775° Surface Elev.: 210 (Ft.) DEPTH
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Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem AugerAbandonment Method:
Boring backfilled with auger cuttings upon completion.See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-16-2021

Driller: 2R Drilling

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

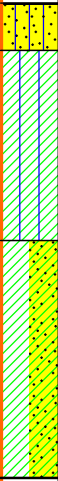
BORING LOG NO. P-2

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5331° Longitude: -117.6773° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	1.0	208											
	5.0	204											
	10.0	199			5-9-10								83
Boring Terminated at 10 Feet													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

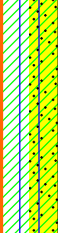
BORING LOG NO. P-3

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5318° Longitude: -117.6776° Surface Elev.: 212 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
	SILTY CLAY WITH SAND (CL-ML), olive-brown to brown very stiff	5.0			6-11-11					8.5	99		83
	Boring Terminated at 5 Feet	207											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem AugerAbandonment Method:
Boring backfilled with auger cuttings upon completion.See [Exploration and Testing Procedures](#) for a
description of field and laboratory procedures used
and additional data (if any).See [Supporting Information](#) for explanation of
symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Drill Rig: CME-75

Project No.: 60215170

Boring Completed: 09-16-2021

Driller: 2R Drilling

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

Page 1 of 1

CLIENT: Sargent & Lundy LLC
Chicago, IL

GRAPHIC LOG	LOCATION See Exploration Plan		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH	ELEVATION (Ft.)						TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	SILTY CLAY WITH SAND (CL-ML), olive-brown to brown very stiff 10.0		201		 	9-16-16							79	

Hammer Type: Automatic

Project No.: 60215170

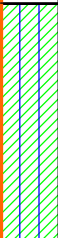
BORING LOG NO. P-5

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5319° Longitude: -117.6767° Surface Elev.: 208 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	SILTY CLAY (CL-ML) , trace sand, olive-brown to brown very stiff 5.0	5			7-10-9								89
	Boring Terminated at 5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

Page 1 of 1

CLIENT: Sargent & Lundy LLC
Chicago, IL

[illegible]

Hammer Type: Automatic

Project No.: 60215170

BORING LOG NO. P-7

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5312° Longitude: -117.6776° Surface Elev.: 211 (Ft.) DEPTH
-------------	---

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem AugerSee [Exploration and Testing Procedures](#) for a
description of field and laboratory procedures used
and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.See [Supporting Information](#) for explanation of
symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/19/21

BORING LOG NO. P-8

Page 1 of 1

PROJECT: Broad Reach Power Compass BESS

CLIENT: Sargent & Lundy LLC
Chicago, IL

SITE: San Juan Capistrano, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.5312° Longitude: -117.6774° Surface Elev.: 209 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	EXPANSION INDEX	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	SILTY CLAY (CL-ML) , trace sand, olive-brown to brown	5.0	204										
	LEAN CLAY (CL) , trace silt and sand, olive-brown to gray-brown very stiff	10.0	199		7-17-17					16.4			93
Boring Terminated at 10 Feet													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 09-16-2021

Boring Completed: 09-16-2021

Drill Rig: CME-75

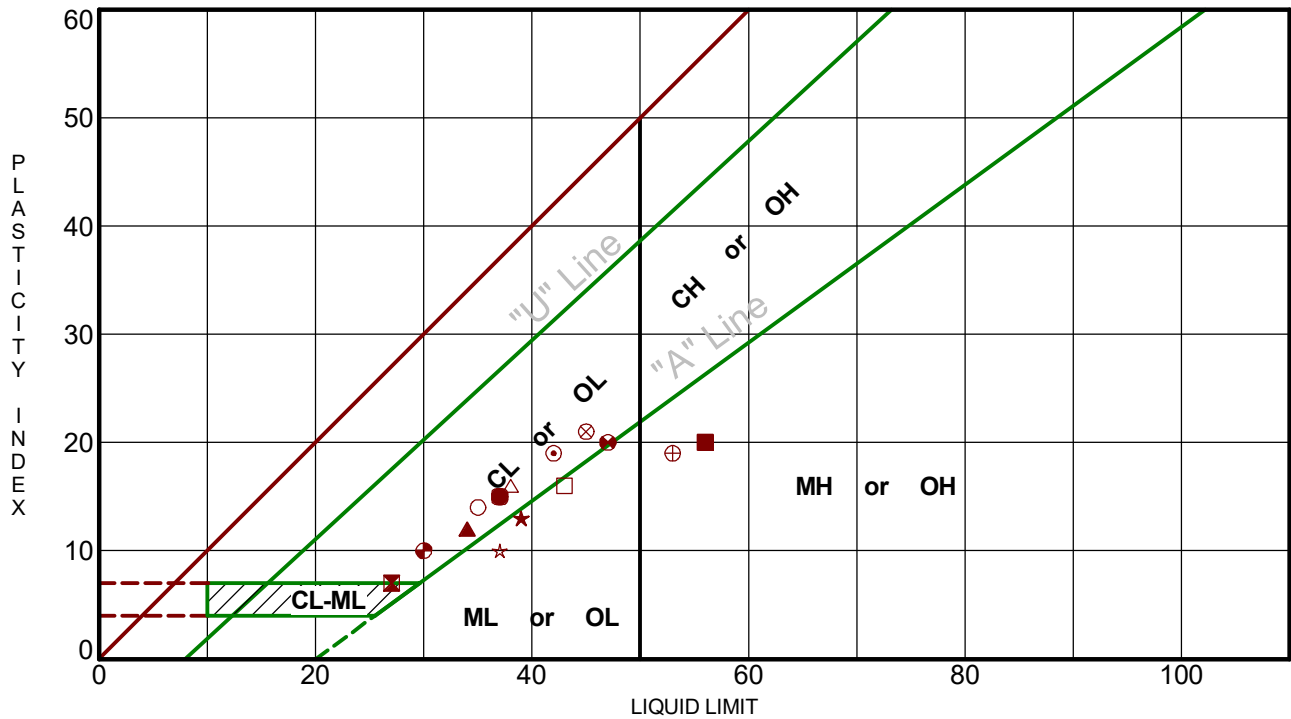
Driller: 2R Drilling

Project No.: 60215170

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60215170 COMPASS BESS.GPJ TERRACON DATATEMPLATE.GDT 10/19/21

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● B-1	0 - 4	37	22	15	84.5	CL	LEAN CLAY with SAND
⊠ B-2	5 - 6.5	27	20	7		CL-ML	SILTY CLAY
▲ B-3	7.5 - 9	34	22	12		CL	LEAN CLAY
★ B-4	5 - 6.5	39	26	13		ML	SILT
⊙ B-5	15 - 16.5	42	23	19		CL	LEAN CLAY
⊕ B-8	2.5 - 4	37	22	15		CL	LEAN CLAY
○ B-10	2.5 - 4	35	21	14		CL	LEAN CLAY with SAND
△ B-11	7.5 - 9	38	22	16		CL	LEAN CLAY
⊗ B-11	40 - 41.5	45	24	21		CL	LEAN CLAY
⊕ B-12	65 - 66.5	53	34	19		MH	ELASTIC SILT
□ B-13	15 - 16.5	43	27	16		ML	SILT
⊕ B-14	2.5 - 4	47	27	20		CL	LEAN CLAY
⊕ B-17	0 - 5	30	20	10		CL	LEAN CLAY with SAND
★ B-19	7.5 - 9	37	27	10		ML	SILT
⊗ B-20	5 - 6.5	37	22	15		CL	LEAN CLAY
■ B-24	65 - 66.5	56	36	20		MH	ELASTIC SILT

PROJECT: Broad Reach Power Compass BESS

SITE: San Juan Capistrano, CA

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

PROJECT NUMBER: 60215170

CLIENT: Sargent & Lundy LLC
Chicago, IL

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/12/21

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

Source of Material B-25 @ 0 - 5 feet

Description of Material SANDY LEAN CLAY

Remarks:

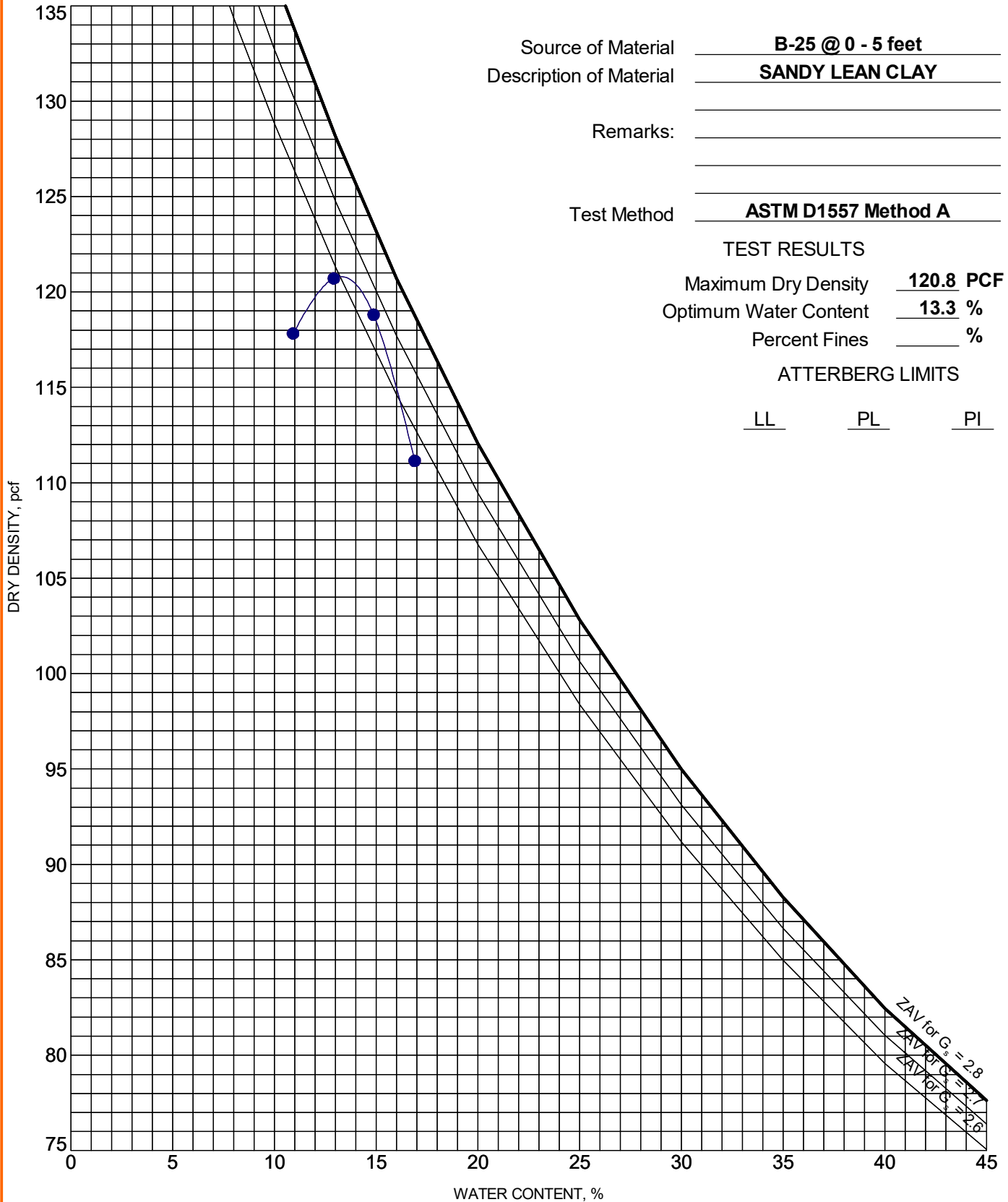
Test Method ASTM D1557 Method A

TEST RESULTS

Maximum Dry Density 120.8 PCF
Optimum Water Content 13.3 %
Percent Fines %

ATTERBERG LIMITS

LL PL PI



PROJECT: Broad Reach Power Compass BESS

SITE: San Juan Capistrano, CA

Terracon

1421 Edinger Ave, Ste C
Tustin, CA

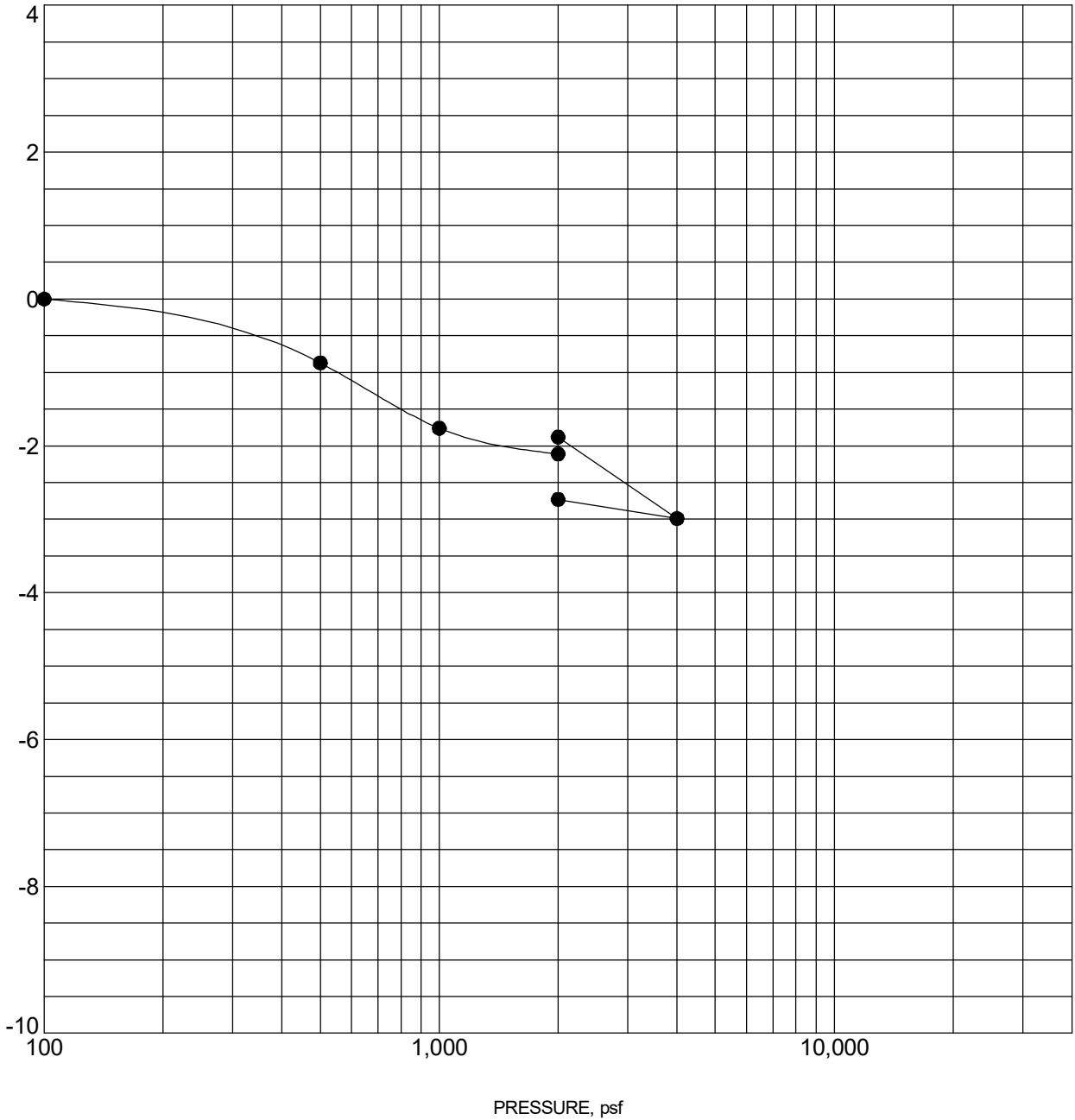
PROJECT NUMBER: 60215170

CLIENT: Sargent & Lundy LLC
Chicago, IL

SWELL CONSOLIDATION TEST
ASTM D4546

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_CONSOL_STRAIN-USCS 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/12/21

AXIAL STRAIN, %



Specimen Identification			Classification	γ_d , pcf	WC, %
●	B- 1	5 - 6.5 ft	LEAN CLAY with SAND	100	18.7

NOTES: Water added at 2,000 psf

PROJECT: Broad Reach Power Compass BESS

SITE: San Juan Capistrano, CA

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

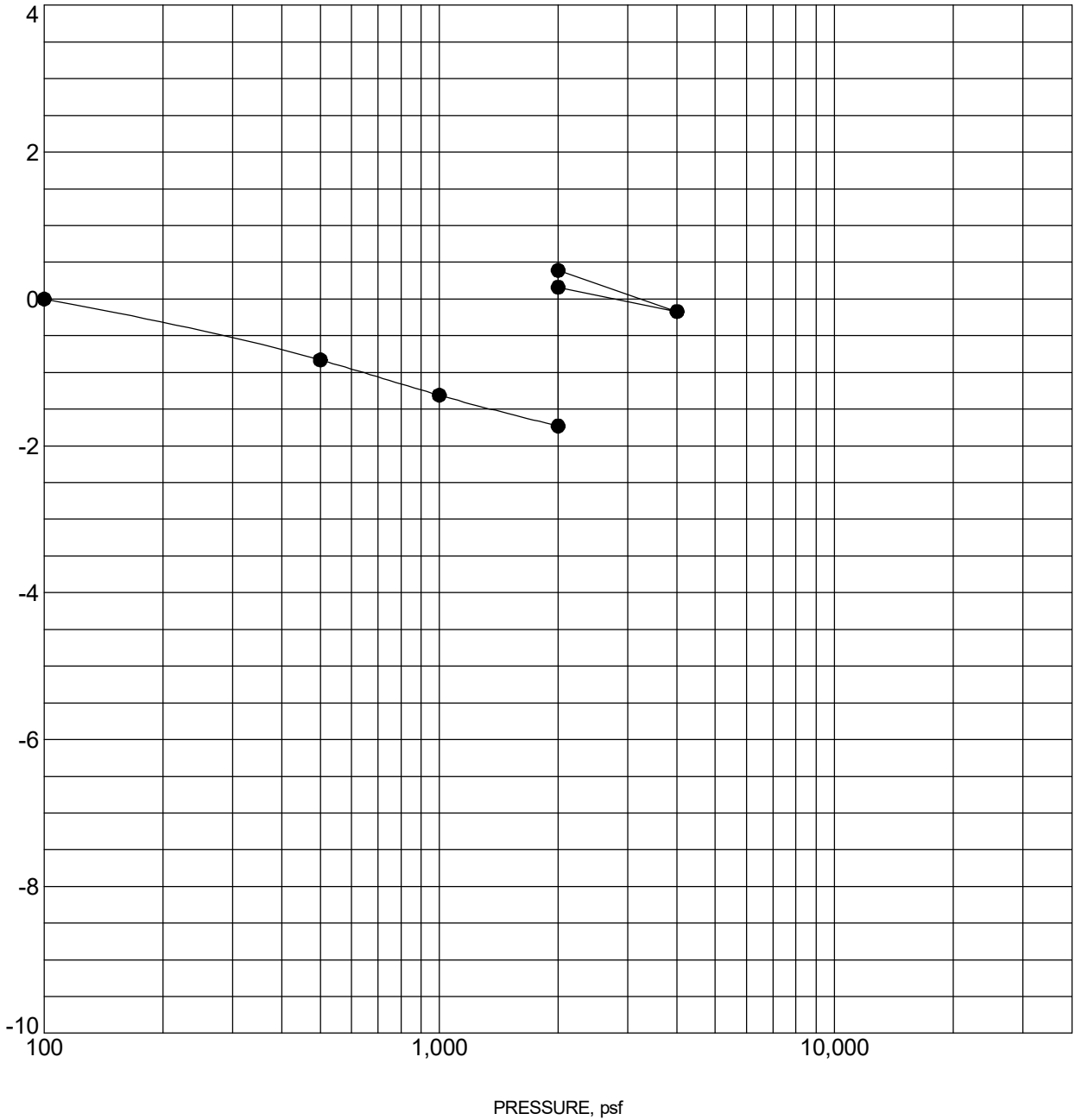
PROJECT NUMBER: 60215170

CLIENT: Sargent & Lundy LLC
Chicago, IL

SWELL CONSOLIDATION TEST
ASTM D4546

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_CONSOL_STRAIN-USCS 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/12/21

AXIAL STRAIN, %

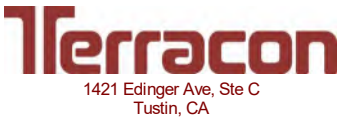


Specimen Identification			Classification	γ_d , pcf	WC, %
●	B- 3	5 - 6.5 ft	LEAN CLAY with SAND	103	17.4

NOTES: Water added at 2,000 psf

PROJECT: Broad Reach Power Compass BESS

SITE: San Juan Capistrano, CA



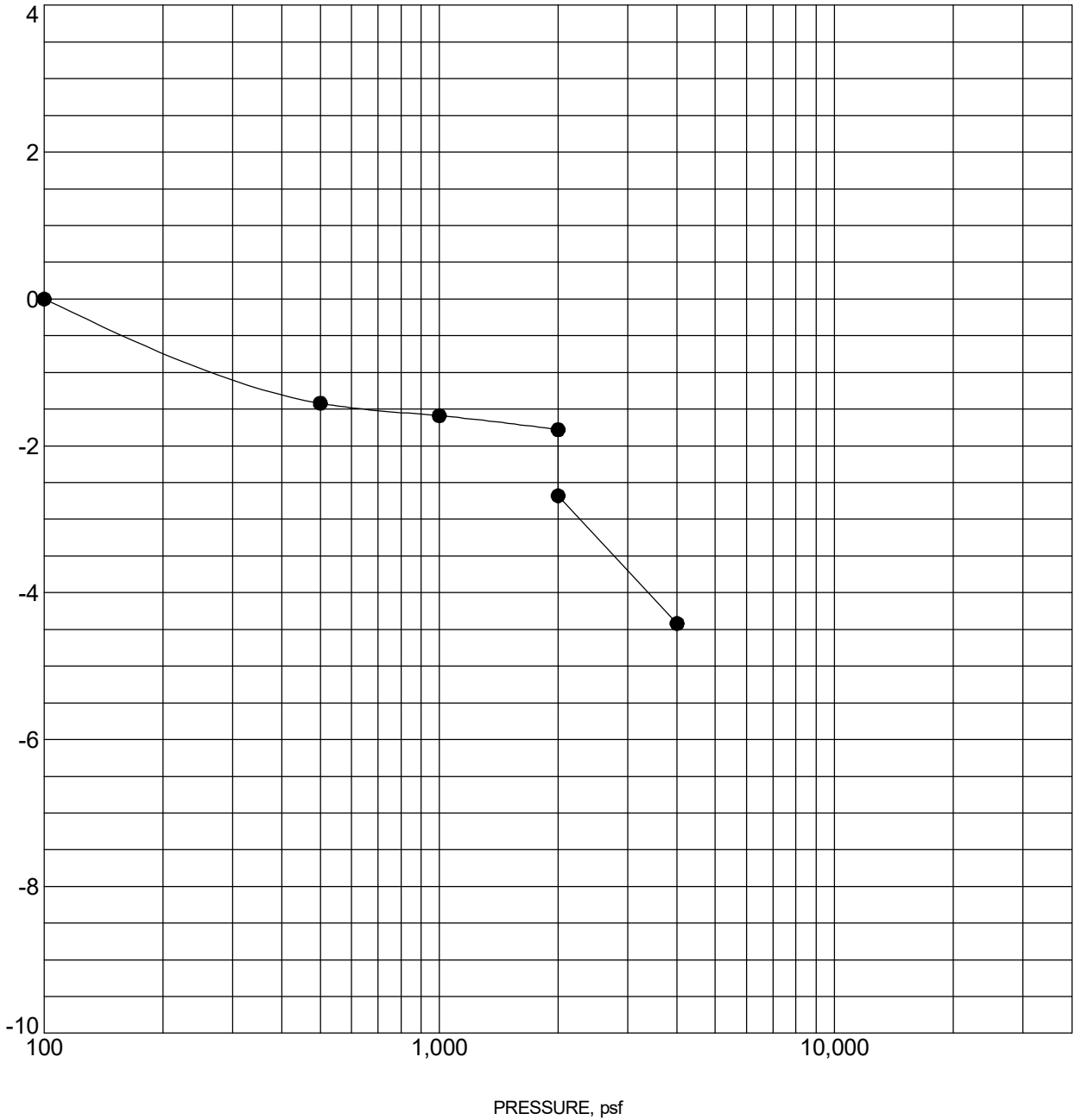
PROJECT NUMBER: 60215170

CLIENT: Sargent & Lundy LLC
Chicago, IL

SWELL CONSOLIDATION TEST
ASTM D4546

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_CONSOL_STRAIN-USCS 60215170 COMPASS BESS.GPJ TERRACON_DATATEMPLATE.GDT 10/12/21

AXIAL STRAIN, %



Specimen Identification			Classification	γ_d , pcf	WC, %
●	B-20	2.5 - 4 ft	SANDY SILT	92	11.6

NOTES: Water added at 2,000 psf

PROJECT: Broad Reach Power Compass BESS

SITE: San Juan Capistrano, CA

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

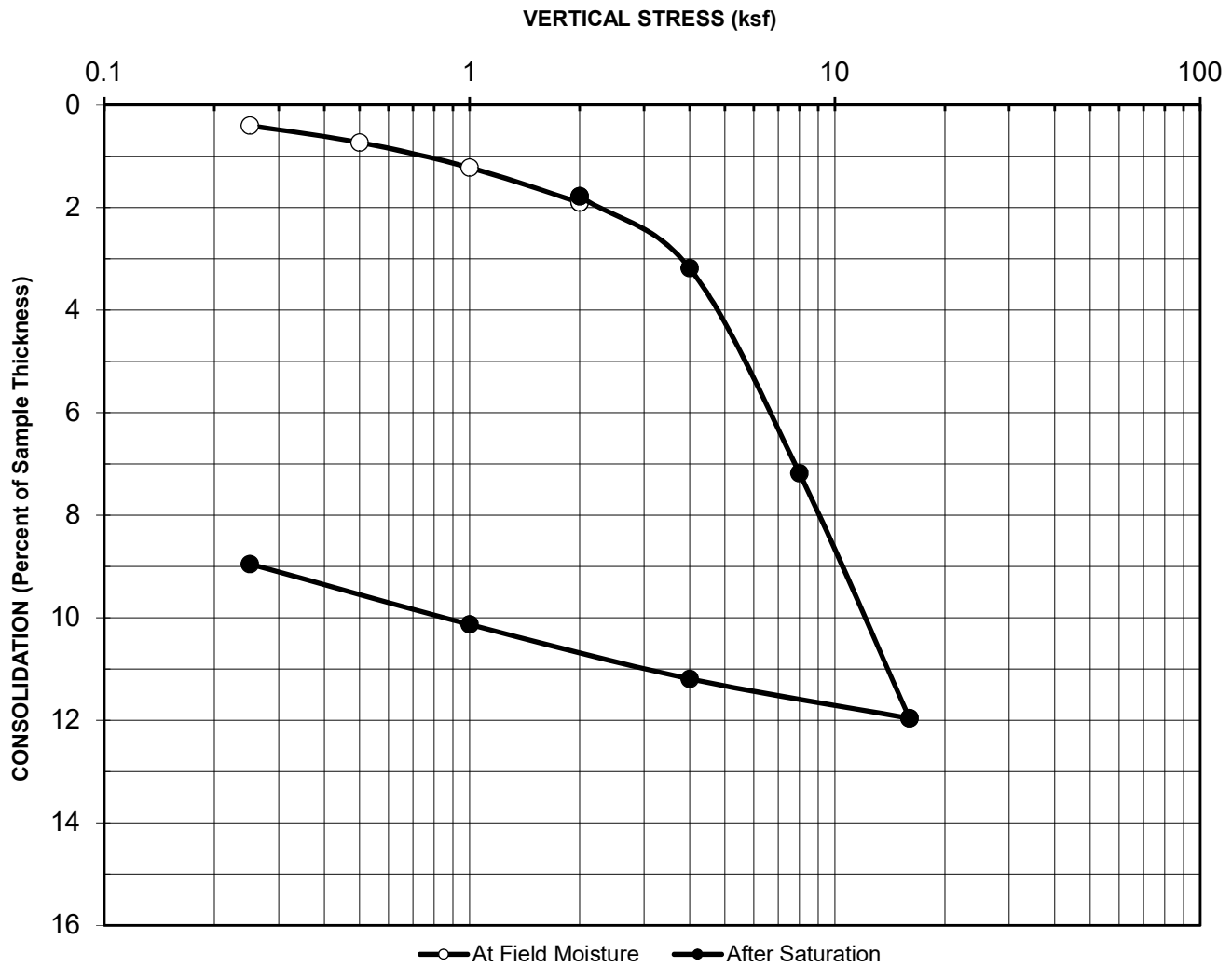
PROJECT NUMBER: 60215170

CLIENT: Sargent & Lundy LLC
Chicago, IL

**AP Engineering and Testing, Inc.**

DBE | MBE | SBE

2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.comBoring No. : B-15Initial Dry Unit Weight (pcf): 96.3Sample No.: -Initial Moisture Content (%): 14.2Depth (feet): 7.5Final Moisture Content (%): 22.2Sample Type: Mod CalAssumed Specific Gravity: 2.7Soil Description: Lean ClayInitial Void Ratio: 0.75Remarks: Swell= 0.12% upon inundation**CONSOLIDATION CURVE
ASTM D 2435**Project Name: Compass BESSProject No.: 6E+07Date: 9/22/2021AP No: 21-0953 Sheet No: 1

**AP Engineering and Testing, Inc.**

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2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**CORROSION TEST RESULTS**Client Name: TerraconAP Job No.: 21-0953Project Name: Compass BESSDate: 09/23/21Project No.: 60215170

Boring No.	Sample No.	Depth (feet)	Soil Description	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B-1	-	0	Lean Clay	1,867	8.0	50	27
B-3	-	0	Silty Clay	2,215	8.0	46	40
B-12	-	0	Lean Clay	1,461	8.0	64	23
B-25	-	0	Lean Clay	1,313	8.1	91	36

NOTES: Resistivity Test and pH: California Test Method 643

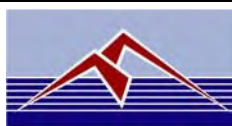
Sulfate Content : California Test Method 417

Chloride Content : California Test Method 422

ND = Not Detectable

NA = Not Sufficient Sample

NR = Not Requested

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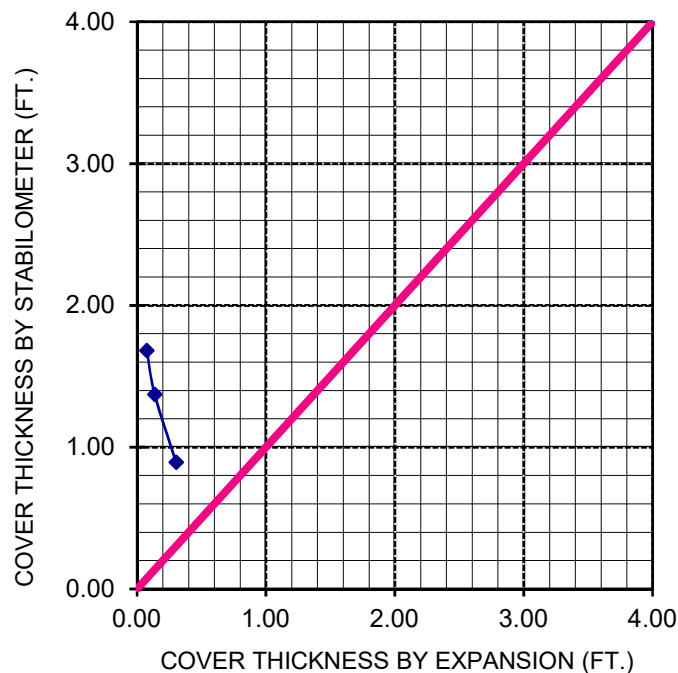
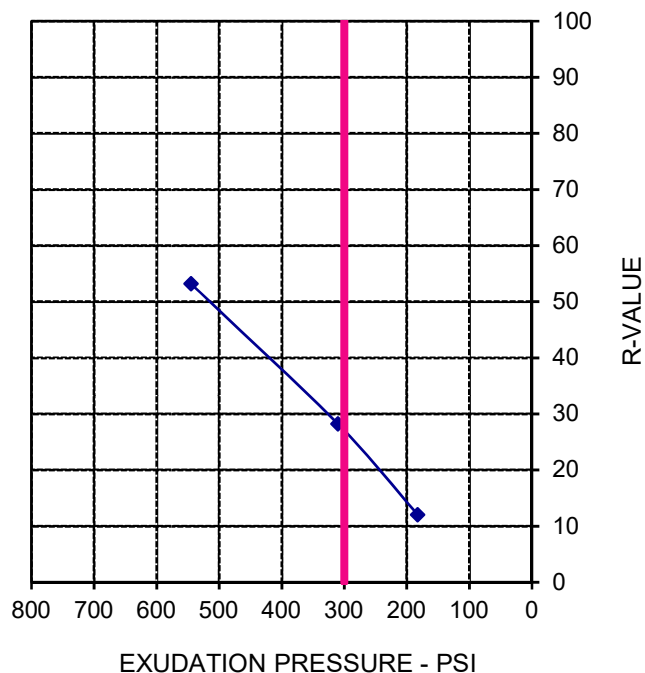
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**R-VALUE TEST DATA**

ASTM D2844

Project Name: Compass BESSTested By: STDate: 09/23/21Project Number: 60215170Computed By: KMDate: 09/24/21Boring No.: B-15Checked By: APDate: 09/28/21Sample No.: - Depth (ft.): 0Location: N/ASoil Description: Sandy silty clay

Mold Number	A	C	B	
Water Added, g	61	75	92	
Compact Moisture(%)	15.8	17.2	18.9	
Compaction Gage Pressure, psi	250	180	125	
Exudation Pressure, psi	545	310	183	
Sample Height, Inches	2.4	2.5	2.5	
Gross Weight Mold, g	2979	2989	3004	
Tare Weight Mold, g	1967	1968	1966	
Net Sample Weight, g	1012	1021	1038	
Expansion, inches $\times 10^{-4}$	91	41	23	
Stability 2,000 (160 psi)	22/52	40/92	55/125	
Turns Displacement	4.11	4.70	5.11	
R-Value Uncorrected	56	28	12	
R-Value Corrected	53	28	12	
Dry Density, pcf	110.4	105.5	105.8	
Traffic Index	8.0	8.0	8.0	
G.E. by Stability	0.89	1.37	1.68	
G.E. by Expansion	0.30	0.14	0.08	

R-VALUE	By Exudation:	27
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	27
Remarks	Gf = 1.34, and 1.1 % Retained on the $\frac{3}{4}$ " *Not Applicable	



**AP Engineering and Testing, Inc.**

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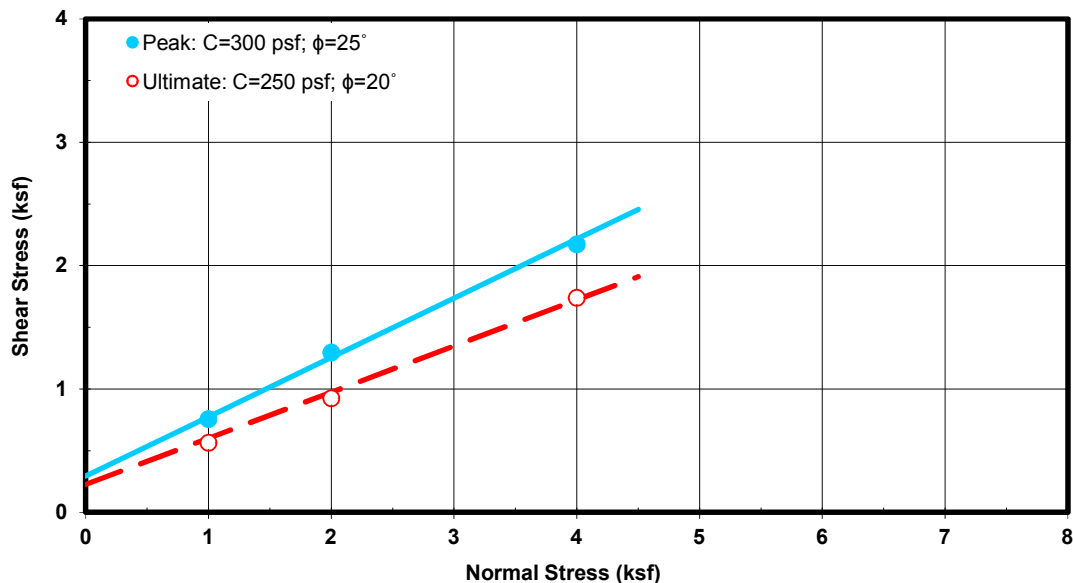
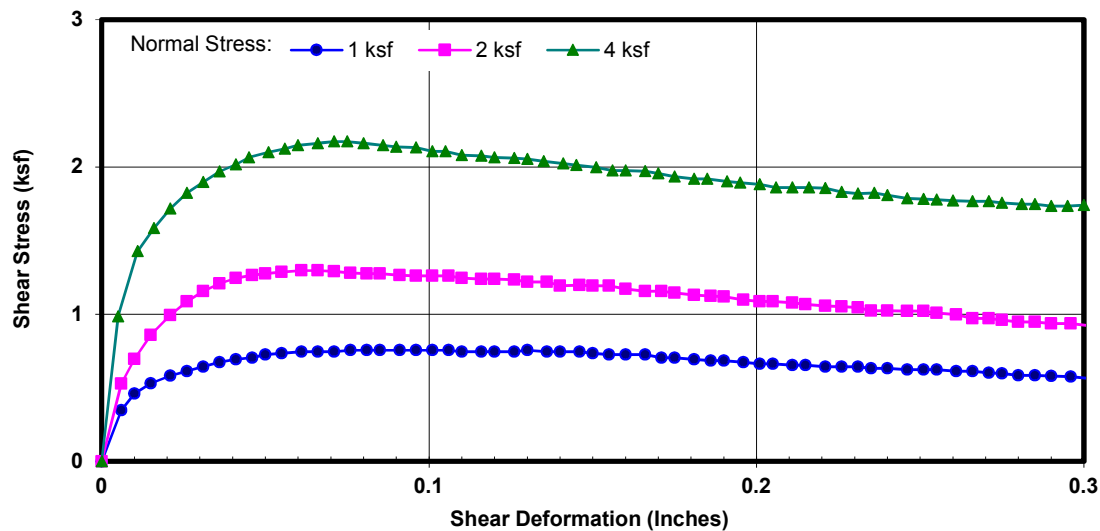
2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**DIRECT SHEAR TEST RESULTS**
ASTM D 3080

Client: Terracon
Project Name: Compass BESS
Project No.: 60215170
Boring No.: B-10
Sample No.: - Depth (ft): 10
Sample Type: Mod. Cal.
Soil Description: Clay
Test Condition: Inundated Shear Type: Regular

Tested By: LS Date: 09/24/21
Computed By: NR Date: 09/27/21
Checked by: AP Date: 09/28/21

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
108.4	79.5	36.3	41.5	88	100	1	0.755	0.564
						2	1.296	0.924
						4	2.172	1.740



**AP Engineering and Testing, Inc.**

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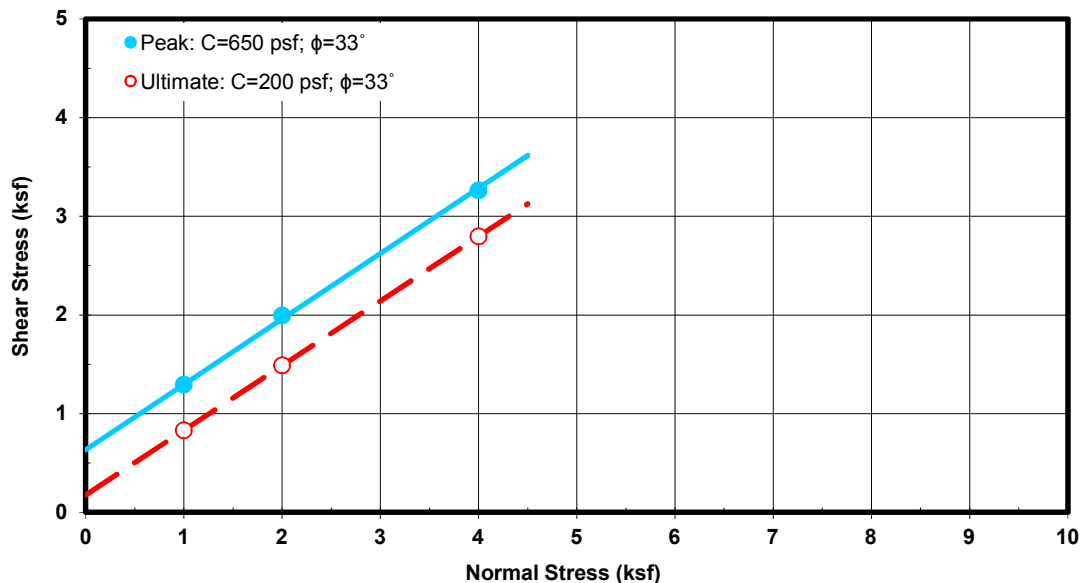
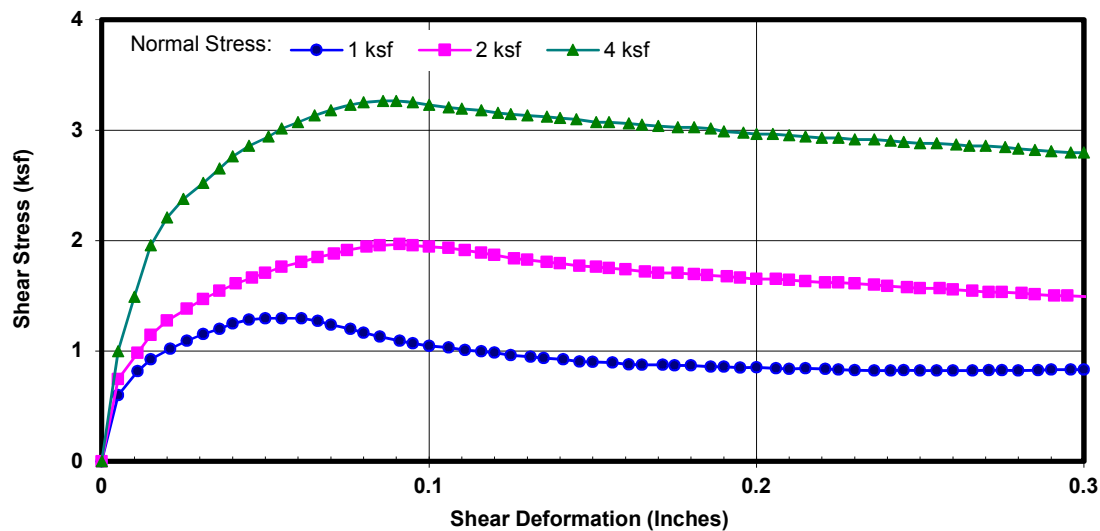
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t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**DIRECT SHEAR TEST RESULTS**
ASTM D 3080

Client: Terracon
Project Name: Compass BESS
Project No.: 60215170
Boring No.: B-12
Sample No.: - Depth (ft): 10
Sample Type: Mod. Cal.
Soil Description: Clay
Test Condition: Inundated Shear Type: Regular

Tested By: LS Date: 09/24/21
Computed By: NR Date: 09/27/21
Checked by: AP Date: 09/28/21

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
124.4	107.3	15.9	21.2	75	100	1	1.296	0.831
						2	1.996	1.490
						4	3.264	2.796



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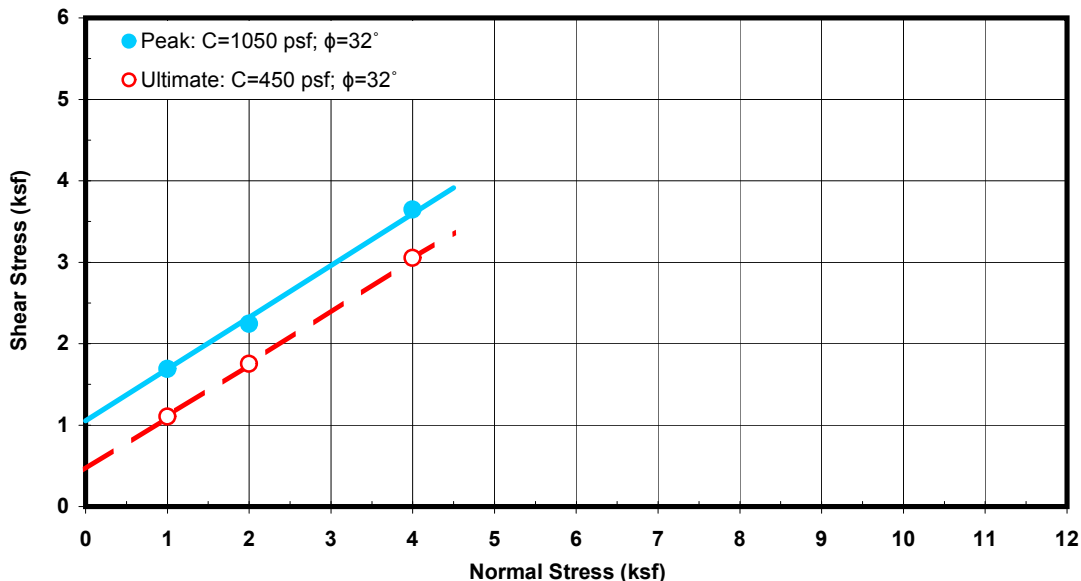
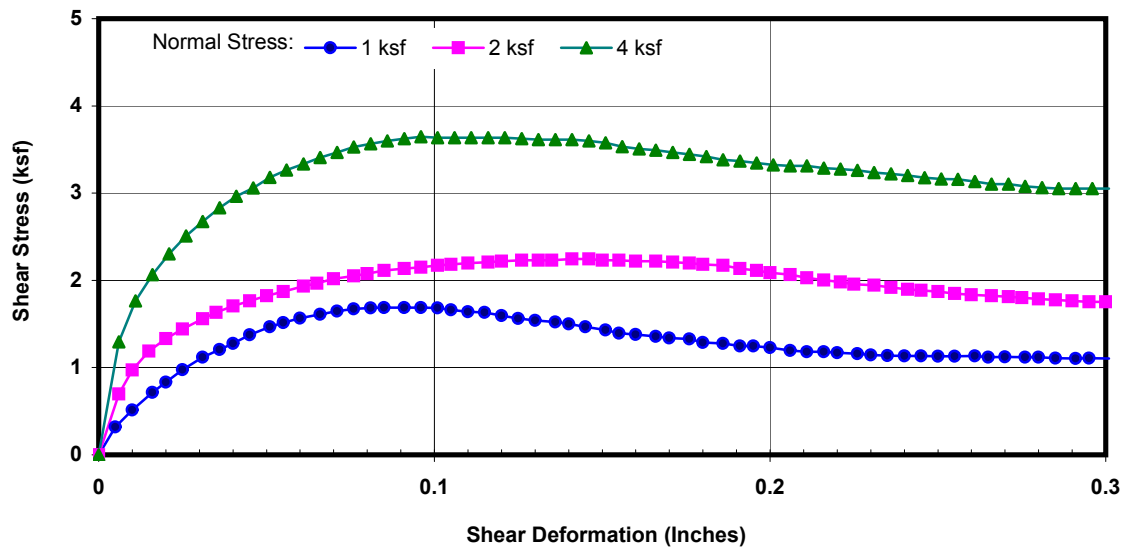
2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**DIRECT SHEAR TEST RESULTS**
ASTM D 3080

Client: Terracon
Project Name: Compass BESS
Project No.: 60215170
Boring No.: B-13
Sample No.: - Depth (ft): 10
Sample Type: Mod. Cal.
Soil Description: Silt
Test Condition: Inundated Shear Type: Regular

Tested By: LS Date: 09/23/21
Computed By: NR Date: 09/24/21
Checked by: AP Date: 09/28/21

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
128.3	105.5	21.6	22.0	98	100	1	1.688	1.103
						2	2.244	1.752
						4	3.648	3.052



AP Engineering and Testing, Inc.

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UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (UU,Q)
ASTM D 2850

Client Name:	Terracon		
Project Name:	Compass BESS		
Project No.:	60215170		
Boring No.:	B-5		
Sample No.:	-	Depth (feet):	60
Soil Description	Silty Clay		

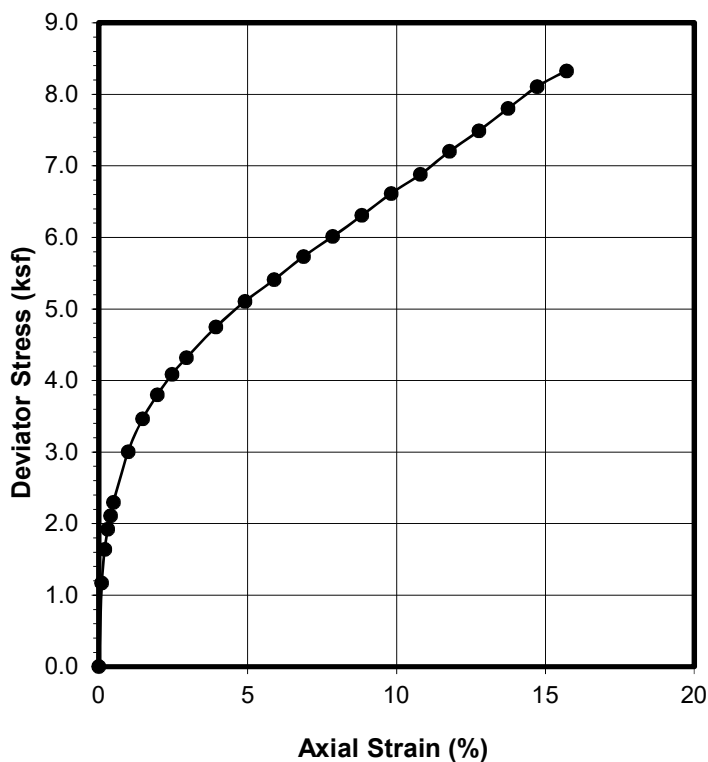
Tested By: ST Date: 09/23/21
Checked by: AP Date: 09/28/21

Sample Diameter (inch):	<u>2.409</u>
Sample Height (inch):	<u>5.093</u>
Sample Weight (g):	<u>784.51</u>
Wt. of Wet Soil+Container (g):	<u>125.17</u>
Wt. of Dry Soil+Container (g):	<u>113.09</u>
Wt. of Container (g):	<u>50.47</u>

Wet Unit Weight (pcf):	<u>128.7</u>
Dry Unit Weight (pcf):	<u>107.9</u>
Moisture Content (%):	<u>19.3</u>
Void Ratio for $G_s=2.7$:	<u>0.56</u>
% Saturation:	<u>92.7</u>

TEST DATA

Cell Pressure (ksf):	7.00
Back Pressure (ksf):	0.0
Tested Total Confining Pressure (ksf):	7.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	8.33
Ultimate Deviator Stress (ksf):	8.33
Ultimate Undrained Shear Strength (ksf):	4.16
Axial Strain @ Maximum Stress (%)	15.71

[illegible]

AP Engineering and Testing, Inc.

DBE | MBE | SBE

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UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (UU,Q)
ASTM D 2850

Client Name:	Terracon		
Project Name:	Compass BESS		
Project No.:	60215170		
Boring No.:	B-13		
Sample No.:	-	Depth (feet):	30
Soil Description	Lean Clay		

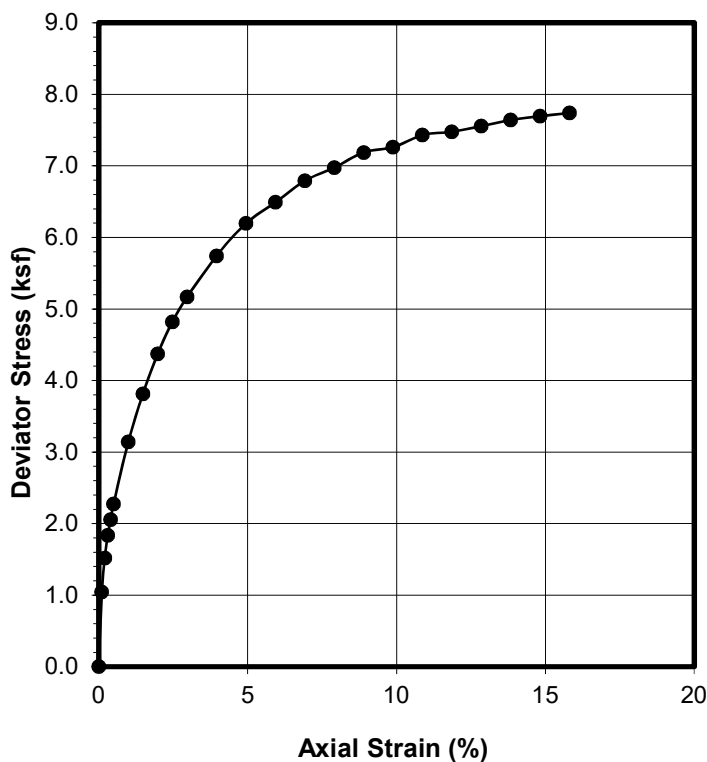
Tested By: ST Date: 09/23/21
Checked by: AP Date: 09/28/21

Sample Diameter (inch):	<u>2.404</u>
Sample Height (inch):	<u>5.061</u>
Sample Weight (g):	<u>738.50</u>
Wt. of Wet Soil+Container (g):	<u>152.54</u>
Wt. of Dry Soil+Container (g):	<u>130.29</u>
Wt. of Container (g):	<u>49.92</u>

Wet Unit Weight (pcf):	<u>122.4</u>
Dry Unit Weight (pcf):	<u>95.9</u>
Moisture Content (%):	<u>27.7</u>
Void Ratio for $G_s=2.7$:	<u>0.76</u>
% Saturation:	<u>98.7</u>

TEST DATA

Cell Pressure (ksf):	3.50
Back Pressure (ksf):	0.0
Tested Total Confining Pressure (ksf):	3.50
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	7.74
Ultimate Deviator Stress (ksf):	7.74
Ultimate Undrained Shear Strength (ksf):	3.87
Axial Strain @ Maximum Stress (%)	15.81

[illegible]

AP Engineering and Testing, Inc.

DBE | MBE | SBE

2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (UU,Q)
ASTM D 2850

Client Name:	Terracon		
Project Name:	Compass BESS		
Project No.:	60215170		
Boring No.:	B-19		
Sample No.:	-	Depth (feet):	45
Soil Description	Silty Clay		

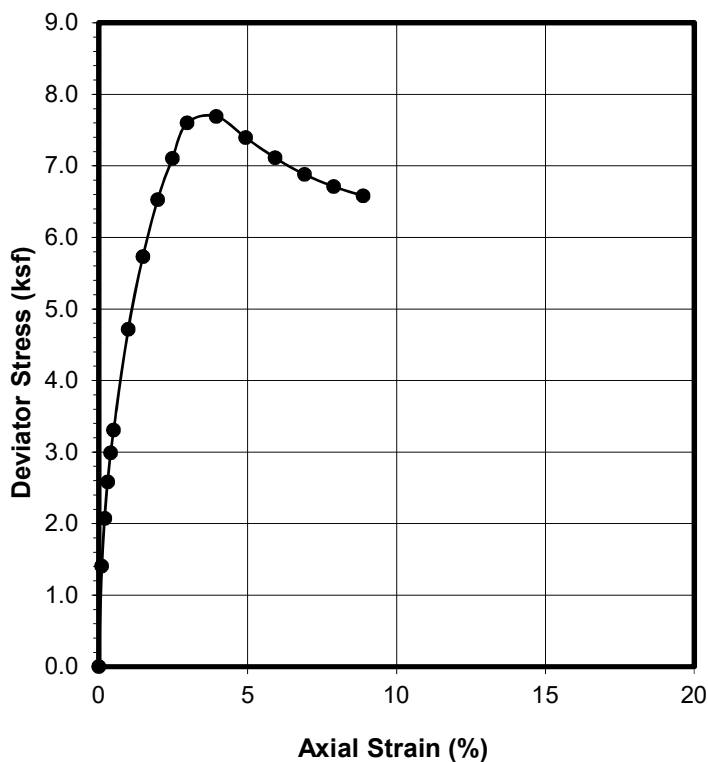
Tested By: ST Date: 09/23/21
Checked by: AP Date: 09/28/21

Sample Diameter (inch):	<u>2.395</u>
Sample Height (inch):	<u>5.070</u>
Sample Weight (g):	<u>679.89</u>
Wt. of Wet Soil+Container (g):	<u>105.81</u>
Wt. of Dry Soil+Container (g):	<u>92.53</u>
Wt. of Container (g):	<u>51.56</u>

Wet Unit Weight (pcf):	<u>113.3</u>
Dry Unit Weight (pcf):	<u>85.6</u>
Moisture Content (%):	<u>32.4</u>
Void Ratio for $G_s=2.7$:	<u>0.97</u>
% Saturation:	<u>90.3</u>

TEST DATA

Cell Pressure (ksf):	5.00
Back Pressure (ksf):	0.0
Tested Total Confining Pressure (ksf):	5.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	7.69
Ultimate Deviator Stress (ksf):	6.58
Ultimate Undrained Shear Strength (ksf):	3.29
Axial Strain @ Maximum Stress (%)	3.94

[illegible]

FIELD ELECTRICAL RESISTIVITY TEST DATA

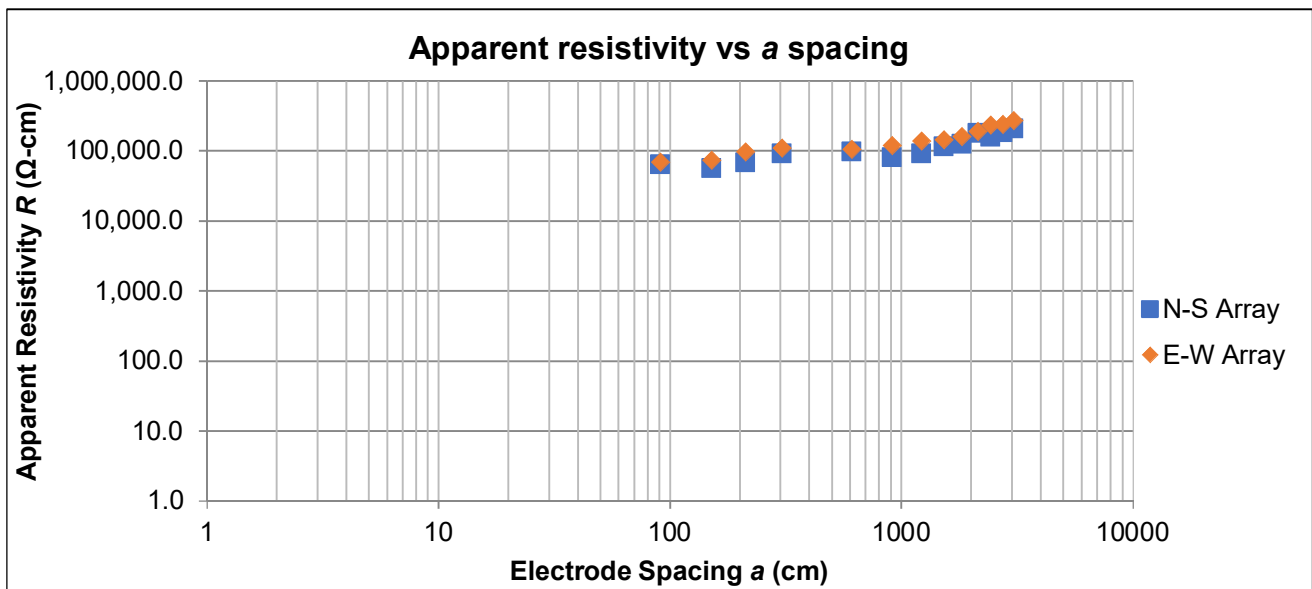
Compass BESS ■ San Juan Capistrano, Orange County, California
October 13, 2021 ■ Terracon Project No. 60215170



Array Loc.	Traverse 1 and 2 (See Site Plan)		
Instrument	The Mini Sting	Weather	Sunny
Serial #		Ground Cond.	Bare soil
Cal. Check	7/14/2021	Tested By	N.B.,C.M.
Test Date	October 4, 2021	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as :
$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		Traverse 1		Traverse 2	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
3	91	4	10	108.20	63150	118.50	69160
5	152	4	10	58.06	55870	76.99	74080
7	213	4	10	50.47	67800	71.57	96150
10	305	12	30	47.09	91750	56.30	109690
20	610	12	30	24.91	95880	27.60	106230
30	914	12	30	14.06	80900	20.57	118350
40	1219	12	30	11.75	90090	17.89	137170
50	1524	12	30	11.84	113450	15.15	145170
60	1829	12	30	10.80	124170	14.05	161540
70	2134	12	30	13.26	177860	14.12	189390
80	2438	12	30	10.16	155680	15.15	232140
90	2743	12	30	10.47	180490	13.90	239610
100	3048	12	30	10.73	205530	14.3	273910
120	3658	12	30	11.21	257680	13.51	310550
140	4267	12	30	8.715	233670		
160	4877	12	30	5.98	183260		



FIELD ELECTRICAL RESISTIVITY TEST DATA

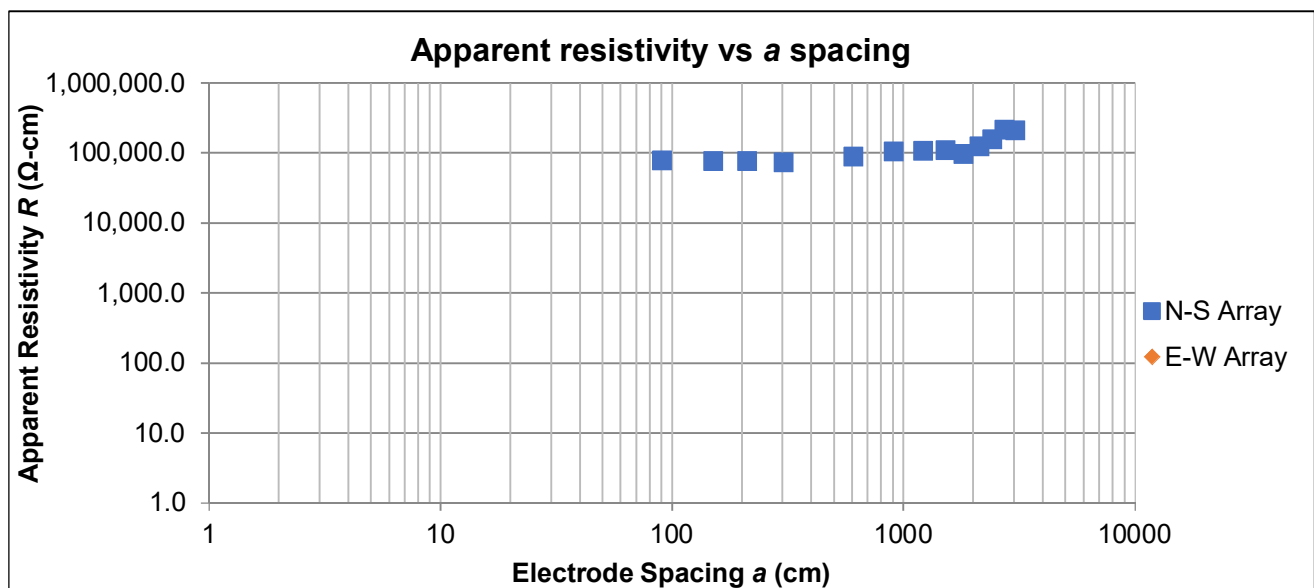
Compass BESS ■ San Juan Capistrano, Orange County, California
October 13, 2021 ■ Terracon Project No. 60215170



Array Loc.	Traverse 3 (See Site Plan)		
Instrument	The Mini Sting	Weather	Cloudy
Serial #		Ground Cond.	Bare soil
Cal. Check	7/14/2021	Tested By	N.B.,C.M.
Test Date	October 6, 2021	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts			

Apparent resistivity ρ is calculated as :
$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		Traverse 3			
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ		
				Ω	(Ω -cm)		
3	91	4	10	131.70	76860		
5	152	4	10	78.10	75150		
7	213	4	10	55.73	74870		
10	305	12	30	37.21	72500		
20	610	12	30	22.86	87990		
30	914	12	30	17.79	102360		
40	1219	12	30	13.85	106190		
50	1524	12	30	11.20	107320		
60	1829	12	30	8.32	95700		
70	2134	12	30	9.06	121480		
80	2438	12	30	10.00	153220		
90	2743	12	30	12.20	210310		
100	3048	12	30	10.73	205530		
120	3658	12	30	11.81	271470		
140	4267	12	30	11.74	314780		
160	4877	12	30	11.67	357630		



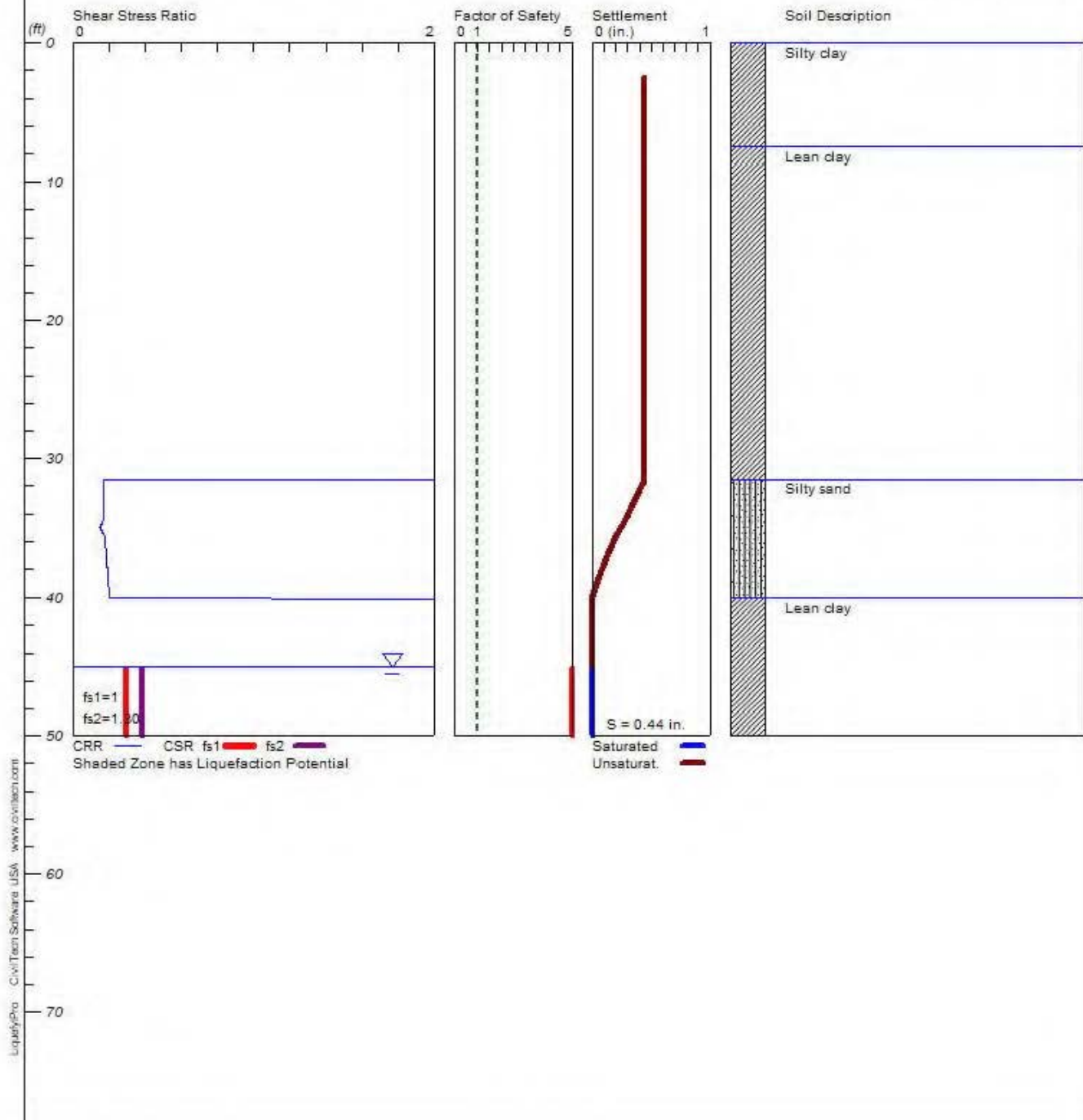
SUPPORTING INFORMATION

LIQUEFACTION ANALYSIS

Broad Reach Power Compass BESS

Hole No.=B-2 Water Depth=45 ft

Magnitude=7.69
Acceleration=0.563g



LIQUEFACTION ANALYSIS SUMMARY
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Input File Name: C:\Users\vvnnguyen\OneDrive - Terracon Consultants Inc\Desktop\Liquefaction\60215170\B-2.liq
Title: Broad Reach Power Compass BESS
Subtitle: 60215170

Surface Elev.=
Hole No.=B-2
Depth of Hole= 50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration= 0.56 g
Earthquake Magnitude= 7.69

Input Data:

Surface Elev.=
Hole No.=B-2
Depth of Hole=50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration=0.56 g
Earthquake Magnitude=7.69
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
 2. Settlement Analysis Method: Tokimatsu, M-correction
 3. Fines Correction for Liquefaction: Stark/Olson et al.*
 4. Fine Correction for Settlement: During Liquefaction*
 5. Settlement Calculation in: All zones*
 6. Hammer Energy Ratio, Ce = 1.42
 7. Borehole Diameter, Cb= 1.15
 8. Sampling Method, Cs= 1.2
 9. User request factor of safety (apply to CSR) , User= 1.3
Plot two CSR (fs1=1, fs2=User)
 10. Use Curve Smoothing: Yes*
- * Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	18.00	104.00	NoLiq
5.00	9.00	105.00	NoLiq
7.50	8.00	105.00	NoLiq
10.00	8.00	110.00	NoLiq
15.00	5.00	110.00	NoLiq
20.00	5.00	110.00	NoLiq
25.00	7.00	115.00	NoLiq
30.00	6.00	115.00	NoLiq
35.00	7.00	115.00	25.00
40.00	10.00	120.00	NoLiq

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.44 in.
Total Settlement of Saturated and Unsaturated Sands=0.44 in.
Differential Settlement=0.222 to 0.293 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
2.50	2.00	0.36	5.00	0.00	0.44	0.44
3.00	2.00	0.36	5.00	0.00	0.44	0.44
3.50	2.00	0.36	5.00	0.00	0.44	0.44
4.00	2.00	0.36	5.00	0.00	0.44	0.44
4.50	2.00	0.36	5.00	0.00	0.44	0.44
5.00	2.00	0.36	5.00	0.00	0.44	0.44
5.50	2.00	0.36	5.00	0.00	0.44	0.44
6.00	2.00	0.36	5.00	0.00	0.44	0.44
6.50	2.00	0.36	5.00	0.00	0.44	0.44
7.00	2.00	0.36	5.00	0.00	0.44	0.44
7.50	2.00	0.36	5.00	0.00	0.44	0.44
8.00	2.00	0.36	5.00	0.00	0.44	0.44
8.50	2.00	0.36	5.00	0.00	0.44	0.44
9.00	2.00	0.36	5.00	0.00	0.44	0.44
9.50	2.00	0.36	5.00	0.00	0.44	0.44
10.00	2.00	0.36	5.00	0.00	0.44	0.44

10.50	2.00	0.36	5.00	0.00	0.44	0.44
11.00	2.00	0.36	5.00	0.00	0.44	0.44
11.50	2.00	0.36	5.00	0.00	0.44	0.44
12.00	2.00	0.36	5.00	0.00	0.44	0.44
12.50	2.00	0.36	5.00	0.00	0.44	0.44
13.00	2.00	0.35	5.00	0.00	0.44	0.44
13.50	2.00	0.35	5.00	0.00	0.44	0.44
14.00	2.00	0.35	5.00	0.00	0.44	0.44
14.50	2.00	0.35	5.00	0.00	0.44	0.44
15.00	2.00	0.35	5.00	0.00	0.44	0.44
15.50	2.00	0.35	5.00	0.00	0.44	0.44
16.00	2.00	0.35	5.00	0.00	0.44	0.44
16.50	2.00	0.35	5.00	0.00	0.44	0.44
17.00	2.00	0.35	5.00	0.00	0.44	0.44
17.50	2.00	0.35	5.00	0.00	0.44	0.44
18.00	2.00	0.35	5.00	0.00	0.44	0.44
18.50	2.00	0.35	5.00	0.00	0.44	0.44
19.00	2.00	0.35	5.00	0.00	0.44	0.44
19.50	2.00	0.35	5.00	0.00	0.44	0.44
20.00	2.00	0.35	5.00	0.00	0.44	0.44
20.50	2.00	0.35	5.00	0.00	0.44	0.44
21.00	2.00	0.35	5.00	0.00	0.44	0.44
21.50	2.00	0.35	5.00	0.00	0.44	0.44
22.00	2.00	0.35	5.00	0.00	0.44	0.44
22.50	2.00	0.35	5.00	0.00	0.44	0.44
23.00	2.00	0.35	5.00	0.00	0.44	0.44
23.50	2.00	0.35	5.00	0.00	0.44	0.44
24.00	2.00	0.35	5.00	0.00	0.44	0.44
24.50	2.00	0.35	5.00	0.00	0.44	0.44
25.00	2.00	0.34	5.00	0.00	0.44	0.44
25.50	2.00	0.34	5.00	0.00	0.44	0.44
26.00	2.00	0.34	5.00	0.00	0.44	0.44
26.50	2.00	0.34	5.00	0.00	0.44	0.44
27.00	2.00	0.34	5.00	0.00	0.44	0.44
27.50	2.00	0.34	5.00	0.00	0.44	0.44
28.00	2.00	0.34	5.00	0.00	0.44	0.44
28.50	2.00	0.34	5.00	0.00	0.44	0.44
29.00	2.00	0.34	5.00	0.00	0.44	0.44
29.50	2.00	0.34	5.00	0.00	0.44	0.44
30.00	2.00	0.34	5.00	0.00	0.44	0.44
30.50	2.00	0.34	5.00	0.00	0.44	0.44
31.00	2.00	0.34	5.00	0.00	0.44	0.44
31.50	2.00	0.34	5.00	0.00	0.44	0.44
32.00	0.17	0.33	5.00	0.00	0.42	0.42
32.50	0.17	0.33	5.00	0.00	0.39	0.39
33.00	0.17	0.33	5.00	0.00	0.36	0.36
33.50	0.17	0.33	5.00	0.00	0.33	0.33
34.00	0.17	0.33	5.00	0.00	0.31	0.31
34.50	0.17	0.33	5.00	0.00	0.28	0.28
35.00	0.15	0.33	5.00	0.00	0.24	0.24
35.50	0.17	0.32	5.00	0.00	0.21	0.21
36.00	0.18	0.32	5.00	0.00	0.18	0.18
36.50	0.18	0.32	5.00	0.00	0.16	0.16
37.00	0.18	0.32	5.00	0.00	0.13	0.13
37.50	0.19	0.32	5.00	0.00	0.11	0.11
38.00	0.19	0.32	5.00	0.00	0.08	0.08
38.50	0.19	0.31	5.00	0.00	0.06	0.06
39.00	0.19	0.31	5.00	0.00	0.04	0.04
39.50	0.20	0.31	5.00	0.00	0.02	0.02
40.00	0.20	0.31	5.00	0.00	0.00	0.00
40.50	2.00	0.31	5.00	0.00	0.00	0.00
41.00	2.00	0.31	5.00	0.00	0.00	0.00
41.50	2.00	0.31	5.00	0.00	0.00	0.00
42.00	2.00	0.30	5.00	0.00	0.00	0.00
42.50	2.00	0.30	5.00	0.00	0.00	0.00
43.00	2.00	0.30	5.00	0.00	0.00	0.00
43.50	2.00	0.30	5.00	0.00	0.00	0.00
44.00	2.00	0.30	5.00	0.00	0.00	0.00
44.50	2.00	0.30	5.00	0.00	0.00	0.00
45.00	2.00	0.30	5.00	0.00	0.00	0.00
45.50	2.00	0.30	5.00	0.00	0.00	0.00
46.00	2.00	0.30	5.00	0.00	0.00	0.00
46.50	2.00	0.30	5.00	0.00	0.00	0.00
47.00	2.00	0.30	5.00	0.00	0.00	0.00
47.50	2.00	0.30	5.00	0.00	0.00	0.00
48.00	2.00	0.30	5.00	0.00	0.00	0.00
48.50	2.00	0.30	5.00	0.00	0.00	0.00
49.00	2.00	0.30	5.00	0.00	0.00	0.00
49.50	2.00	0.30	5.00	0.00	0.00	0.00
50.00	2.00	0.30	5.00	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

1 atm (atmosphere) = 1 tsf (ton/ft²)

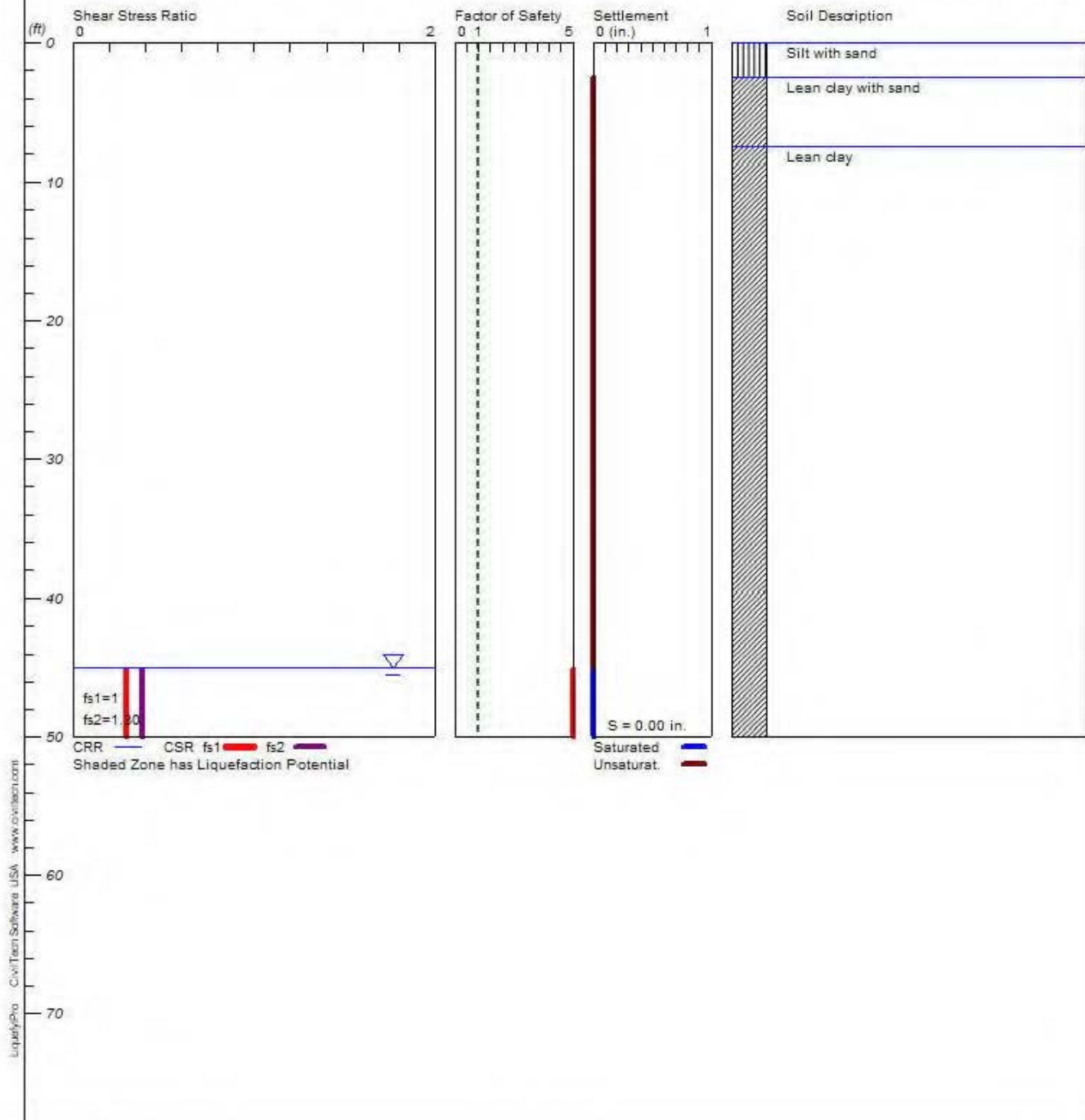
CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

LIQUEFACTION ANALYSIS

Broad Reach Power Compass BESS

Hole No.=B-3 Water Depth=45 ft

Magnitude=7.69
Acceleration=0.563g



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Subtitle: 60215170

Surface Elev.=
Hole No.=B-3
Depth of Hole= 50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration= 0.56 g
Earthquake Magnitude= 7.69

Input Data:

Surface Elev.=
Hole No.=B-3
Depth of Hole=50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration=0.56 g
Earthquake Magnitude=7.69
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
 2. Settlement Analysis Method: Tokimatsu, M-correction
 3. Fines Correction for Liquefaction: Stark/Olson et al.*
 4. Fine Correction for Settlement: During Liquefaction*
 5. Settlement Calculation in: All zones*
 6. Hammer Energy Ratio, Ce = 1.42
 7. Borehole Diameter, Cb= 1.15
 8. Sampling Method, Cs= 1.2
 9. User request factor of safety (apply to CSR) , User= 1.3
Plot two CSR (fs1=1, fs2=User)
 10. Use Curve Smoothing: Yes*
- * Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	21.00	120.00	NoLiq
5.00	13.00	120.00	NoLiq
7.50	18.00	123.00	NoLiq
10.00	22.00	123.00	NoLiq
15.00	18.00	123.00	NoLiq
20.00	12.00	123.00	NoLiq
25.00	12.00	120.00	NoLiq
30.00	9.00	118.00	NoLiq
35.00	5.00	120.00	NoLiq
40.00	8.00	120.00	NoLiq
45.00	7.00	120.00	NoLiq
50.00	10.00	120.00	90.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=0.00 in.
Differential Settlement=0.000 to 0.000 in.

Depth ft	CRRm	CSRfs	F.S.	S sat. in.	S dry in.	S all in.
2.50	2.00	0.36	5.00	0.00	0.00	0.00
3.00	2.00	0.36	5.00	0.00	0.00	0.00
3.50	2.00	0.36	5.00	0.00	0.00	0.00
4.00	2.00	0.36	5.00	0.00	0.00	0.00
4.50	2.00	0.36	5.00	0.00	0.00	0.00
5.00	2.00	0.36	5.00	0.00	0.00	0.00
5.50	2.00	0.36	5.00	0.00	0.00	0.00
6.00	2.00	0.36	5.00	0.00	0.00	0.00
6.50	2.00	0.36	5.00	0.00	0.00	0.00
7.00	2.00	0.36	5.00	0.00	0.00	0.00
7.50	2.00	0.36	5.00	0.00	0.00	0.00
8.00	2.00	0.36	5.00	0.00	0.00	0.00
8.50	2.00	0.36	5.00	0.00	0.00	0.00
9.00	2.00	0.36	5.00	0.00	0.00	0.00

[illegible]

* F.S.<1, Liquefaction Potential Zone

(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

1 atm (atmosphere) = 1 tsf (ton/ft²)

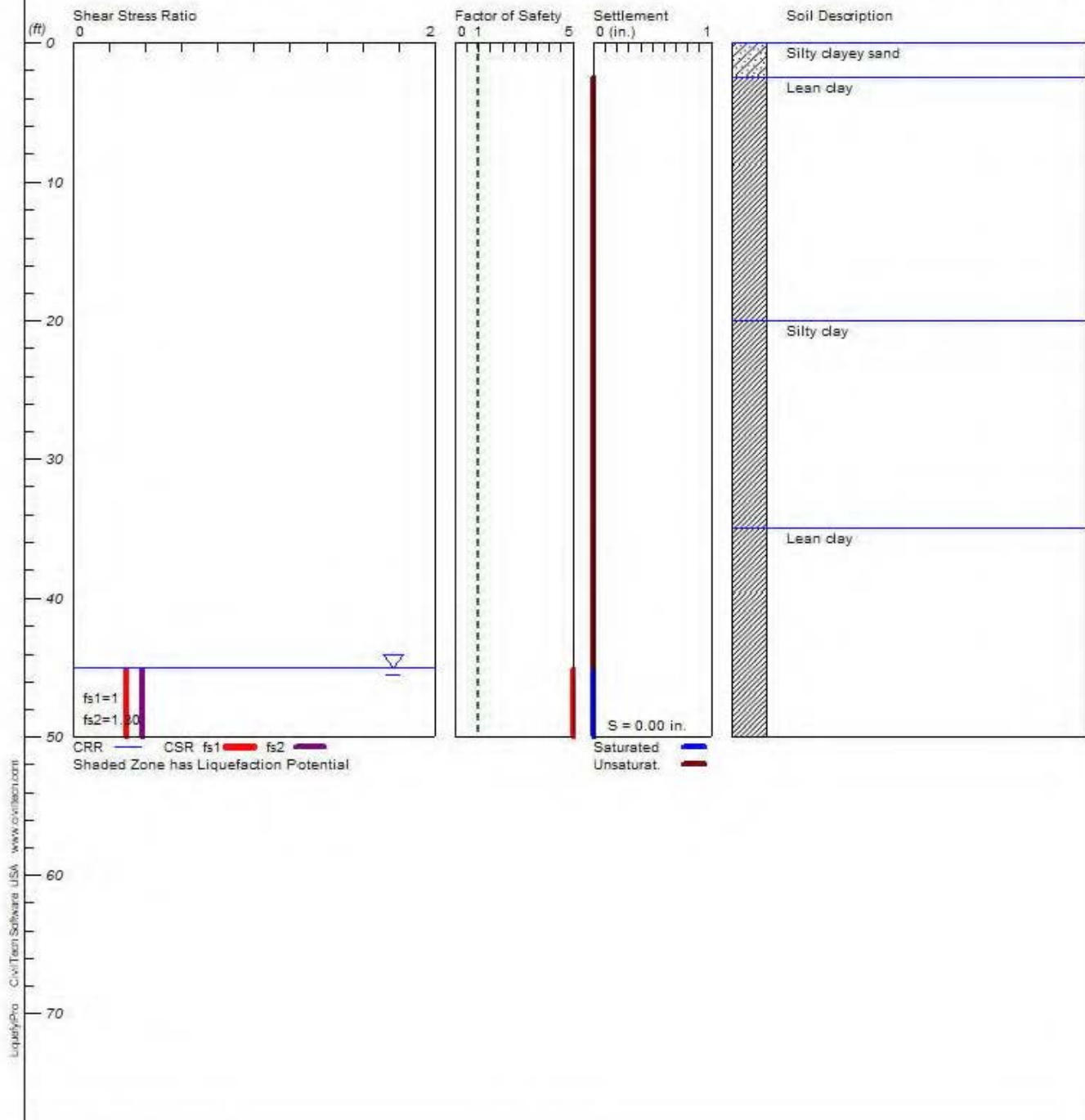
CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

LIQUEFACTION ANALYSIS

Broad Reach Power Compass BESS

Hole No.=B-7 Water Depth=45 ft

Magnitude=7.69
Acceleration=0.563g



LIQUEFACTION ANALYSIS SUMMARY
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Title: Broad Reach Power Compass BESS
Subtitle: 60215170

Surface Elev.=
Hole No.=B-7
Depth of Hole= 50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration= 0.56 g
Earthquake Magnitude= 7.69

Input Data:

Surface Elev.=
Hole No.=B-7
Depth of Hole=50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration=0.56 g
Earthquake Magnitude=7.69
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
 2. Settlement Analysis Method: Tokimatsu, M-correction
 3. Fines Correction for Liquefaction: Stark/Olson et al.*
 4. Fine Correction for Settlement: During Liquefaction*
 5. Settlement Calculation in: All zones*
 6. Hammer Energy Ratio, Ce = 1.42
 7. Borehole Diameter, Cb= 1.15
 8. Sampling Method, Cs= 1.2
 9. User request factor of safety (apply to CSR) , User= 1.3
Plot two CSR (fs1=1, fs2=User)
 10. Use Curve Smoothing: Yes*
- * Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	7.00	104.00	NoLiq
5.00	7.00	116.00	NoLiq
7.50	11.00	117.00	NoLiq
10.00	11.00	117.00	NoLiq
15.00	10.00	120.00	NoLiq
20.00	4.00	120.00	NoLiq
25.00	3.00	120.00	NoLiq
30.00	4.00	120.00	NoLiq
35.00	4.00	120.00	NoLiq
40.00	5.00	120.00	NoLiq
45.00	8.00	120.00	NoLiq
50.00	6.00	120.00	90.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=0.00 in.
Differential Settlement=0.000 to 0.000 in.

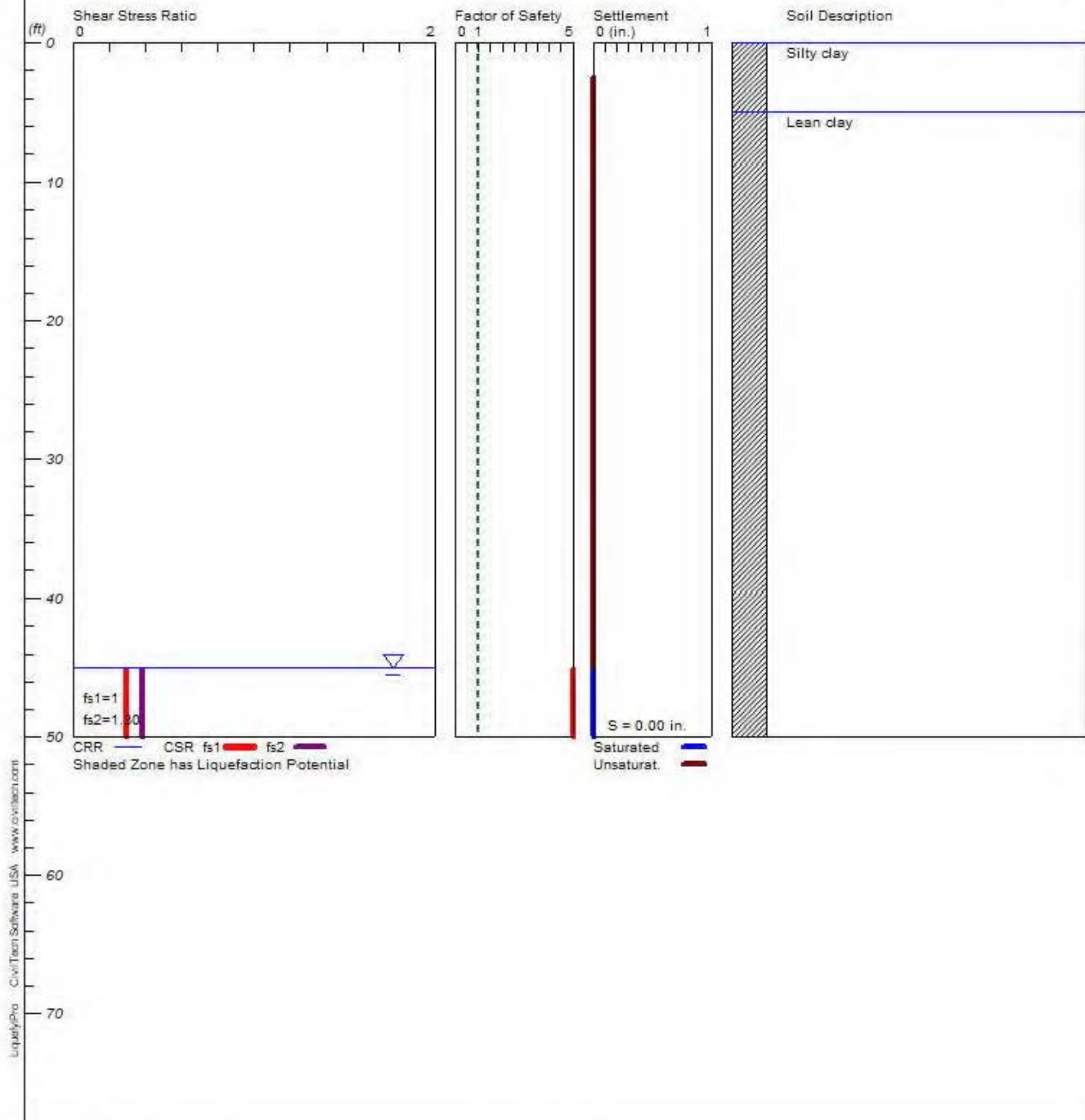
Depth ft	CRRm	CSRfs	F.S.	S sat. in.	S dry in.	S all in.
2.50	2.00	0.36	5.00	0.00	0.00	0.00
3.00	2.00	0.36	5.00	0.00	0.00	0.00
3.50	2.00	0.36	5.00	0.00	0.00	0.00
4.00	2.00	0.36	5.00	0.00	0.00	0.00
4.50	2.00	0.36	5.00	0.00	0.00	0.00
5.00	2.00	0.36	5.00	0.00	0.00	0.00
5.50	2.00	0.36	5.00	0.00	0.00	0.00
6.00	2.00	0.36	5.00	0.00	0.00	0.00
6.50	2.00	0.36	5.00	0.00	0.00	0.00
7.00	2.00	0.36	5.00	0.00	0.00	0.00
7.50	2.00	0.36	5.00	0.00	0.00	0.00
8.00	2.00	0.36	5.00	0.00	0.00	0.00
8.50	2.00	0.36	5.00	0.00	0.00	0.00
9.00	2.00	0.36	5.00	0.00	0.00	0.00

LIQUEFACTION ANALYSIS

Broad Reach Power Compass BESS

Hole No.=B-15 Water Depth=45 ft

Magnitude=7.69
Acceleration=0.563g



LIQUEFACTION ANALYSIS SUMMARY
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Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 10/19/2021 8:48:51 AM

Input File Name: C:\Users\vvnnguyen\OneDrive - Terracon Consultants Inc\Desktop\Liquefaction\60215170\B-15.liq
Title: Broad Reach Power Compass BESS
Subtitle: 60215170

Surface Elev.=
Hole No.=B-15
Depth of Hole= 50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration= 0.56 g
Earthquake Magnitude= 7.69

Input Data:

Surface Elev.=
Hole No.=B-15
Depth of Hole=50.00 ft
Water Table during Earthquake= 45.00 ft
Water Table during In-Situ Testing= 47.00 ft
Max. Acceleration=0.56 g
Earthquake Magnitude=7.69
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
 2. Settlement Analysis Method: Tokimatsu, M-correction
 3. Fines Correction for Liquefaction: Stark/Olson et al.*
 4. Fine Correction for Settlement: During Liquefaction*
 5. Settlement Calculation in: All zones*
 6. Hammer Energy Ratio, Ce = 1.42
 7. Borehole Diameter, Cb = 1.15
 8. Sampling Method, Cs = 1.2
 9. User request factor of safety (apply to CSR) , User= 1.3
Plot two CSR (fs1=1, fs2=User)
 10. Use Curve Smoothing: Yes*
- * Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	10.00	104.00	NoLiq
5.00	11.00	105.00	NoLiq
7.50	14.00	105.00	NoLiq
10.00	13.00	110.00	NoLiq
15.00	10.00	110.00	NoLiq
20.00	5.00	110.00	NoLiq
25.00	5.00	115.00	NoLiq
30.00	6.00	115.00	NoLiq
35.00	7.00	115.00	NoLiq
40.00	8.00	120.00	NoLiq
45.00	9.00	120.00	NoLiq
50.00	14.00	120.00	90.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=0.00 in.
Differential Settlement=0.000 to 0.000 in.

Depth ft	CRRm	CSRfs	F.S.	S sat. in.	S dry in.	S all in.
2.50	2.00	0.36	5.00	0.00	0.00	0.00
3.00	2.00	0.36	5.00	0.00	0.00	0.00
3.50	2.00	0.36	5.00	0.00	0.00	0.00
4.00	2.00	0.36	5.00	0.00	0.00	0.00
4.50	2.00	0.36	5.00	0.00	0.00	0.00
5.00	2.00	0.36	5.00	0.00	0.00	0.00
5.50	2.00	0.36	5.00	0.00	0.00	0.00
6.00	2.00	0.36	5.00	0.00	0.00	0.00
6.50	2.00	0.36	5.00	0.00	0.00	0.00
7.00	2.00	0.36	5.00	0.00	0.00	0.00
7.50	2.00	0.36	5.00	0.00	0.00	0.00
8.00	2.00	0.36	5.00	0.00	0.00	0.00
8.50	2.00	0.36	5.00	0.00	0.00	0.00
9.00	2.00	0.36	5.00	0.00	0.00	0.00

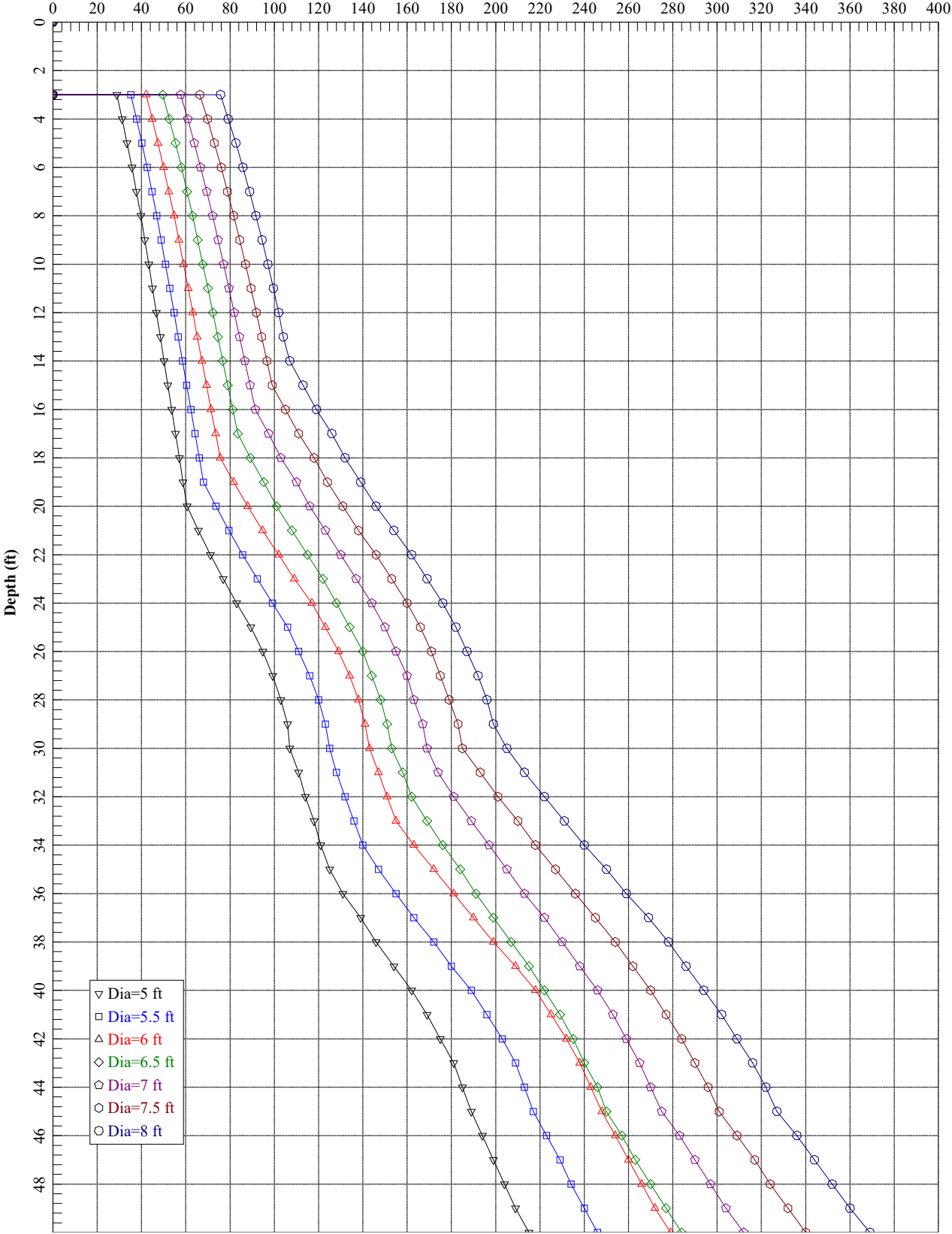
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

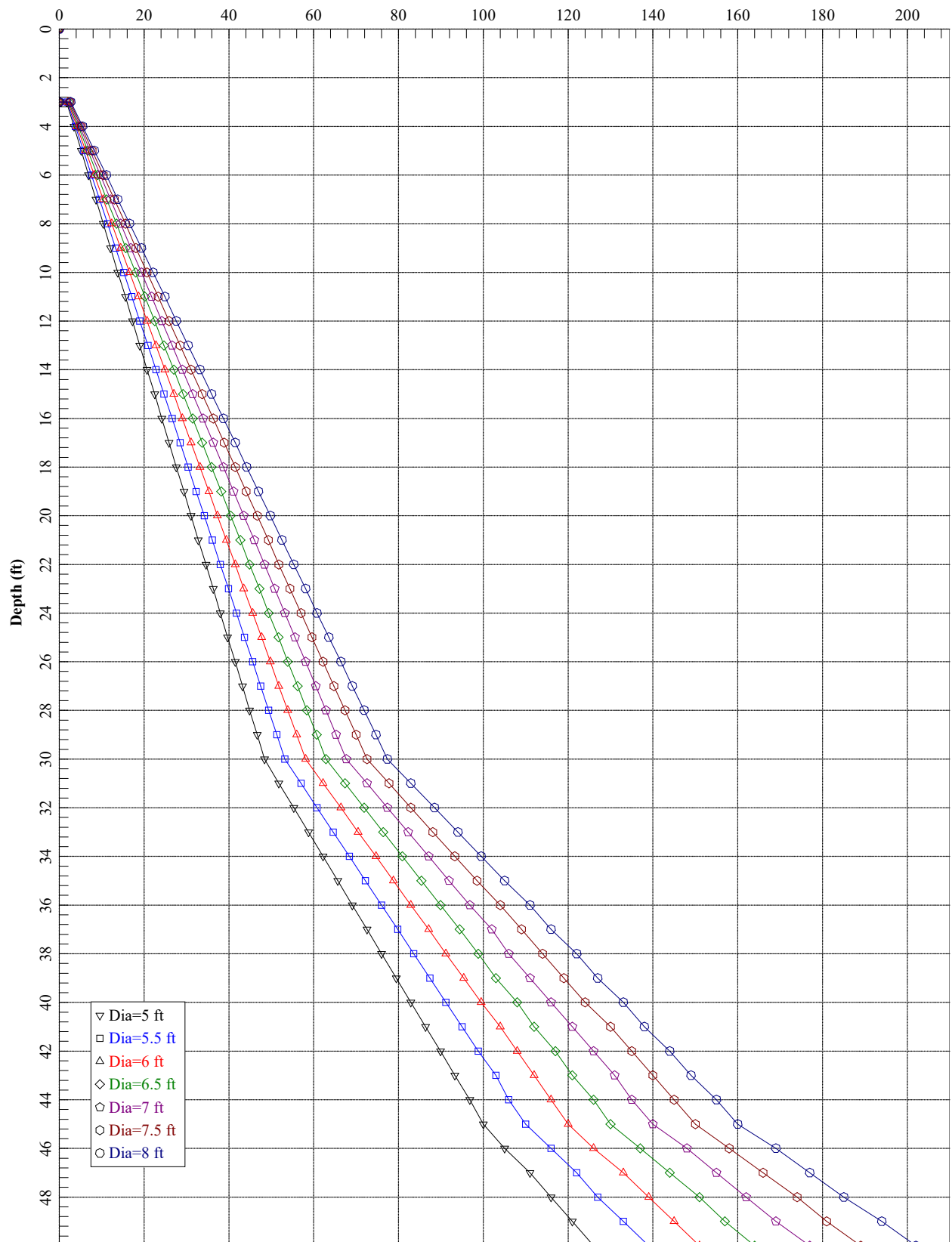
1 atm (atmosphere) = 1 tsf (ton/ft²)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

Drilled Shaft Allowable Downward Capacity
Total Resistance/F.S. (tons)



Drilled Shaft Allowable Side Resistance
Side Resistance/F.S. (tons)



GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING				WATER LEVEL		Water Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer
						Water Level After a Specified Period of Time		(T) Torvane
						Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)
						Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.		N N value
								(PID) Photo-Ionization Detector
								(OVA) Organic Vapor Analyzer
								(WOH) Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.
	Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1
	Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4
	Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8
	Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15
	Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30
				Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above “A”	CL	Lean clay ^{K, L, M}	
			$PI < 4$ or plots below “A” line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line	CH	Fat clay ^{K, L, M}	
			PI plots below “A” line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

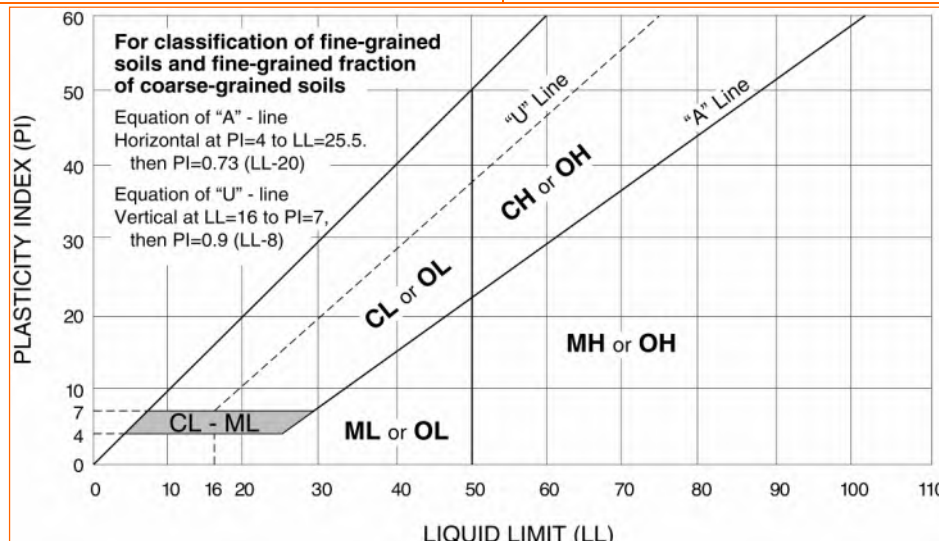
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



June 29, 2021

Charles Greely, P.E., LEED AP, QSD
Principal Engineer
Dudek
3615 Main Street, Suite 103
Riverside, California 92501

**Subject: Geotechnical and Geomorphic Evaluations
Compass Energy Storage Project
San Juan Capistrano, California**

INTRODUCTION

Geosyntec Consultants Inc. (Geosyntec) prepared this report in support of Dudek's feasibility evaluations of the proposed Compass Energy Storage Project in San Juan Capistrano, California. The scope of work performed was in general accordance with our proposal submitted to Dudek, dated March 19, 2021. Geosyntec was authorized to proceed by issuance of Dudek's Task Order Authorization (Dudek Job No. 12755.17). This letter summarizes our findings from a site reconnaissance, the results of our geologic/geotechnical evaluations, the likely geomorphic trends and processes in Oso Creek, and our recommendations regarding potential related mitigation measures.

PROJECT AND SITE DESCRIPTION

The project proponent is planning to develop portions of two parcels adjacent to the Oso Creek channel in southern Orange County at the location indicated in Figure 1 as part of an energy storage project. The parcel locations, APN 637-082-71 and APN 637-082-16, are indicated in Figure 2. The development is proposed to include a switching station and storage batteries as part of an energy storage project. The primary project site (identified as "Northern Development Area" in Figure 2) is located on the western abandoned alluvial floodplain (i.e., herein referred to as the "terrace") of Oso Creek. This development area is approximately a quarter of a mile downstream of a riprap apron at the terminus of the concrete lined segment of Oso Creek. The "Southern Development Area" is approximately three quarters of a mile downstream of the northern site located on a sloped hillside west of Oso Creek. The two development areas are linked by a proposed utility corridor which will also include an access road.

The project sites are confined between the hillslope to the west and Oso Creek to the east. The channel is actively incising through its floodplain deposits and into the underlying bedrock in this unlined reach. This incision has produced widening of the creek channel top of bank width and associated migration of the channel. On the eastern bank of the channel across the northern development area, a riprap embankment was constructed recently to prevent the channel migration into the railroad right-of-way

HISTORIC HYDROLOGIC BACKGROUND

Oso Creek is a major tributary within the San Juan Creek Watershed of South Orange County, California. The Oso Creek headwaters originate in the foothills of the Santa Ana Mountains and flow north to south through a mostly developed watershed. The Oso Creek drainage ultimately discharges to Arroyo Trabuco, then to the San Juan Creek, which outlets to the Pacific Ocean. The total stream length of Oso Creek is approximate 13.5 miles from the headwaters to its confluence with Arroyo Trabuco, and its historical floodplain (now, an abandoned terrace), confined by hillslopes on both sides, is generally less than 2000 ft wide.

Oso Creek historically had ephemeral flow, which was later altered due to development within the drainage area and now flows perennially. The creek has since been dammed twice to create both the Upper Oso Reservoir and Lake Mission Viejo and is a mostly lined channel. Principal sources of flow to Oso Creek are urban stormwater and groundwater discharges supported by landscape irrigation from residences, golf courses, and other green belts.

This reach of Oso Creek has been continually modified and channelized since the 1950s, as illustrated in Figure 3. The creek valley (e.g., terrace) supported commercial citrus groves up until the mid-1990s. Prior to the 1970s, this reach was described as a shallow (approximately 6 ft in depth), vegetated channel with sloping banks and little to no lateral migration. After development, channelization, and lining of the upstream reach in the mid-1980s, this reach has severely incised and widened (See Figure 4) and now has bank heights greater than 50 ft in some areas. As a result, episodic bank collapses have retrogressed into adjacent properties and caused significant loss of upland acreage along certain areas of the reach (USACE, 2002). The potential for future bank collapse and migration is an important design consideration for the proposed project.

AVAILABLE GEOLOGIC AND GEOTECHNICAL INFORMATION AND INTERPRETATION

Geosyntec reviewed available geologic and geotechnical data in the vicinity of the site. Geologic data included the Morton and Miller [2006] geologic map of the San Bernardino and Santa Ana 30'x60' quadrangles. As shown in the 2006 map, the geology in the vicinity of the site consists of Quaternary Alluvium along Oso Creek, with an elevated plateau of primarily Tertiary Capistrano Formation bedrock to the west, and large landslide deposits that developed in the Capistrano bedrock due to undermining at the toe by the historical meandering of Oso Creek, a common failure mechanism for the Capistrano Formation in this area of South Orange County. The large landslide deposits are mapped by Morton and Miller in between the Oso Creek alluvial plain deposits and the Capistrano Bedrock along the ridgelines to the west. Bedding dips in the bedrock are reported between 6 and 14 degrees to the west [Vedder, 1957], which is common in this area of the Capistrano Embayment.

Geosyntec also reviewed a letter by Cotton, Shires & Associates [Cotton Shires, 2001] titled: "Summary of Surface and Subsurface Exploration" that presents a discussion of past geologic explorations within the Rancho Capistrano Site. This site includes APN 637-082-71. This document characterized the alluvial floodplain of Oso Creek as mostly level Alluvial Terrace Deposits consisting of unconsolidated sand, silt, and clay where exposed in the Oso Creek embankments, with perched water seeps reported up to 15 ft above creek level. The document also described the western hillside as Capistrano bedrock with deep-seated landslides and/or alluvial terraces, possibly displaced by deep-seated landslides. Bedding dips in the Capistrano were reported in this document as flat in the mid portion of the hillside where in-place bedrock is exposed.

SITE RECONNAISSANCE

On April 7, 2021, a Geosyntec team composed of a Geotechnical Engineer, a Certified Engineering Geologist and a geomorphologist performed a reconnaissance of the area surrounding the site and inside the Oso Creek incision, where accessible. The attached photo log (Attachment A) documents the April 7, 2021 site reconnaissance.

GEOLOGIC SITE CONDITIONS

The attached geologic map and cross-sections (Figures 5 through 8) were developed based on existing information augmented by direct observations made during the Geosyntec's April 7, 2021 site reconnaissance. Slightly weathered, flat lying, thinly

bedded bedrock of the Capistrano Formation composed of light gray siltstone was mapped at the bottom of Oso Creek in the north portion of the site (See Attachment A, Photos No. 3, 4, and 5), while young alluvium and an alluvial terrace overlying the Capistrano Formation were observed on the creek embankments (See Photos No. 6, 7, 8, 9, and 21). The creek embankments were observed as locally failing in a regressive fashion forming active landslide deposits (See Photos No. 10, 11, 13, 17, and 18). Where the creek has reached slightly weathered bedrock, it is eroding laterally into the weaker sediments (young alluvium, alluvial terraces, and potentially the weathered upper portion of the Capistrano). The young alluvium appeared varved in alternating darker fine-grained and lighter coarser soil layers, corresponding to different depositional episodes.

The large, deep-seated landslide deposits forming the hillside to the west of Oso Creek appear as prehistoric features based on geomorphic evidence and erosional processes. These paleo landslide deposits more closely abut the active Oso Creek west bank margin at the southern portion of the Northern Development, along the utility corridor, and in the area of the Southern Development. The eastern limits of the landslide deposits are particularly uncertain in these areas, as they are concealed by alluvium. These deposits may extend into the area of the proposed utility corridor and the Southern Development. This material is expected to perform poorly if exposed in a cut due to past deformation it has experienced.

GEOMORPHIC EVALUATION

Upstream of the area of interest, Oso Creek flows through 2-mile-long concrete-lined trapezoidal channel to box culvert with 10-ft tall wing walls (See Attachment A, Photo No. 1). The 700-ft long culvert, which contains series of drop structures, eventually releases flow into a 170-ft riprap lined reach, and then into the earthen-bottom northern terminus of the reach of interest (see Photo No. 2).

Below the riprap transition, Oso Creek can be characterized as a wide, deep, asymmetrically step-pool to a meandering gully system. The two proposed development areas occupy the historical floodplain terrace, which is a flat alluvial valley floor in the north and a sloped hillside comprised of colluvium in the south. The top of bank (i.e., transition between proposed development areas and slope down to active Oso Creek system and similar upland elevation on eastern side Oso Creek) width varies significantly along the reach from north to south (Approximately 90 to 250 ft wide). The northern reach of Oso creek that parallels the northern property is confined on the eastern bank by

an embankment placed west of the Metrolink rail line. The western bank of Oso Creek is not laterally confined.

During the field assessment, Geosyntec Consultants' personnel observed zones of high benches along the western bank created through bank collapse. Signs of continued retrogressive failure of the high terrace into the gully were indicated by surficial cracks in the terrace at some locations parallel to Oso Creek.

The typical progression of morphological features from the west bank to the east bank is as follows: at the base of the steep western bank cliff face, there is a bank-collapse deposit forming a bench; bankfull alluvial deposits; the primary channel of Oso Creek (including back slough and secondary channels at some areas); and the steep eastern bank to the floodplain.

On the southern edge of the Northern Property, Oso Creek Bends westward toward the Utility Access Road. On this bend, the erosive active bank transfers away from the northern property toward the eastern bank, which immediately steepens. The next bend transfers the active bank back toward the western edge of Oso Creek, which parallels the Utility Access Corridor for approximately 600 ft. Erosion by Oso Creek and cliff failures were observed just south of this reach where a historical meander is actively straightening and pulling the active bank toward the west. This activity is located just north of the Southern Property and may pose a direct hazard to the Utility Access Corridor.

Evidence of recent geomorphic change due to fluvial processes in Oso Creek along the Southern Property (western bank of Oso Creek) was not directly observed in the field. From the vantage of the Southern Property, the active bank was observed to be on the eastern side of Oso Creek. However, evidence of past channel widening and western regression of the top of bank into the Southern Property, as discussed in the Historical Evaluations section below, may illustrate sensitivity to future widening events. Additionally, there is the potential for stormwater runoff, which would drain from the developed area and its retention basin to the west and eventually flow east down through the property resulting in a gully tributary to Oso Creek. This tributary intersects both the existing Oso Rancho Capistrano Trail and the Utility Access Road.

Historical Lateral Migration Desktop Analysis

This reach of Oso Creek under evaluation has been continually modified and channelized since the 1950s. It flowed through a valley of citrus grove properties up until the mid-1990s. Prior to the 1970s, this reach was described as a shallow (approximately 6 ft

in depth) vegetated channel with sloping banks and little to no lateral migration. Post development, this reach has severely incised and now has bank heights greater than 50 ft in some areas. As a result, episodic bank collapses have cut into adjacent properties and caused significant losses of acreage along certain areas of the reach [USACE, 2002].

Historical responses to this geomorphic activity include the stabilization of the first 2000 ft of the eastern slope by Metrolink during the 1990s. Metrolink stabilized the eastern bank slump by installing soil tiebacks and armoring the slope with riprap [USACE, 2002]. The continued issue of channel instability and bank collapse has been monitored and documented by OC Public Works [2021].

In order to identify past and future high-risk locations along Oso Creek, a 4000-ft long segment of the channel (as measured in the north-south direction) was assessed to document channel and top of terrace (e.g., “bank” or slope edge) and its annual change. Geosyntec leveraged aerial imagery from several sources, including the Orange County Imagery Archives from 1929 through 1990, Google Earth from 1994 through 2013, and NearMap from September 2014 through January 2021 (collected on an approximate bi-annual basis).

Lateral Migration (2014 – 2021)

The most recent and highest resolution aerial imagery (2014 through 2021) was used to measure the top of bank location change and establish an annual rate of change at control stations at 80 ft intervals along the Oso Creek floodplain (Figures 9 and 10 “Average Lateral Migration chart,” respectively), respectively). Top of bank change was established from manual digitization ¹of top of bank locations from recent and historical imagery. These rates of change measured over the observation period (2014 through 2021) are believed to appropriately represent the types of geomorphic evolution in this reach and are generally representative of processes that may be active within this reach

¹ Several factors in the digitization process introduce some error in the digitization process. These factors are the spatial resolution of aerial imagery, subjective interpretation of the top of bank or slope break, and vegetation obstructions. While there is error in the measurements, the relative magnitude are assumed to be small and have a negligible effect on average rates since the error is present in each of the observations.

going forward in the same locations as well as areas where limited change over this period was observed.

The average annual lateral migration rate of the western bank for the entire reach was approximately 3 ft per year with maximum annual migration rate of approximately 100 ft per year observed at sta. 39+20 (Figure 9). Over 50% of the reach had a maximum annual lateral migration rate of less than or equal to 10 ft per year. Only in localized areas, less than 5% of the observed stations, were maximum annual lateral migration rates above 80 feet per year recorded.

Across the areas evaluated, there is a difference between the average annual rate of change measured from 2014 through 2021 and the maximum rates of change measured (Figure 11). This difference speaks to the episodic nature of channel evolution, lateral migration, and bank failure events within specific corridors along Oso Creek. Mitigation measures to slow the bank evolution or arrest it will be needed to preserve a buildable footprint on the upland terrace for the north and south properties and their connecting road and utility corridor.

Historical Evaluations (1929 through 2021)

Further historical analysis using imagery from 1929 through 2021 was conducted to inform trends in geomorphic restructuring along Oso Creek, and separate historical regions of geomorphic change from those presently at risk. Important events in the resultant hydromodification of Oso Creek include: 1) the alteration in flow path from a braided channel to a channelized single-thread system at the northern extent of the valley from 1938 through 1953; and 2) the development of residential neighborhoods within the drainage area and the damming and creation of two reservoirs upstream from 1965 through 1980. The alteration of Oso Creek from ephemeral to perennial due to increases in imperviousness within the drainage area resulted in severe hydromodification of Oso Creek, especially along the northern channelized reach that extended from 900 ft north of the present day riprap terminus location to 500 ft south of the riprap terminus. Between 1983 and 1986, a concrete channel was installed along an approximately two-mile length of Oso Creek that terminates at the present-day riprap at the northern bounds of the area of interest. The immediate downstream western bank was backfilled and graded to reclaim property lost during a large erosional event between 1980 and 1983.

From the inception of development in the mid-1960s through the early 2000s, channel incision and widening were ubiquitous along the investigated reach of Oso Creek, and property loss within the northern and southern property footprints was prevalent (Figure

4). However, in the more recent past, 2002 through present, there is evidence of a transition in the geomorphic behavior of Oso Creek from a vertical degradation-dominated channel widening regime to a lower energy meander-dominated regime (Figure 12 – “Historical trends 2002 -2021”). Exposure of the bedrock formations identified during the field investigation may corroborate that Oso Creek approaching a physical limit to incision and a uniformity in longitudinal slope. The reduction of slope along Oso Creek could transfer work done by fluvial processes away from channelized degradation and toward the active edges of bends. This results in larger meanders and lateral migration of active top of bank location into floodplain areas.

Geomorphic Findings

Through combined effort of the field reconnaissance and historical desktop analysis, the following geomorphic hazards have been identified along the Oso Creek reach. Westward lateral migration along the northern boundary of the Northern Property (sta 07+20 to sta 13+60) has progressed significantly since 2014. Exposure of past fill efforts from the 1980s and the significant loss of surrounding property emphasizes the need for a permanent stabilization of the western slope nearest to the Northern Property. Localized failures in the steep western bank that parallels the utility access road are the main source of western lateral migration detected through the utility road region. The proximity of the road to the present top of bank (from sta. 15+20 to sta. 21+60) and tendency of the area for bank failure, may present risk to road access for the Southern Property. Both regions along the Northern Property and access road should be evaluated for mitigation alternatives to arrest further retrogressive bank failures from impacting these areas.

Although active westward lateral migration was not observed in the area immediately adjacent to the Southern Property after 2014, past migration identified during the Historical Evaluation and illustrated in Figure 4, significantly widened the banks in this area after development of the watershed.

RECOMMENDATIONS

Areas of risk for significant bank erosion from lateral migration into the upland terrace area include : 1) the Northern Property (from the riprap terminus south to approximately sta.13+60); the northern portion of the utility corridor (from sta. 15+20 south to approximately sta. 21+60; and 3) the Southern Property (from sta. 28+00 south to approximately sta. 34+40.

Given project demands, we understand that the relocation of the proposed development or a restriction of the proposed footprint to address this potential future migration is not preferable. As such, based on discussions with Dudek regarding these areas of vulnerability, Geosyntec developed the design concepts and rough order of magnitude costs for retaining wall-type solutions which would be intended to protect the proposed development areas from future slope instabilities to their east. An optimal alignment for these features would preserve the current footprint of the proposed development while staying west of the riparian habitat along the creek to the east. These concepts presented in the following section were developed with the understanding that current locations of geomorphic change may shift to current “stable” areas in the future, as is evidenced by the historical geomorphic trends in this reach.

We also note that stormwater runoff from the proposed development could further exacerbate hillslope, gully, and Oso Creek bank failure processes. Stormwater controls to limit hydromodification impacts should be considered in the final design or mitigation measures installed to prevent a negative geomorphic response.

DESCRIPTION OF CONCEPTUAL MITIGATION MEASURES

Concepts were developed for retaining wall-type solutions intended to protect the proposed development areas from future slope instabilities to their east. Figure 13 indicates the conceptual alignment of these proposed retaining walls. Figure 14 illustrates the conceptual location of these wall relative to geologic conditions at several cross sections. Two types of retaining wall systems are considered potentially applicable in this instance: secant pile walls and diaphragm walls. Selection of the applicable system will ultimately depend on the actual depth to competent Capistrano bedrock and the anticipated loading within particular segments of each wall.

Secant pile walls consists of alternating primary and secondary concrete piles that interlock to form a continuous structure. After the primary piles are installed and gain sufficient strength, the secondary piles reinforced with wide flange steel beams are installed in between the primary piles. It is anticipated that piles would have diameters of approximately 3 to 4 feet with approximately 6 inches of overlap. This technology is considered applicable to the northern wall segment based on the wall heights anticipated to be required.

Diaphragm walls are constructed in bentonite slurry-supported open trenches. This type of wall consists of reinforced concrete panels, which in this case are anticipated to be 15 to 25 feet long with a thickness of approximately 4 feet. This technology is considered applicable for both the north and southern wall segments. A series of “T-panels” is likely to be required based on wall heights and the associated anticipated loads.

Tieback anchors will be required as part of either of these systems. For T-panel diaphragm walls, a vertical anchor through the t-panel section is anticipated to be required in addition to the tieback anchor.

The table below provides rough order of magnitude cost estimate for the two wall segments.

Location	Wall Length (feet)	Wall Depth (feet)	Wall Area (square feet)	Unit Cost	Total Cost
Northern Wall	~2,400	~40	96,000	\$200 to \$250	\$19.2M to \$24M
Southern Wall	~1,000	~60	60,000	\$250 to \$300	\$15M to \$18M

Please note that these costs are presented at a study level without the benefit of a field investigation or design and as such should be considered to potentially range from -30% to +50% of estimates provided. Additionally, there are significant unknowns associated with the estimates provided which may be addressed in future phases of work through a targeted/phased subsurface investigations to improve understanding of site geomorphology and groundwater conditions.

CLOSURE

We appreciate the opportunity of assisting you on this project. If you have any questions about this report, or require additional information, please do not hesitate to call the undersigned at (714) 969-0800.

Sincerely,



Lauren Mathews
Senior Staff Professional



Saverio Siciliano, P.G., C.E.G.
Principal Engineering Geologist



Chris Conkle, P.E., G.E.
Principal Geotechnical Engineer

Attachments:

- Figure 1 – Site Location
- Figure 2 – Site Plan

Figure 3 – Development of Oso Creek Watershed 1970-1990
Figure 4 – Increasing Riparian Width along Oso Creek 1960-2020
Figure 5 - Geologic Map
Figure 6 – Geologic Cross Section 1-1’
Figure 7 – Geologic Cross Sections 2-2’
Figure 8- Geologic Cross Sections A-A’, B-B’, and C-C’
Figure 9 – Western Top of Bank and Lateral Migration Analysis (2014-2021)
Figure 10 – Average Lateral Migration Chart
Figure 11 – Average Lateral Migration by Region
Figure 12 – Historical Trends in Lateral Migration (2002-2021)
Figure 13 – Proposed Retaining Wall Alignment
Figure 14 – Geologic Cross Sections A-A’, B-B’, and C-C’ with the Proposed Wall
Attachment A – Photo Log

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- Cotton Shires [2001] Summary of Surface and Subsurface Exploration, Rancho Capistrano, June 22, 2001.
- OC Public Works [2021]. SJC10 Rehabilitation Project Concepts, Presentation dated February 23, 2021
- Morton, D.M., and Miller, F.K. [2006]. “Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California.” *Open-File Report OF-2006-1217*. U.S. Geological Survey. 1:100,000.
- USACE [2002] San Juan Creek Flood Risk Management Feasibility Study
- Vedder, J.G., Yerkes, R.F., and Schoellhamer, J.E. [1957]. “Geologic map of the San Joaquin Hills-San Juan Capistrano area, Orange County, California.” *Oil and Gas Investigations Map OM-193*. U.S. Geological Survey. 1:24,000.

Figures



Legend



Site



San Juan Creek Watershed



Major Streams

0 1.25 2.5 5 7.5 10
Miles

Site Location Map

San Juan Capistrano, California

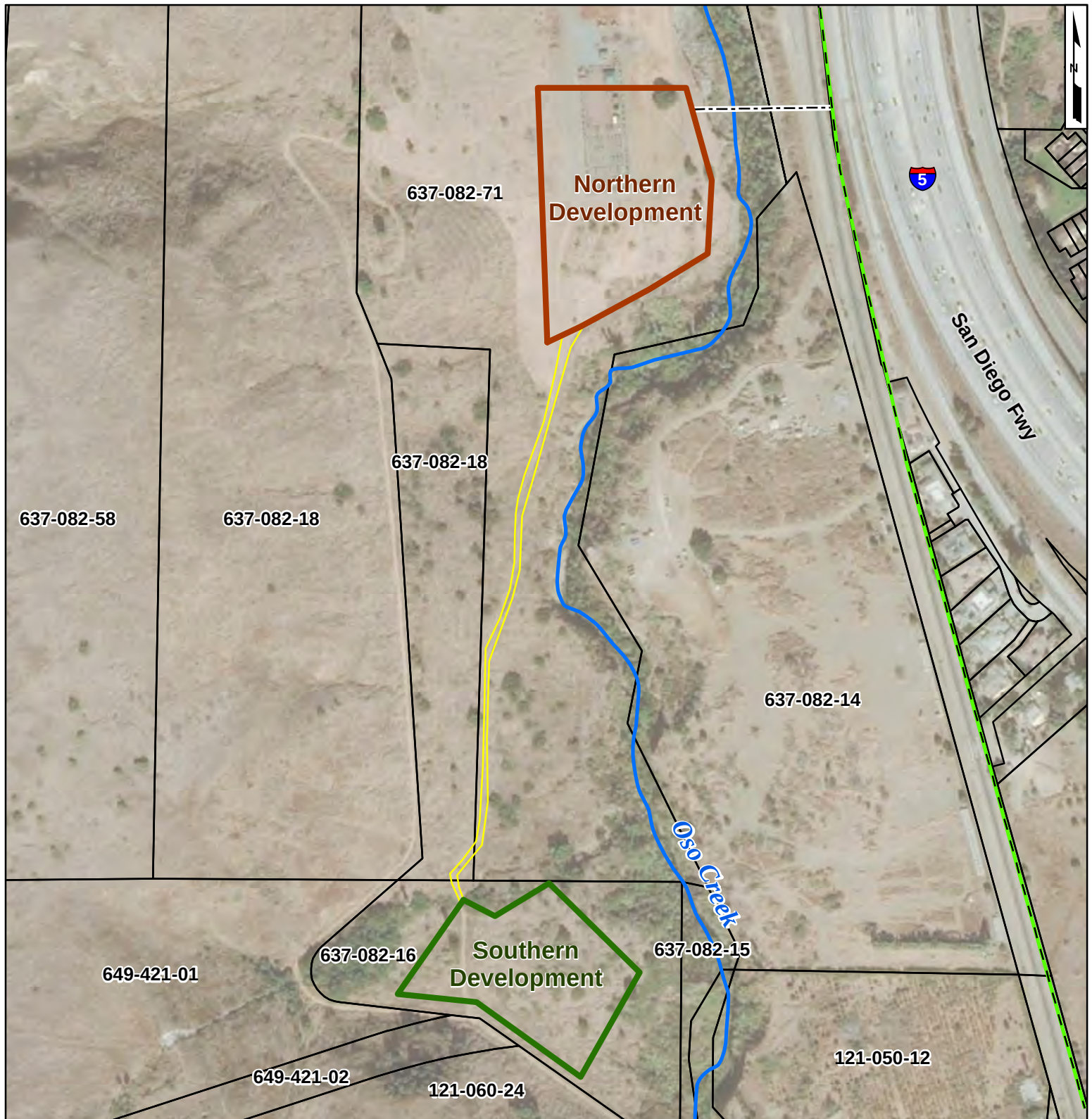
Geosyntec
consultants

Orange County, CA

April 2021

Figure

1



Legend

- Southern Development Area
- Northern Development Area
- Utility Corridor
- SDG&E 138kV Transmission Line
- Point of Interconnection to SDG&E Facilities
- Oso Creek

0 100 200 400 600 800 1,000
 Feet

Site Plan Map

San Juan Capistrano, California

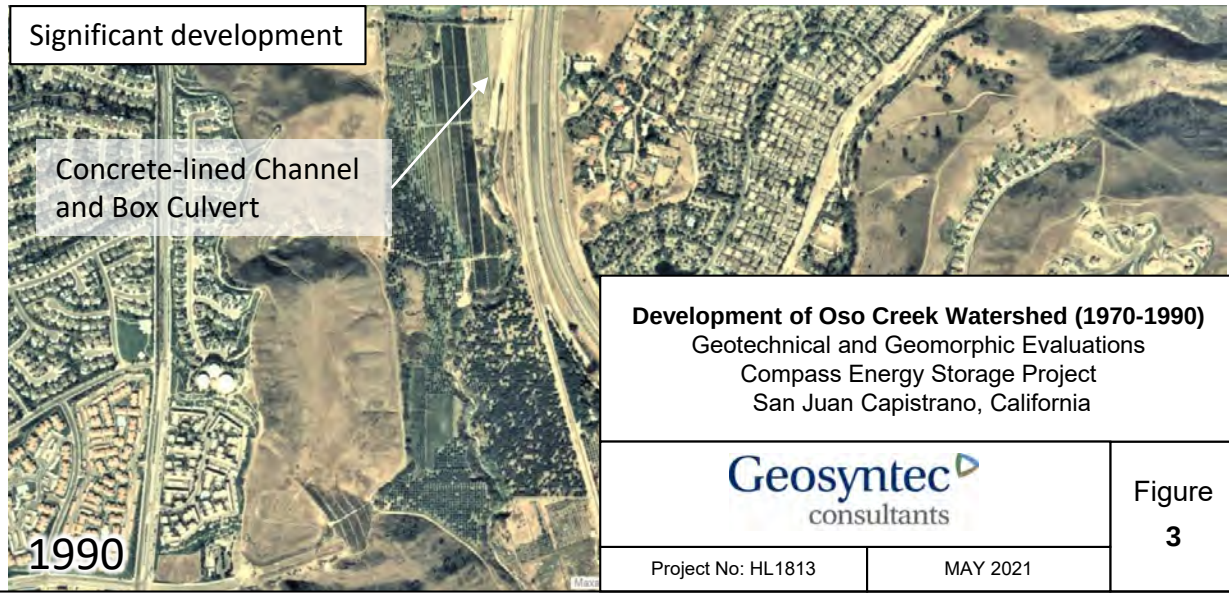
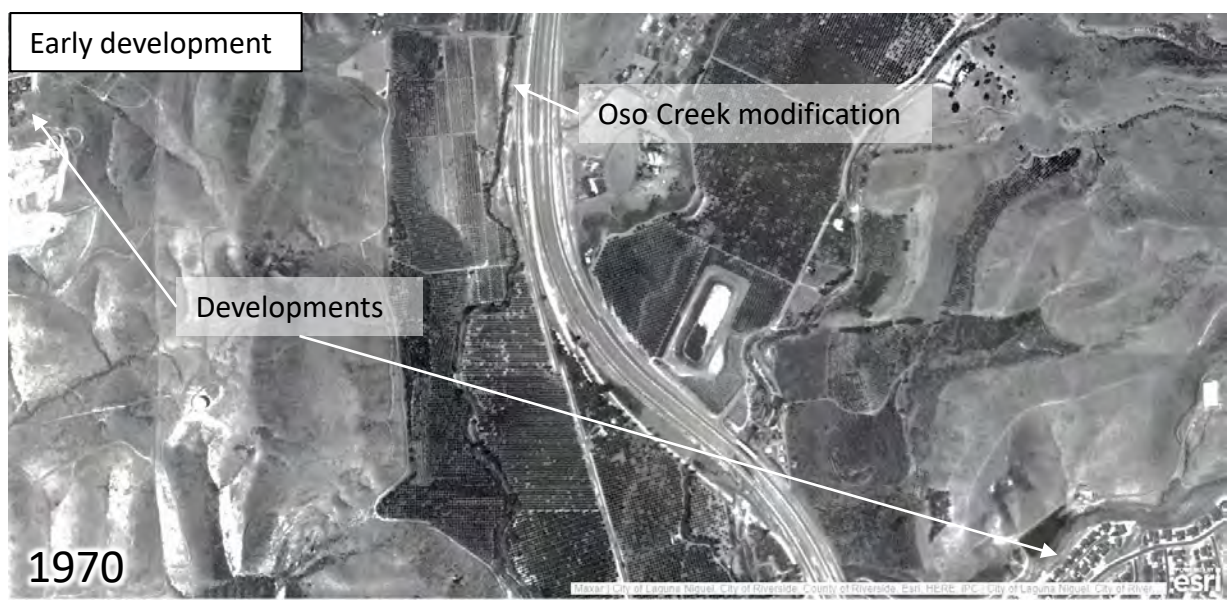
Geosyntec
 consultants

Figure

2

Orange County, CA

April 2021

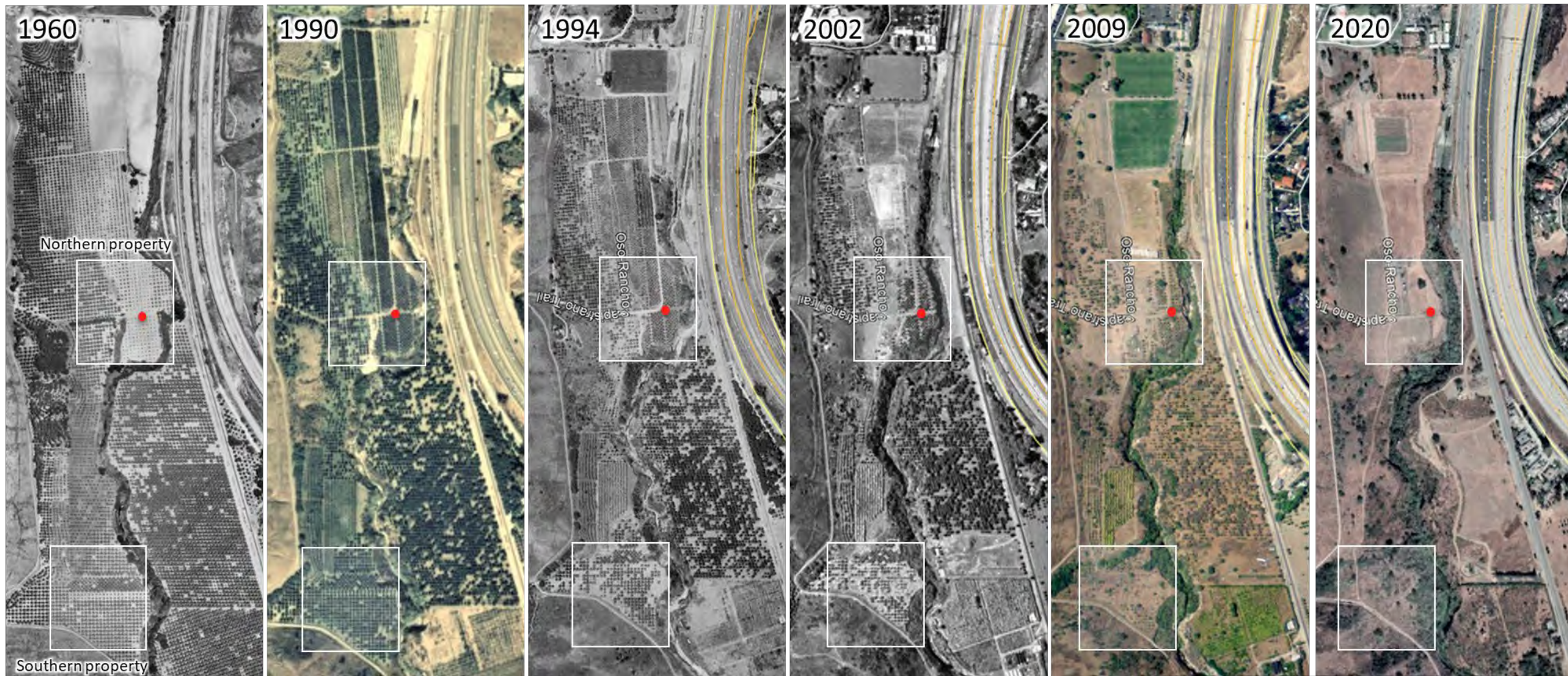


Development of Oso Creek Watershed (1970-1990)
Geotechnical and Geomorphic Evaluations
Compass Energy Storage Project
San Juan Capistrano, California



Project No: HL1813 MAY 2021

Figure
3



● = Control Point

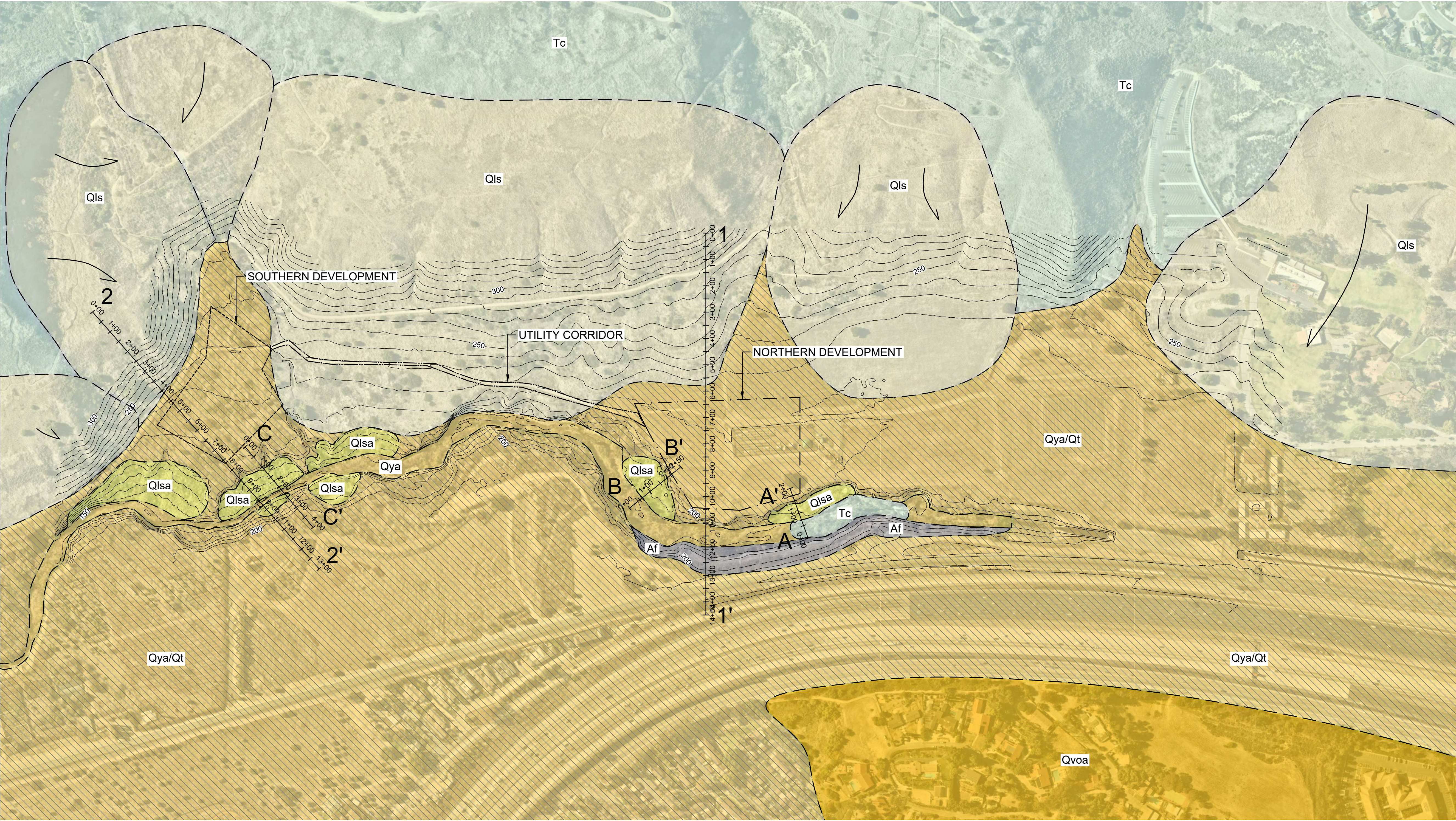
Increasing riparian width along Oso Creek (1960-2020)
 Geotechnical and Geomorphic Evaluations
 Compass Energy Storage Project
 San Juan Capistrano, California

Geosyntec
 consultants

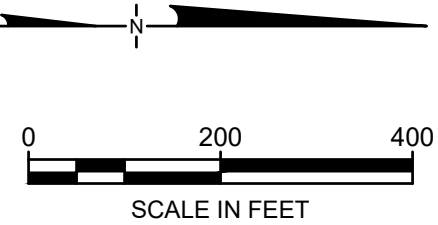
Project No: HL1813

MAY 2021

Figure
 4



LEGEND	
	EXISTING GROUND MAJOR CONTOUR (10')
	EXISTING GROUND MINOR CONTOUR (2')
	ARTIFICIAL FILL
	QUATERNARY LANDSLIDE DEPOSIT
	QUATERNARY YOUNGER ALLUVIUM
	QUATERNARY TERRACE DEPOSITS
	TERTIARY CAPISTRANO FORMATION
	QUATERNARY ALLUVIUM
	ACTIVE LANDSLIDES
	SOUTHERN DEVELOPMENT AREA
	NORTHERN DEVELOPMENT AREA
	UTILITY CORRIDOR



GEOLOGIC MAP
OSO CREEK GEOTECHNICAL AND
GEOMORPHIC EVALUATIONS
SAN JUAN CAPISTRANO, CALIFORNIA

Geosyntec
consultants

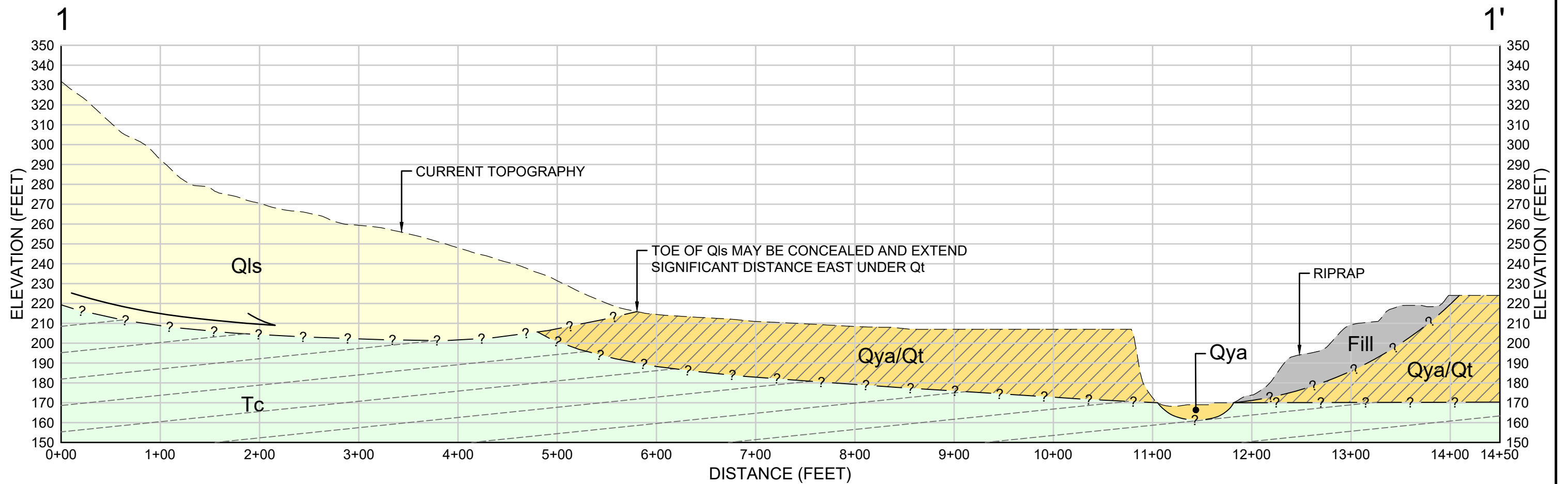
FIGURE

5

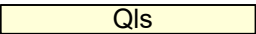
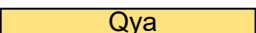
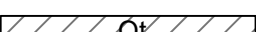
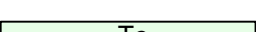
PROJECT NO: HL1813

MAY 2021

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LEGEND

	FILL MATERIAL
	QUATERNARY LANDSLIDE DEPOSIT
	QUATERNARY YOUNGER ALLUVIUM
	QUATERNARY TERRACE DEPOSITS
	TERTIARY CAPISTRANO FORMATION
	INTERPRETED GEOLOGIC CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN

0 100
HORIZONTAL SCALE

0 50
VERTICAL SCALE

GEOLOGIC CROSS SECTION 1-1'
OSO CREEK GEOTECHNICAL AND
GEOMORPHIC EVALUATIONS
SAN JUAN CAPISTRANO, CALIFORNIA

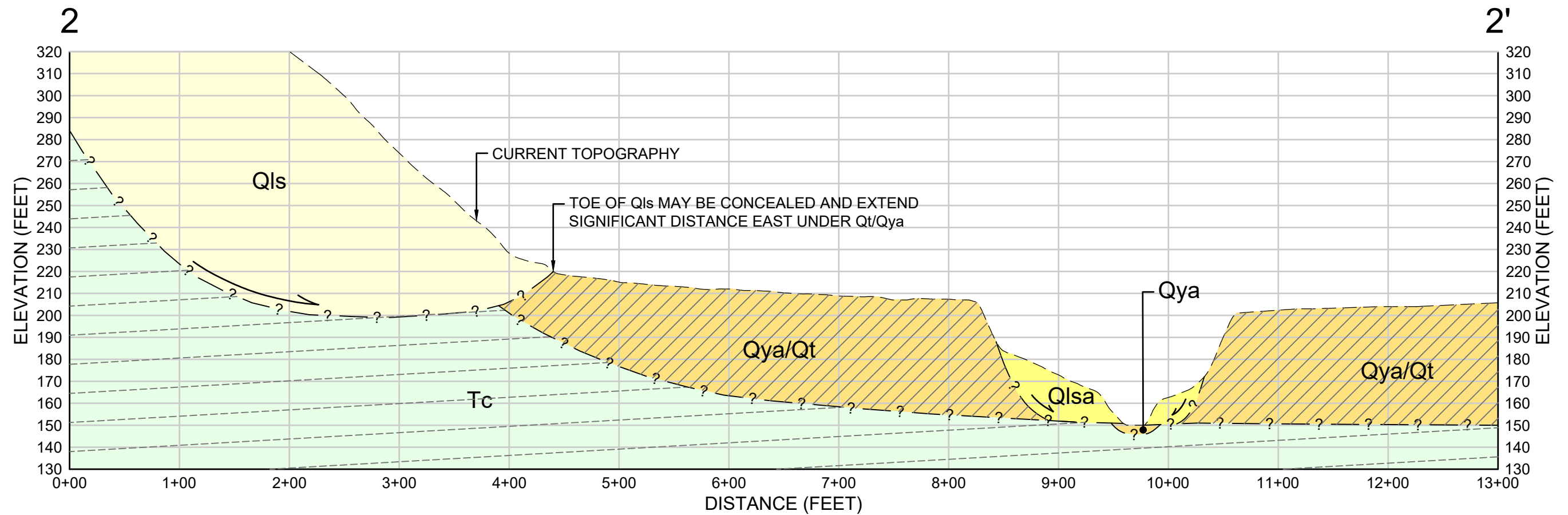
Geosyntec
consultants

PROJECT NO: HL1813

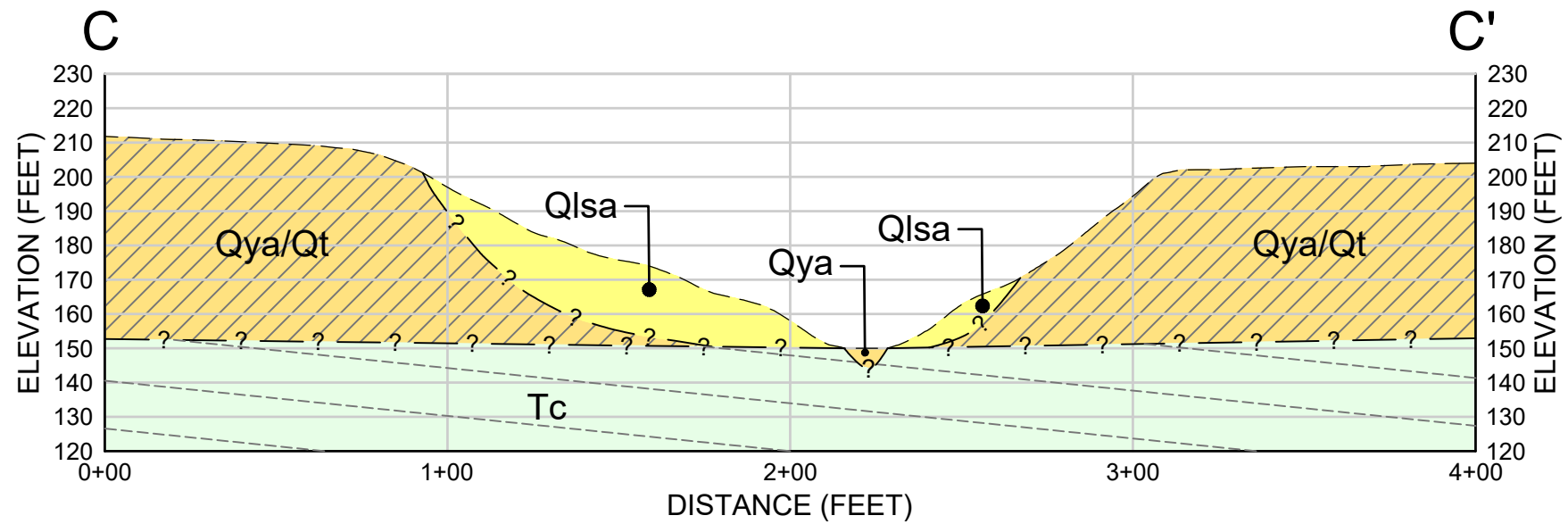
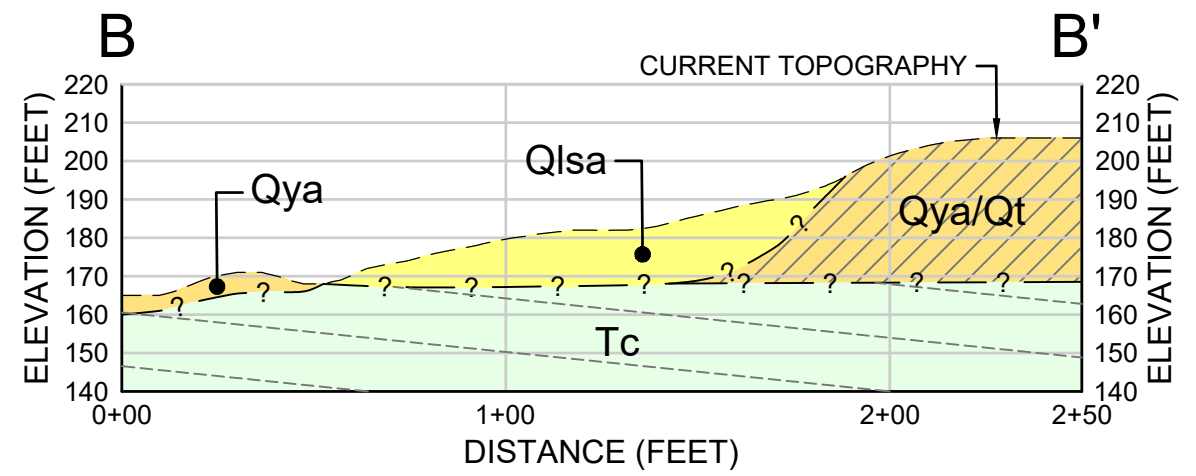
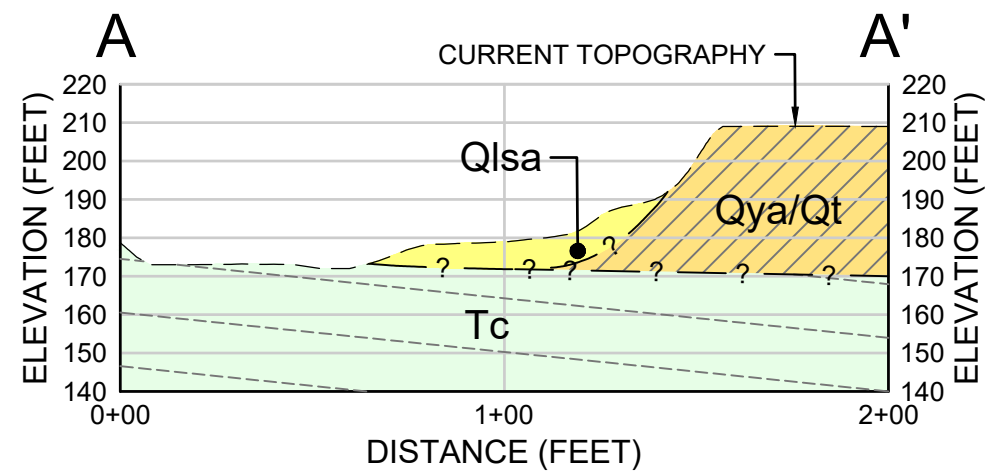
MAY 2021

FIGURE
6

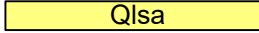
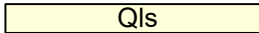
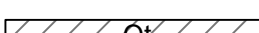
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LEGEND

	Qlsa	ACTIVE LANDSLIDE DEPOSITS
	Qls	QUATERNARY LANDSLIDE DEPOSIT
	Qya	QUATERNARY YOUNGER ALLUVIUM
	Qt	QUATERNARY TERRACE DEPOSITS
	Tc	TERTIARY CAPISTRANO FORMATION
	— ? — ? —	INTERPRETED GEOLOGIC CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN



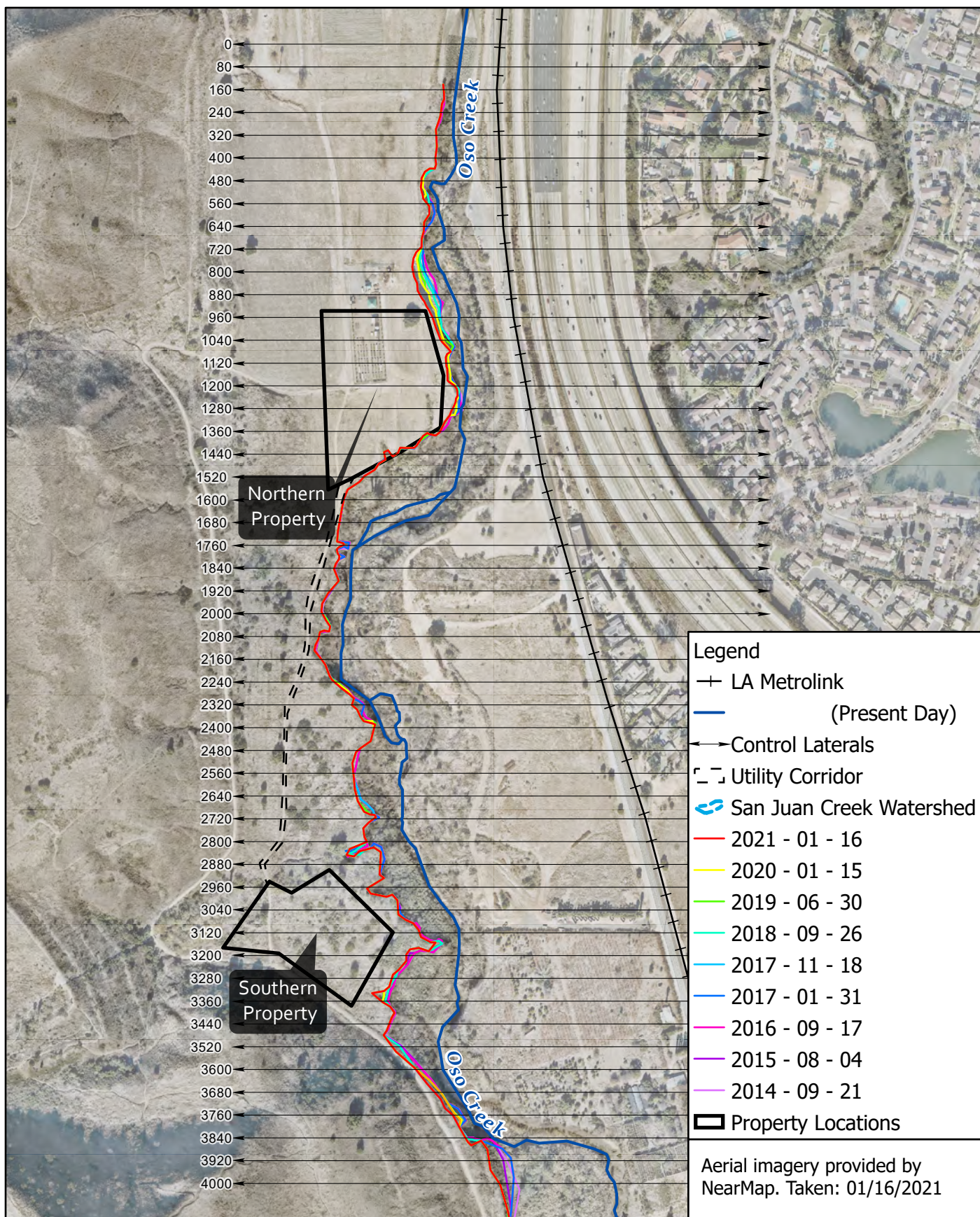
GEOLOGIC CROSS SECTIONS A-A', B-B'
AND C-C'
OSO CREEK GEOTECHNICAL AND
GEOMORPHIC EVALUATIONS
SAN JUAN CAPISTRANO, CALIFORNIA

Geosyntec
consultants

PROJECT NO: HL1813

MAY 2021

FIGURE
8



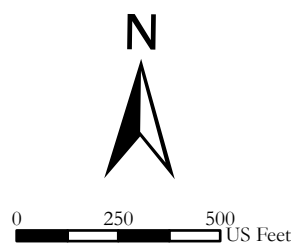
Western Top of Bank and Lateral Migration Analysis (2014 - 2021)

Geosyntec
consultants

Oso Creek, San Juan Capistrano, CA

Figure 9

May 2021



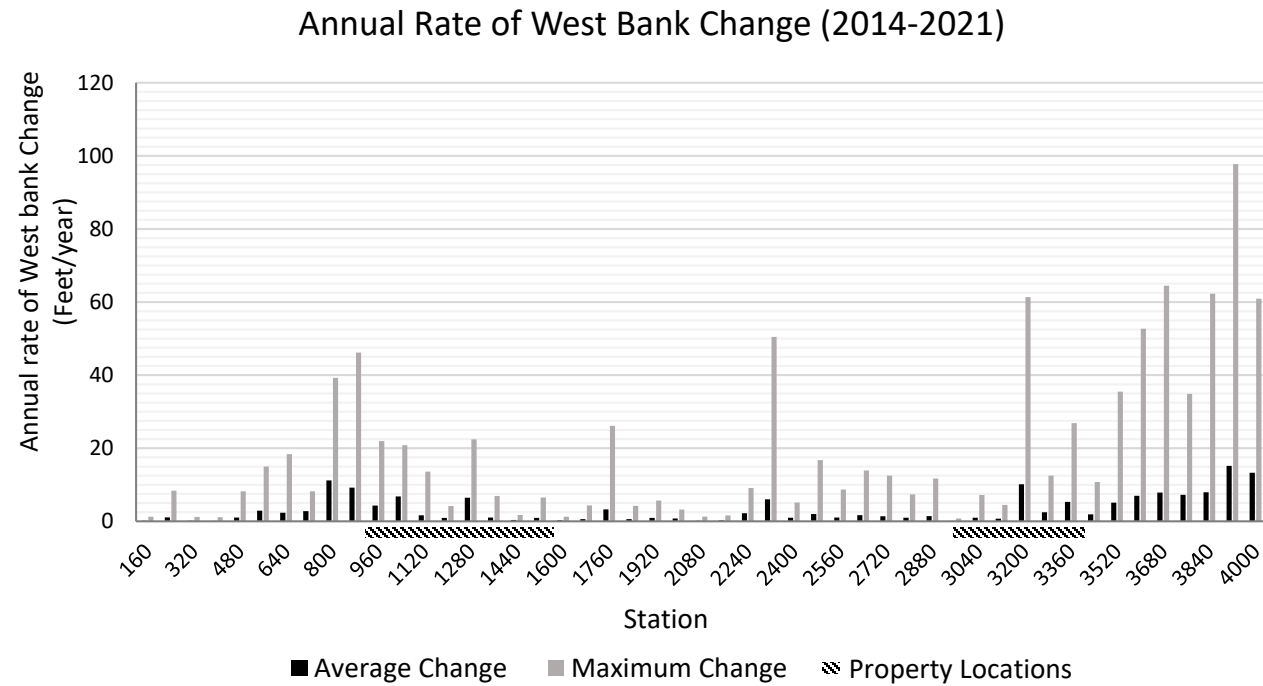


Figure 10. Annual rate of lateral change [feet/year] along the western bank of Oso Creek at 80-ft station intervals.

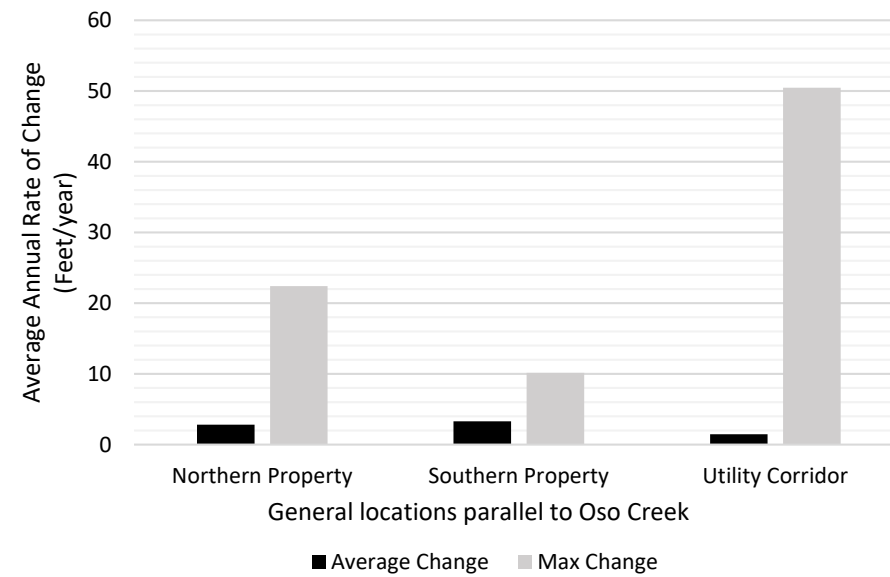


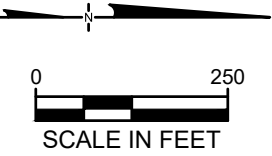
Figure 11. Average annual rate of change [feet/year] within control laterals associated with the Northern Property, Southern Property and the connecting road and utility corridor.

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LEGEND

	340	EXISTING GROUND MAJOR CONTOUR (10')		NORTHERN DEVELOPMENT AREA
		EXISTING GROUND MINOR CONTOUR (2')		UTILITY CORRIDOR
		SOUTHERN DEVELOPMENT AREA		RIPARIAN



PROPOSED RETAINING WALL ALIGNMENT
OSO CREEK GEOTECHNICAL AND
GEOMORPHIC EVALUATIONS
SAN JUAN CAPISTRANO, CALIFORNIA

Geosyntec
consultants

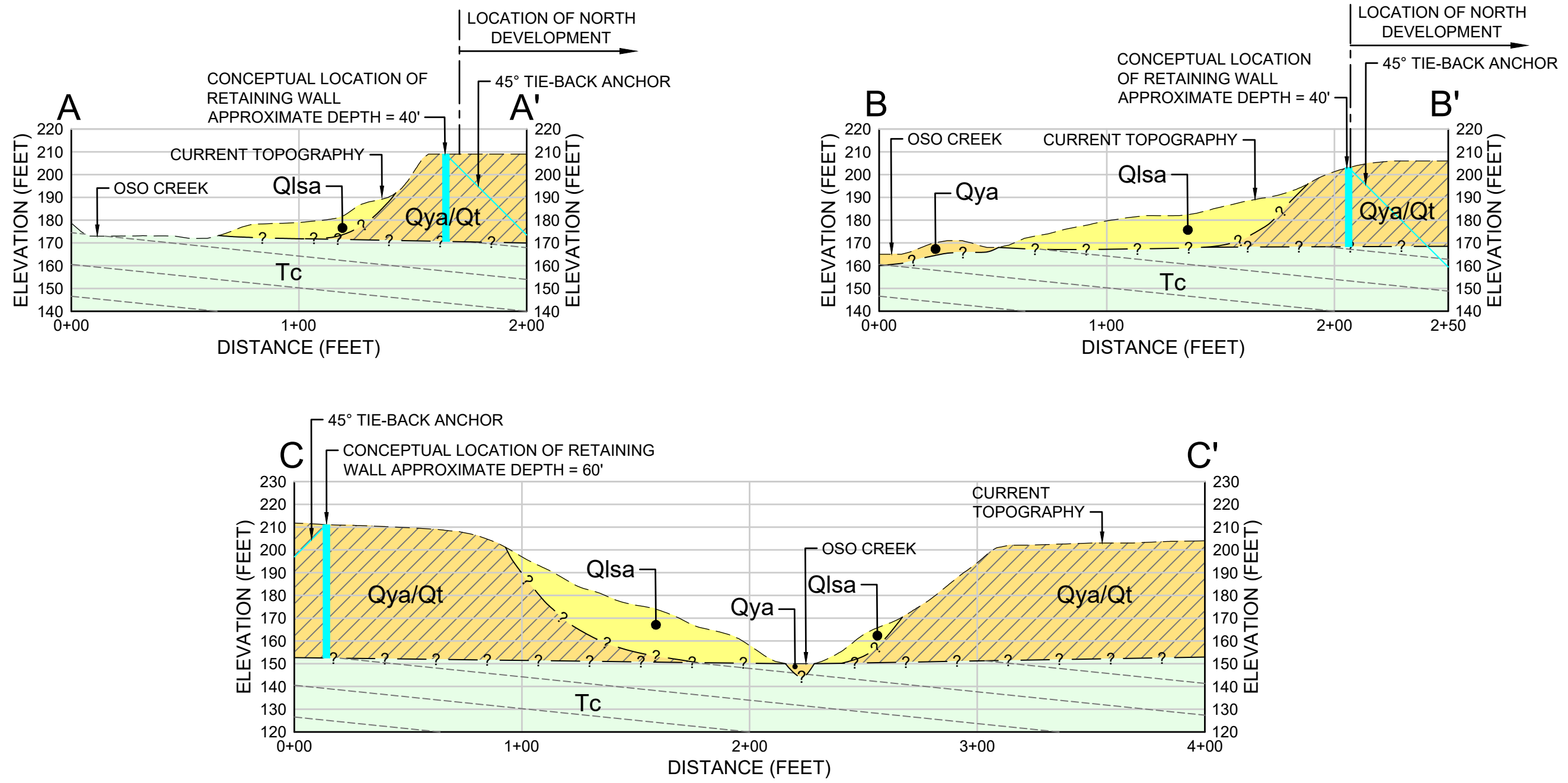
PROJECT NO: HL1813

MAY 2021

FIGURE

13

N:\CADD\ID\DUK\OSO CREEK\HL1813-01 GEOTECH EVALUATIONS\FIGURES\HL1813F004 - Last Saved by: SBerdy on 5/25/21



LEGEND

Qlsa	ACTIVE LANDSLIDE DEPOSITS
Qls	QUATERNARY LANDSLIDE DEPOSIT
Qya	QUATERNARY YOUNGER ALLUVIUM
Qt	QUATERNARY TERRACE DEPOSITS
Tc	TERTIARY CAPISTRANO FORMATION
? ?	INTERPRETED GEOLOGIC CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN



GEOLOGIC CROSS SECTIONS A-A', B-B' AND C-C' WITH THE PROPOSED WALL
OSO CREEK GEOTECHNICAL AND GEOMORPHIC EVALUATIONS
SAN JUAN CAPISTRANO, CALIFORNIA

FIGURE 14

PROJECT NO: HL1813

MAY 2021

Attachment A

Photo Log



Photo No.:	1	Latitude:	33.535929	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	View downstream from bridge over Oso Creek near end of lined channel						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	2	Latitude:	33.535517	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Downstream view at transition from vertical channel to 1 1/2 to 1 (H;V)						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	3	Latitude:	N/A	Longitude:	N/A	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Capistrano Formation exposed in left Bank of creek at this location for 100 feet, view looking east, Bedding dipping shallow to the west						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	4	Latitude:	33.533622	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Capistrano formation exposed in channel bottom dipping sub horizontal to the west						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	5	Latitude:	33.53363	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Bedding attitude in Capistrano formation in channel, sub horizontal to the west						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	6	Latitude:	33.533834	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	General overview of right bank at just down stream of end of riprap						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	7	Latitude:	33.53341	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Contact between Capistrano and young alluvium/terrace deposits at 4 feet from Creek elevation						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	8	Latitude:	33.53341	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Contact between Capistrano and young alluvium/terrace deposits at 4 feet from Creek elevation						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	9	Latitude:	33.53341	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Contact between Capistrano and young alluvium/terrace deposits at 4 feet from Creek elevation						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	10	Latitude:	33.533197	Longitude:	-117.677	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Standing on young alluvium approximate thickness 4 to 5 feet overlying Terrace Deposits/Capistrano formations, recent landslides in Capistrano formation evident in Creek channel right bank						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	11	Latitude:	33.533124	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Large area of a cut Bank erosion occurring in Terrace Deposits on the right bank						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	12	Latitude:	33.532553	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Left Bank area adjacent to railroad Looking down stream						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	13	Latitude:	33.531642	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	View looking west from left Bank exposed terrace deposits in slope						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	14	Latitude:	33.531537	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	View from Northern Property, Potential young alluvium in Left Bank						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	15	Latitude:	33.53154	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	View from Northern Property, potentially resistant material on the base of channel uncertain formation						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	16	Latitude:	33.531129	Longitude:	-117.677	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	View from Northern Property, Landslide debris exposed at tributary channel on Right bank						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	17	Latitude:	33.529255	Longitude:	-117.677	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Capistrano silt stone block in landslide debris						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	18	Latitude:	33.529242	Longitude:	-117.678	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Residual soils derieved from Capistrano formation potentially overlying Capistrano formation in right bank						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	19	Latitude:	33.529193	Longitude:	-117.678	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Formerly buried tank concrete reinforced undermined by erosion at left channel bank						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	20	Latitude:	33.52482	Longitude:	-117.678	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Site Overview from the South						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	21	Latitude:	33.525434	Longitude:	-117.677	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Potential resistant material at base of slope overhanging on left Bank,						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	22	Latitude:	33.525224	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	40- to 50-foot high slope in young alluvium with potential Capistrano exposed at the base in left bank						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



Photo No.:	23	Latitude:	33.524826	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Potential Capistrano formation visible within low flow channel at left bank overlain by young alluvium/.terrace deposits						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	24	Latitude:	33.524826	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Potential Capistrano formation visible within low flow channel at left bank overlain by young alluvium/.terrace deposits						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	25	Latitude:	33.524629	Longitude:	-117.676	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Young alluvium/Terrace Deposits in left channel bank at south end of property						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	26	Latitude:	33.525882	Longitude:	-117.683	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Exposure of weathered Capistrano bedrock showing shallow dip of bedding to the west						
Project:	Compass Energy Storage Project				City/State:	San Juan Capistrano, CA	



Photo No.:	27	Latitude:	33.525882	Longitude:	-117.683	Date:	April 27, 2021
Photographer:	Chris Conkle						
Subject:	Exposure of weathered Capistrano bedrock showing shallow dip of bedding to the west						
Project:	Compass Energy Storage Project			City/State:	San Juan Capistrano, CA		



March 16, 2023

via email: kcolson@lgcgeotechnical.com

LGC Geotechnical, Inc.
131 Calle Iglesia, Suite 200
San Clemente, California, 92672

Attention: Kevin Colson

Re: Soil Corrosivity Study
Saddleback Valley Compass Substation
San Juan Capistrano, California
HDR #23-0169LAB

Introduction

Field and laboratory tests have been completed for the Saddleback Valley Compass Substation project. Laboratory tests have been completed on two soil samples collected for the referenced project. The purpose of these tests was to determine the electrical resistivity of the soil for grounding design, and to determine whether the soils are likely to have deleterious effects on underground utility piping and concrete structures. HDR assumes that the collected samples are representative of the most corrosive soils at the site.

The proposed structure is a power substation. The site is located near the Saddleback Church Rancho Capistrano at 29251 Camino Capistrano in San Juan Capistrano, California, and the water table is reportedly 36 feet deep.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. HDR's recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, HDR will be happy to work with them as a separate phase of this project.

Soil Corrosivity Testing

Field Testing

The electrical resistivity of the soil was measured in place at one location with two orientations using the Wenner Four Pin Method per ASTM International (ASTM) G57. This procedure gives the average resistivity to a depth equal to the spacing between the pins. Approximate pin spacings of 0.5, 1, 1.5, 2, 3, 5, 7, 10, 20, 30, 50, 75, 100, 150, 200, and 300 feet were used so that variations with depth could be evaluated. During testing two different injection currents were used to check the consistency of the readings. Strata resistivities were calculated from resistance data using the Barnes Procedure.

The full set of test results are shown in the attached Table A1. Field testing locations are shown in the attached Figure A1.

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431 West Baseline Road, Claremont, CA 91711-1608
(909) 626-0967

Laboratory Testing

The electrical resistivity of each sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated samples was measured per ASTM G51. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327, ASTM D6919, and American Water Works Association (AWWA) Standard Method 2320-B.

The laboratory analyses were performed under HDR laboratory number 23-0169LAB. The full set of test results are shown in the attached Table A2.

Discussion

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil. A correlation between electrical resistivity and corrosivity toward ferrous metals is shown in Table 1.¹

Table 1: Soil Corrosivity Categories

Soil Resistivity (ohm-cm)	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,001 to 10,000	Moderately Corrosive
1,001 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

The average and stratum resistivities measured in the field were in the moderately corrosive to severely corrosive categories. Average resistivities decreased with increasing depth to approximately 50 – 75 feet, then increased with increasing depth.

Laboratory electrical resistivities were in the moderately corrosive category with as-received moisture. When saturated, the resistivities were in moderately corrosive to corrosive categories. One as-received resistivity was at its saturated value.

Soil pH values varied from 6.5 to 7. This range is slightly acidic to neutral.² These values do not particularly increase soil corrosivity.

¹ Romanoff, Melvin. *Underground Corrosion*, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.

² Romanoff, Melvin. *Underground Corrosion*, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.

The soluble salt content of the samples ranged from low to high.

Per ACI-318, the soil is classified as S0 with respect to sulfate concentration.³

Ammonium and nitrate were detected in low concentrations.

Tests were not made for sulfide and oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

In conclusion, this soil is classified as corrosive to severely corrosive to ferrous metals and negligible (S0) for sulfate attack on concrete.

Corrosion Control Recommendations

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion. The following recommendations are based on the evaluation of soil corrosivity described above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.
2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.
3. To prevent differential aeration corrosion cells, provide at least 2 inches of pipe bedding or backfill material all around metallic piping, including the bottom. Do not lay pipe directly on undisturbed soil.

Steel Pipe

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
 - a. At each end of the pipeline.

³ American Concrete Institute (ACI) 318-19 Table 19.3.1.1.

- b. At each end of all casings.
 - c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.
3. To prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection, electrically isolate each buried steel pipeline per NACE International (NACE) SP0286 from:
- a. Dissimilar metals.
 - b. Dissimilarly coated piping (cement-mortar vs. dielectric).
 - c. Above ground steel pipe.
 - d. All existing piping.
4. Choose one of the following corrosion control options:

OPTION 1

- a. Apply a suitable dielectric coating intended for underground use such as:
 - i. Polyurethane per AWWA C222 *or*
 - ii. Extruded polyethylene per AWWA C215 *or*
 - iii. A tape coating system per AWWA C214 *or*
 - iv. Hot applied coal tar enamel per AWWA C203 *or*
 - v. Fusion bonded epoxy per AWWA C213.
- b. Apply cathodic protection to steel piping as per NACE SP0169.

OPTION 2

As an alternative to the coating systems described in Option 1 and cathodic protection, apply a ¾-inch cement mortar coating per AWWA C205 or encase all buried portions of metallic piping so that there is a minimum of 3 inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of ASTM C150 cement. Install joint bonds, test stations, and insulated joints to provide for corrosion monitoring and/or the future application of cathodic protection if needed.

Ductile Iron Pipe

1. To prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection, electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE SP0286.
2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
 - a. At each end of the pipeline.
 - b. At each end of any casings.
 - c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.
4. Choose one of the following corrosion control options:

OPTION 1

- a. Apply a suitable coating intended for underground use such as:
 - i. Polyethylene encasement per AWWA C105; *or*
 - ii. Epoxy coating; *or*
 - iii. Polyurethane; *or*
 - iv. Wax tape.

NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.

- b. Apply cathodic protection to ductile iron piping as per NACE SP0169.

OPTION 2

As an alternative to the coating systems described in Option 1 and cathodic protection, encase all buried portions of metallic piping so that there is a minimum of 3 inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of ASTM C150 cement. Install joint bonds, test stations, and insulated joints to provide for corrosion monitoring and/or the future application of cathodic protection if needed.

Cast Iron Soil Pipe

1. Protect cast iron soil pipe with either a double wrap 4-mil or single wrap 8-mil polyethylene encasement per AWWA C105.
2. It is not necessary to bond the pipe joints or apply cathodic protection.
3. Provide 6 inches of clean sand backfill all around the pipe. Use the following parameters for clean sand backfill:
 - a. Minimum saturated resistivity of no less than 3,000 ohm-cm; *and*
 - b. pH between 6.0 and 8.0.
 - c. All backfill testing should be performed by a corrosion engineering laboratory.

Copper Tubing

1. Use Type K or Type L copper tubing as required by the applicable local plumbing code. Type M tubing should not be used for buried applications.⁴
2. Electrically insulate underground copper pipe from dissimilar metals and from above ground copper pipe with insulating devices per NACE SP0286. Sleeve copper pipe through footings and foundations to prevent pH concentration cells and prevent leaks caused by settlement.
3. Electrically insulate cold water piping from hot water piping systems.
4. Protect cold water pipe using all of the following measures:
 - a. Place cold water copper tubing in an 8-mil polyethylene sleeve or encase in double 4-mil thick polyethylene sleeves. Ensure that sleeves are intact and free of cuts, tears, punctures, or other damage.
 - b. Remove any construction debris, rocks, wood, or organic matter from the trench prior to backfill.
 - c. Bed and backfill with at least 2 inches of clean sand all around the tubing, including the bedding. Use the following parameters for clean sand backfill:
 - i. Minimum saturated resistivity of no less than 3,000 ohm-cm; and
 - ii. pH between 6.0 and 8.0.
 - iii. All backfill testing should be performed by a corrosion engineering laboratory.
 - d. Copper tubing for cold water can also be treated the same as for hot water.

⁴ 2022 California Plumbing Code (CPC), Section 604.3.

5. Hot water tubing may be subject to a higher corrosion rate. Protect hot copper tubing using one of the following measures:
 - a. Prevent soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing with PVC pipe with solvent-welded joints. Either seal the PVC pipe at both ends using ammonia- and methanol-free caulk, or terminate both ends above-grade in a manner that doesn't allow water to infiltrate; *or*
 - b. Applying cathodic protection per NACE SP0169. The amount of cathodic protection current needed can be minimized by coating the tubing with a suitable dielectric coating that is compatible with cathodic protection, such as Polyken 930.

Plastic and Vitrified Clay Pipe

1. No special corrosion control measures are required for plastic and vitrified clay piping placed underground.
2. Protect all metallic fittings and valves with wax tape per AWWA C217, or with epoxy and appropriately designed cathodic protection system per NACE SP0169.

Concrete Structures and Pipe

1. From a corrosion standpoint, any type of ASTM C150 cement may be used for concrete structures and pipe because the sulfate concentration is negligible (S0), from 0 to 0.10 percent. Use a minimum strength of 2,500 psi per applicable codes.^{5,6,7}
2. Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils due to the low chloride concentrations found on site.⁸ Limit the water-soluble chloride ion content in the concrete mix design to less than 0.3 percent by weight of cement.

Electrical Grounding Systems

1. Refer to Table A1 for average soil resistivity values to depth for design of electrical ground grids and ground rods for the proposed site.
2. All below grade connections should be copper-to-copper and coated to prevent moisture intrusion to the connections.
3. Conduct ground impedance testing after installation is complete.

⁵ 2021 International Building Code (IBC) which refers to American Concrete Institute (ACI) 318-19 Table 19.3.2.1

⁶ 2021 International Residential Code (IRC) which refers to American Concrete Institute (ACI) 318-19 Table 19.3.2.1

⁷ 2022 California Building Code (CBC) which refers to American Concrete Institute (ACI) 318-19 Table 19.3.2.1

⁸ Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65

Closure

The analysis and recommendations presented in this report are based upon data obtained from field and laboratory testing. This report does not reflect variations that may occur across the site or due to the modifying effects of construction. If variations appear, HDR should be notified immediately so that further evaluation and supplemental recommendations can be provided.

HDR's services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
HDR Engineering, Inc.



Carlos Jauregui
Water/Wastewater Coordinator



Steven Pierce, PE
Materials Engineer

Enc: Table A1 – Soil Resistivity Field Tests

Table A2 – Laboratory Tests on Soil Samples

Figure A1 – Saddleback Valley Compass Substation Wenner Four Pin Test Locations



Table A1 - Soil Resistivity Field Tests

LGC Geotechnical, Inc.
2/23/2023
HDR #10279415
San Juan Capistrano, CA

LOCATION	DEPTH (feet)	PIN DEPTH (inches)	VOLTAGE (mV)	CURRENT (mA)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
R1	0.5	2	797	22.4	35.6	● 3,410	● 3,410
	NW-SE Orientation						● 2,180
Grass	1	2	321	23.1	13.9	● 2,660	● 2,220
	1.5	2	204	23.5	8.69	● 2,500	● 2,480
52°F	2	3	156	24.0	6.51	● 2,490	● 2,190
16V	3	4	101	24.4	4.15	● 2,380	● 1,600
128 Hz	5	6	52.2	25.1	2.08	● 1,990	● 3,810
10:00 AM	7	6	44.5	25.9	1.72	● 2,310	● 1,160
	10	12	24.6	26.5	0.930	● 1,780	● 1,030
	20	12+	9.14	26.9	0.340	● 1,300	● 1,050
	30	12+	5.78	27.5	0.210	● 1,210	● 2,010
	50	12+	4.22	28.1	0.150	● 1,440	● 4,670
	75	12+	3.72	28.6	0.130	● 1,870	● 7,470
	100	12+	3.7	30.8	0.120	● 2,300	● 7,150
	150	12+	3.35	32.4	0.103	● 2,970	● 12,270
	200	12+	3.54	37.0	0.096	● 3,660	● 9,350
	300	12+	2.92	38.8	0.080	● 4,600	

CORROSIVITY LEGEND (FERROUS METALS)			
● Mildly	● Moderately	● Corrosive	● Severely

**Table A1 - Soil Resistivity Field Tests**

LGC Geotechnical, Inc.
2/23/2023
HDR #10279415
San Juan Capistrano, CA

LOCATION	DEPTH (feet)	PIN DEPTH (inches)	VOLTAGE (mV)	CURRENT (mA)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
R2	0.5	2	602	26.1	23.1	● 2,210	● 2,210
	NE-SW						● 2,750
Grass	1	2	311	24.4	12.8	● 2,450	● 1,470
	1.5	2	170	24.4	6.97	● 2,000	● 1,930
52°F	2	3	130	25.1	5.18	● 1,980	● 2,200
16V	3	4	93.8	26.3	3.57	● 2,050	● 1,890
128 Hz	5	6	56.4	27.3	2.07	● 1,980	● 1,690
12:00 PM	7	6	44.1	31.3	1.41	● 1,890	● 1,570
	10	12	29.3	31.4	0.930	● 1,780	● 810
	20	12+	8.88	30.8	0.290	● 1,110	● 450
	30	12+	3.79	30.4	0.130	● 750	● 1,120
	50	12+	2.95	31.4	0.090	● 860	● 540
	75	12+	1.49	32.7	0.050	● 720	Na ^a
	100	12+	2.29	34.7	0.070	● 1,340	● 4,020
	150	12+	2.25	36.5	0.060	● 1,720	Na ^a
	200	12+	2.39	39.6	0.060	● 2,300	Na ^a
	300	12+	2.5	40.9	0.060	● 3,450	Na ^a

^a Barnes layer equation not applicable for this soil geometry

CORROSIVITY LEGEND (FERROUS METALS)			
● Mildly	● Moderately	● Corrosive	● Severely



Table A2 - Laboratory Tests on Soil Samples

HDR, Claremont
Saddleback Valley Community Church
HDR Lab #23-0169LAB
14-Mar-23

Sample ID

			B-1	B-2
Resistivity				
as-received	ohm-cm		2,680	2,720
saturated	ohm-cm		1,120	2,720
pH			6.5	7.0
Electrical				
Conductivity	mS/cm		0.52	0.17
Chemical Analyses				
Cations				
calcium	Ca ²⁺	mg/kg	336	115
magnesium	Mg ²⁺	mg/kg	62	12
sodium	Na ¹⁺	mg/kg	46	19
potassium	K ¹⁺	mg/kg	151	56
ammonium	NH ₄ ¹⁺	mg/kg	4.1	ND
Anions				
carbonate	CO ₃ ²⁻	mg/kg	ND	ND
bicarbonate	HCO ₃ ¹⁻	mg/kg	979	293
fluoride	F ¹⁻	mg/kg	0.9	1.5
chloride	Cl ¹⁻	mg/kg	17	5.2
sulfate	SO ₄ ²⁻	mg/kg	107	31
nitrate	NO ₃ ¹⁻	mg/kg	0.6	0.6
phosphate	PO ₄ ³⁻	mg/kg	55	14
Other Tests				
sulfide	S ²⁻	qual	na	na
Redox		mV	na	na

Resistivity per ASTM G187, pH per ASTM G51, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Figure A1
Saddleback Valley Compass Substation Wenner Four Pin Test

Legend

 LGC Geotech Compass BESS 4-pin



SEDIMENT TRANSPORT ANALYSIS FOR THE COMPASS ENERGY STORAGE PROJECT

March 21, 2024



A handwritten signature in black ink, appearing to read "Wayne W. Chang", positioned above a horizontal line.

Wayne W. Chang, MS, PE 46548

ChangConsultants

Civil Engineering • Hydrology • Hydraulics • Sedimentation

**P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760**

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APPENDICES

A. FLUVIAL-12 *Users Manual* and Results.

MAP POCKET

FLUVIAL-12 Work Map

INTRODUCTION

The Compass Energy Storage Project will be developed along the west side of Oso Creek in the city of San Juan Capistrano within southern Orange County. The project will be within the Northern Development area shown on Geosyntec's Site Plan Map (see Figure 1). The site is approximately a mile south of Avery Parkway. The Metrolink rail line and Interstate 5 are along the east side of Oso Creek opposite the site. Oso Creek adjacent to the site is naturally-lined and has experienced significant vertical scour, lateral erosion, and bank collapses over time. This segment is approximately 1,000 feet downstream of the concrete-lined Oso Creek channel.

Development has altered Oso Creek and its watershed. A significant portion of Oso Creek above the site has been concrete-lined. Figure 2 contains a delineation of the watershed tributary to the site using the USGS Streamstats program. Figure 2 shows that the watershed is mostly developed and portions have been dammed. The channel lining, development, and damming have significantly reduced the natural sediment supply and impacted sediment transport within Oso Creek. The impervious surfaces and landscaping have eliminated the sediment supply and transport from the pre-development undisturbed ground surfaces. As a result, creek flows now have a sediment transport deficiency along the site. The creek flows make up for the deficiency as they seek an equilibrium condition by removing sediment from the natural channel along, above, and below the site. This has caused the Oso Creek scour and lateral erosion that have occurred along the site.

Ongoing scour and lateral erosion must be considered in the project design. This report contains a sediment transport analysis of Oso Creek to predict the ongoing changes. The project proposes to setback from the westerly Oso Creek bank to protect against lateral erosion from reaching the development area. The sediment transport analysis results in conjunction with soil stability are being used to establish the setback.

SEDIMENT TRANSPORT ANALYSIS

Natural stream areas will carry a sediment load, so can experience scour (channel bed lowering or lateral widening) and deposition (channel bed fill) as the stream attempts to balance the load and strive towards an equilibrium condition. The FLUVIAL-12 model was used to assess sediment transport and predict associated changes. The FLUVIAL-12 model is covered in the following subsections.

FLUVIAL-12 Model

Stream hydraulics, sediment transport, and channel changes may be studied through physical modeling, mathematical modeling, or both. Physical modeling has been relied upon traditionally for stream projects, but mathematical modeling has become popular as this capability expands rapidly. The FLUVIAL-12 program is a mathematical model that has been formulated and developed since 1972 for water and sediment routing in natural and improved streams. The combined effects of flow hydraulics, sediment transport, and stream channel changes are simulated for given flow events and periods.

The model simulates the inter-related changes in channel-bed profile and channel width based upon a stream's tendency to seek uniformities in sediment discharge and power expenditure. At each time step, scour and fill in a channel bed are computed based on the spatial variation in sediment discharge along the channel. Channel-bed corrections for scour and fill will reduce the non-uniformity in sediment discharge. Width changes are also made at each time step, resulting in a movement toward uniformity in power expenditure along the channel. Because the energy gradient is a measure of the power expenditure, uniformity in power expenditure also means a uniform energy gradient or linear water surface profile. A creek channel may not have a uniform power expenditure or linear water-surface profile, but it is constantly adjusting itself toward that direction. The FLUVIAL-12 model was calibrated using twelve sets of field data. Such calibration studies are listed in the FLUVIAL-12 *Users Manual* included in Appendix A. Most of the calibration studies were peer-reviewed.

FLUVIAL-12 is applicable to ephemeral streams, streams with minor base flow as well as streams with long-term, continuous flow. Because dynamic changes have transient behavior, ephemeral streams require more complicated model formulation techniques. Stream impacts simulated by the FLUVIAL-12 model include channel bed scour and fill (aggradation and degradation), width variation, and bed topography changes induced by channel curvature (i.e., bend scour associated with channel curvature). These inter-related changes are coupled at individual time steps over an entire flow event or series of flow events. While the model is applicable for erodible channels, physical constraints such as bank protection or armoring, grade-control structures, bedrock outcroppings, etc. may also be specified. Furthermore, the erodible material limits, bank erodibility, angle of repose, and channel roughness (e.g., channel bed and bank material, vegetation density, etc.) are included. Typical model applications include evaluations of bank protection, bridge scour, sand and gravel mining, channelization, sediment delivery, etc.

FLUVIAL-12 is an *erodible-boundary* model. An erodible-boundary model is different from an erodible-bed model such as HEC-6, HEC-6T, and the sediment transport module in HEC-RAS in some or all of following ways:

1. An erodible-bed model does not simulate channel width changes. Since channel-bed profile changes are closely related to width changes, these should not be separated.
2. An erodible-bed model assumes uniform channel bed profile changes in the erodible zone, i.e., all cross-section points adjust up and down by an equal amount during aggradation and degradation. Actual bed changes are not uniform and, therefore, may not be accurately simulated by an erodible-bed model.
3. An erodible-bed model does not consider channel curvature. In reality, bed topography is highly non-uniform in a curved channel, especially during high flow.
4. An erodible zone needs to be specified at cross-sections in an erodible-bed model. The model does not determine the extent of channel erosion. The user has to

delineate the erodible portion of the channel bed. On the other hand, the erosion boundary is computed and provided by the FLUVIAL-12 model, and the boundary changes with discharge and time.

5. Sediment inflow into the channel reach needs to be specified for other models. This requires a sediment rating curve, which is typically not available for stream channels. In the FLUVIAL-12 model, the sediment inflow may be specified or it may be computed based on the upstream cross-section flow hydraulics.
6. FLUVIAL-12 has been tested and calibrated with field data from several streams in both semi-arid and humid regions. An erodible-bed model may not be calibrated with field data of natural streams.

For the reasons described above, the FLUVIAL-12 model is appropriate for sediment transport analysis of Oso Creek along the project site. The following section describes the current model input.

FLUVIAL-12 Input

The FLUVIAL-12 model uses cross-sections spaced along the study reach to model the channel geometry and physical features. The FLUVIAL-12 cross-sections are delineated on the FLUVIAL-12 Work Map in the map pocket and should extend far enough upstream and downstream from the area of interest to consider the adjacent sediment transport influences. As a result, the cross-sections extend approximately 1,000 feet upstream of the site at the southerly end of the concrete-lined channel to over 2,000 feet downstream of the site. The cross-sections were created from 1-foot contour interval topographic mapping and are looking in the downstream direction, i.e., the site is on the right side of the cross-sections.

The FLUVIAL-12 Work Map indicates that the study reach is not straight, but contains several bends. Vertical and lateral scour tend to increase along the outside of a bend (i.e., bend scour) since transverse flow will occur and exert greater forces the bend. The curvature at each bend was determined from the topographic mapping and added to the appropriate cross-sections.

Portions of the east bank of Oso Creek along the site are lined with riprap. The riprap was observed during a site visit and has been mapped on LGC Geotechnical, Inc.'s Geotechnical Map. The riprap is modeled as non-erodible in the associated FLUVIAL-12 cross-sections.

FLUVIAL-12 also requires a flow hydrograph, bed material gradations, an appropriate sediment transport formula, and sediment inflow. The following paragraphs discuss these input parameters.

The FLUVIAL-12 model includes flow hydrograph data. A flow hydrograph represents the relationship between flow rate (cubic feet per second) versus time (hours) for a given flood (e.g., the 100-year flood). Since channel behavior as the natural Oso Creek watercourse attempts to reach an equilibrium condition is desired, the FLUVIAL-12 analysis was performed using a long-term flood series hydrograph. A 100-year timeframe was used since design standards are typically based on a 100-year storm. The definition of flood frequency indicates that over a 100-

year period Oso Creek should experience, statistically, one event that meets or exceeds the 100-year peak flow, two events that meet or exceed the 50-year peak flow, four events that meet or exceed the 25-year peak flow, 10 events that meet or exceed the 10-year peak flow, 20 events that meet or exceed the 5-year peak flow, etc. Smaller events have limited discharge and hence transport capacity. Consequently, events smaller than the 5-year have been excluded. The sequence of flood events occurs randomly and cannot be predicted, but the order of events does not significantly affect the results pertaining to long-term sediment delivery. Figure 3 contains the flood series hydrographs used for the Oso Creek simulation. In a flood series, the overall flood duration is shortened by connecting the hydrographs back-to-back, i.e., there is no need to model intermediate time periods with no flow.

The peak flow rates used in the flood series were obtained from the following sources provided by Orange County Public Works. The 100-year flow rate at the downstream end of the concrete-lined channel is 6,500 cubic feet per second (cfs) per the Oso Creek Channel Facility No. L03 plans (Drawing No. L03-101-1A). This is supported by Rivertech's May 1987 report, *Oso Creek Channel Facility No. L03 Hydrology Study*, which determined 6,500 cfs near the downstream end of the study reach. The lesser flow rates were estimated from the 100-year flow rate and 5-, 10-, 25-, 50-year Oso Creek flow rates from PACE's January 2020 report, *Lower San Juan Creek and Trabuco Creek Invert Stabilization Master Plan*. Table 1 summarizes PACE's flow rates. The 6,500 cfs within the study reach is 17.7 percent greater than PACE's 100-year flow rate. The 5- to 50-year flow rates used for the study were determined by increasing PACE's data by 17.7 percent.

Source	5-year	10-year	25-year	50-year	100-year
PACE Report	1,611	3,024	4,119	4,809	5,524
Adjusted for FLUVIAL-12	1,896	3,558	4,847	5,659	6,500

Table 1. Flood Series Flow Rates

The channel bed material composition must be input since sediment transport is dependent on bed material. Smaller grain sizes are more readily transported than larger grain sizes. To consider time-dependent and non-equilibrium sediment transport, the bed material at each cross-section is modeled in FLUVIAL-12 as five size fractions based on a grain-size distribution. Each size fraction is represented by its geometric mean. LGC Geotechnical, Inc. obtained three channel bed sediment samples along the study reach and provided the gradations included in Figures 4 (Sample G-1), 5 (Sample G-2), and 6 (Sample G-3). Sample G-1 is the northern sample and at the upstream end of the study reach. Sample G-2 is the middle sample and along the site. Sample G-3 is the southern sample and taken below the study reach. The grain size information from the three samples was input into the FLUVIAL-12 model.

For each size fraction, sediment transport capacity is computed using a sediment-transport formula. The FLUVIAL-12 model allows selection of the following sediment formulas: (1) Engelund-Hansen formula, (2) Yang's unit stream power formula, (3) Graf's formula, (4) Ackers-White formula, (5) Parker, et al. formula for gravel, and (6) Meyer-Peter and Muller bed load formula. Extensive comparison of field measurement with the results using these formulas has been performed previously. Based on these comparisons, it has been determined the Engelund-

Hansen formula gives the best correlation between model and actual results for ephemeral streams in semi-arid to arid regions. The Engelund-Hansen formula was selected for the study for the following reasons:

- (1) The selection was based on the most extensive evaluation of formulas made by Brownlie (see Figure 7); the Engelund-Hansen formula has the best correlation with field data.
- (2) The Engelund-Hansen formula was used in many studies in this region. The results of these studies were verified by field data.
- (3) In a calibration study of the FLUVIAL-12 model, the results generated by the Engelund-Hansen formula can be correlated with the measured channel changes in the San Dieguito River during the 1993 flood.

Engelund and Hansen (1967) applied Bagnold's stream power concept and the similarity principle to obtain their sediment transport equation:

$$f' \phi = 0.1 (\tau^*)^{5/2} \quad (1)$$

$$\text{with } f' = \frac{2gRS}{U^2} \quad (2)$$

$$\phi = \frac{q_s}{\gamma_s [(s-1)gd^3]^{1/2}}, \quad \tau^* = \frac{\tau_o}{(\gamma_s - \gamma)d} \quad (3)$$

where f' is the friction factor, d is the median fall diameter of the bed material, ϕ is the dimensionless sediment discharge, s is the specific gravity of sediment, and τ^* is the dimensionless shear stress or the Shields stress. Substituting Equations. 2 and 3 into Equation 1 yields:

$$C_s = 0.05 \frac{s}{s-1} \frac{US}{[(s-1)gd]^{1/2}} \frac{RS^{1/2}}{(s-1)d} \quad (4)$$

where $C_s (= Q_s/Q)$ is the sediment concentration by weight. This equation relates sediment concentration to the U - S product (which is the rate of energy expenditure per unit weight of water) and the R - S product (which is the shear stress). Strictly speaking, the Engelund-Hansen formula should be applied to streams with a dune bed in accordance with the similarity principle. However, it can be applied to upper flow regime with particle size greater than 0.15 mm without serious error. Therefore, the Engelund-Hansen formula was used for the analyses.

Sediment inflow to the upstream end of the study reach can be specified or computed based on the upstream cross-section flow hydraulics. The watershed development seen in Figure 2 has significantly reduced the sediment supply to the study reach due to the impervious surfaces, landscaping, and damming. As a result, the sediment inflow was set to a small value.

FLUVIAL-12 Results

The FLUVIAL-12 results are included in Appendix A and presented graphically. The first section of results in Appendix A contains the input data (modeling parameters, hydrograph(s), size fractions, and cross-sections). This is followed by tabulation of the initial bed material composition at each cross-section. Next, summary output is provided for each cross-section at a variety of time periods in the hydrograph. The summary output lists the water surface elevation (W.S.ELEV.), flow width at the surface (WIDTH), flow depth (DEPTH), flow discharge (Q), mean flow velocity (V), energy gradient (SLOPE), median sediment load size (D_{50}), ratio of bed material discharge to flow discharge (Q_s/Q), Froude number (FR), and sediment weight passing a cross-section since the beginning of the simulation (SED. YIELD). Within the summary output is detailed output for each cross-section at the peak and end of the flood series hydrograph. The detailed output provides the vertical (Z) and horizontal (Y) coordinate of each cross-section point as well as the elevation change during the current time step (DZ) and the total accumulated elevation change since the beginning of the simulation (TDZ).

Figure 8 presents the sediment delivery results graphically. Sediment delivery along the study reach is graphed at the peak of the flood series (i.e., at the peak 100-year flow rate within the series) as well as at the end of the flood series. The sediment delivery at the upstream study reach above cross-section 3990 is constant (horizontal) since this segment is armored and non-erodible. Sediment is not deposited or removed in this segment. The sediment delivery increases below cross-section 3990. The increasing curves in the downstream direction indicate that sediment is being removed from the channel as flow continues downstream, i.e., Oso Creek flow will continue to create long-term scour in the channel.

Figure 9 illustrates the longitudinal changes in the Oso Creek channel bed profile. The initial channel bed is shown along with the bed profile at the peak and end of the flood series. The peak water surface elevation is also included. The channel bed profiles are constant above cross-section 3990 since this segment is armored and non-erodible. On the other hand, long-term scour is predicted to continue in the downstream reach including along the site. The site extends from cross-section 2120 to 3837, so from over 6 feet to approximately 27 feet of vertical scour can occur.

Figures 10 through 31 are individual cross-section plots along the project. The black lines represent the existing channel cross-section, while the green lines reflect the ultimate cross-sectional changes near the end of the long-term flood series event. The shaded area represents flow within the cross-section near the end of the event. The cross-sections are looking in the downstream direction, so the project is along the right side of each cross-section. The vertical scour and longitudinal erosion are evident in the cross-sections and are of varying degrees.

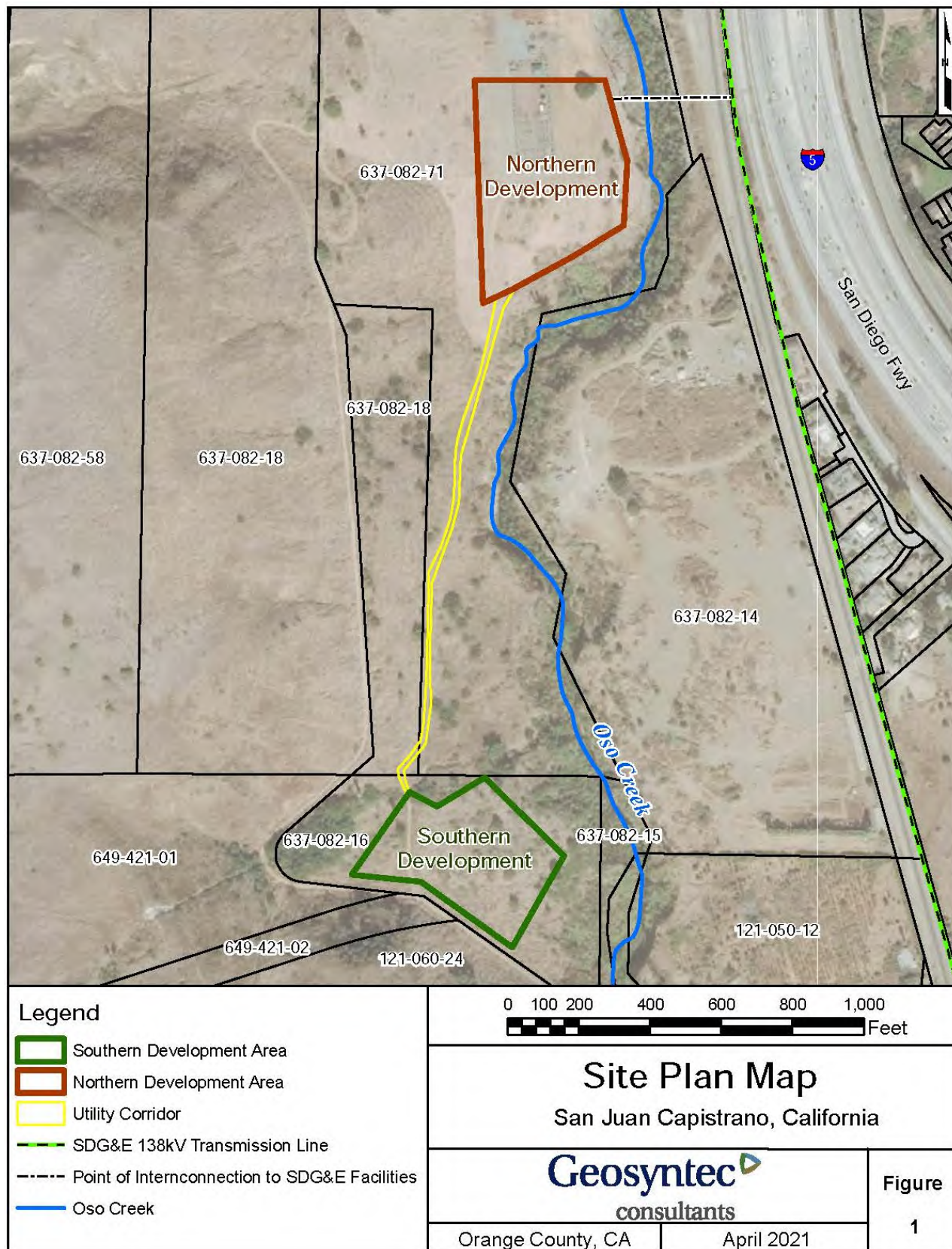
The results indicate that a scour countermeasure, such as the proposed setback, should be incorporated into the design to protect the project from long-term Oso Creek vertical scour and lateral erosion. The setback will prevent lateral erosion from reaching the project. Table 2 summarizes the scour elevations at the cross-sections along the site.

Cross-Section	Scour Elevation, feet
2047	154.0
2120	154.3
2199	154.3
2302	153.1
2430	154.1
2586	156.3
2633	157.5
2730	158.0
2798	158.9
2879	158.8
2953	159.6
3053	160.0
3143	159.0
3236	158.9
3331	158.5
3392	158.2
3502	158.0
3589	158.0
3681	158.0

Table 2. Scour Elevations along Project Site.

CONCLUSION

A long-term sediment transport analysis has been performed for Oso Creek. The historic, natural watershed is essentially fully developed based on a review of aerial photography within the watershed. Development has removed much of the natural sediment supply causing significant changes along natural portions of Oso Creek. This is evidenced by the vertical scour, lateral erosion, and bank collapses within Oso Creek along the Compass Energy Storage Project site. The analysis in this report indicates that the scour and erosion will be ongoing in the long-term due to the sediment deficiency. A setback is proposed between the project and westerly channel bank to protect the project. The setback will consider the erosion/scour as well as geotechnical stability.



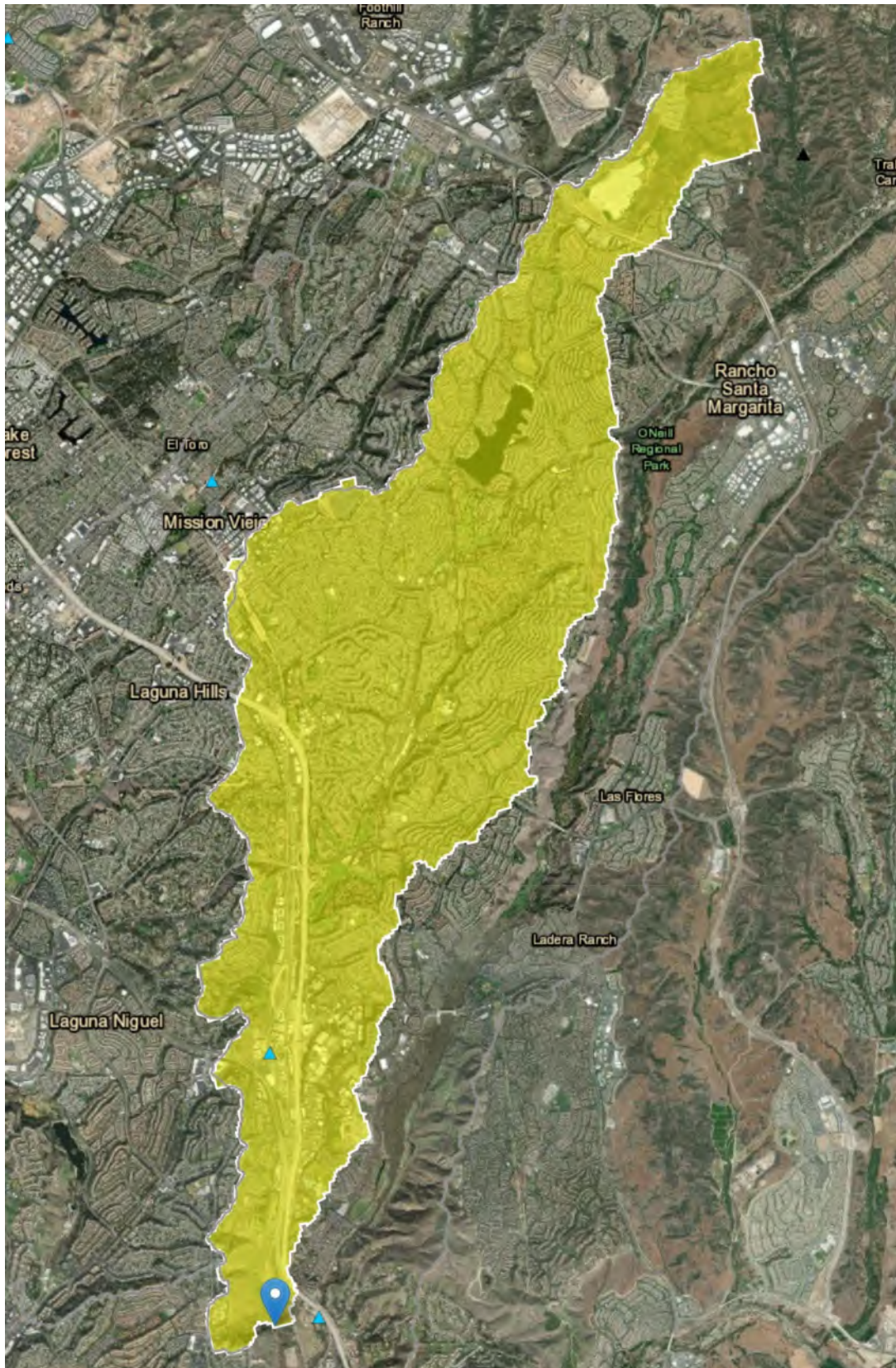


Figure 2. Developed Oso Creek Watershed Tributary to Study Reach

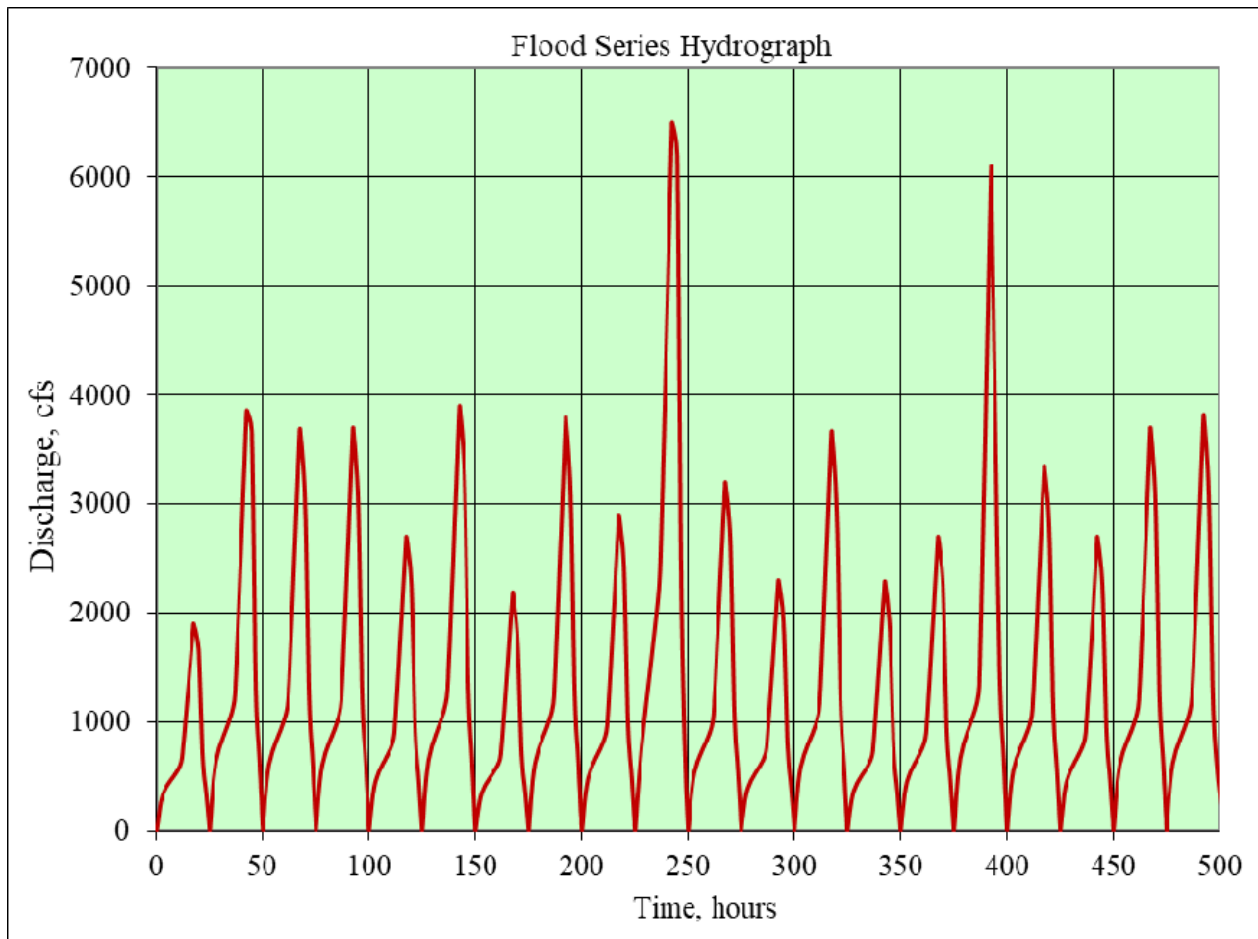
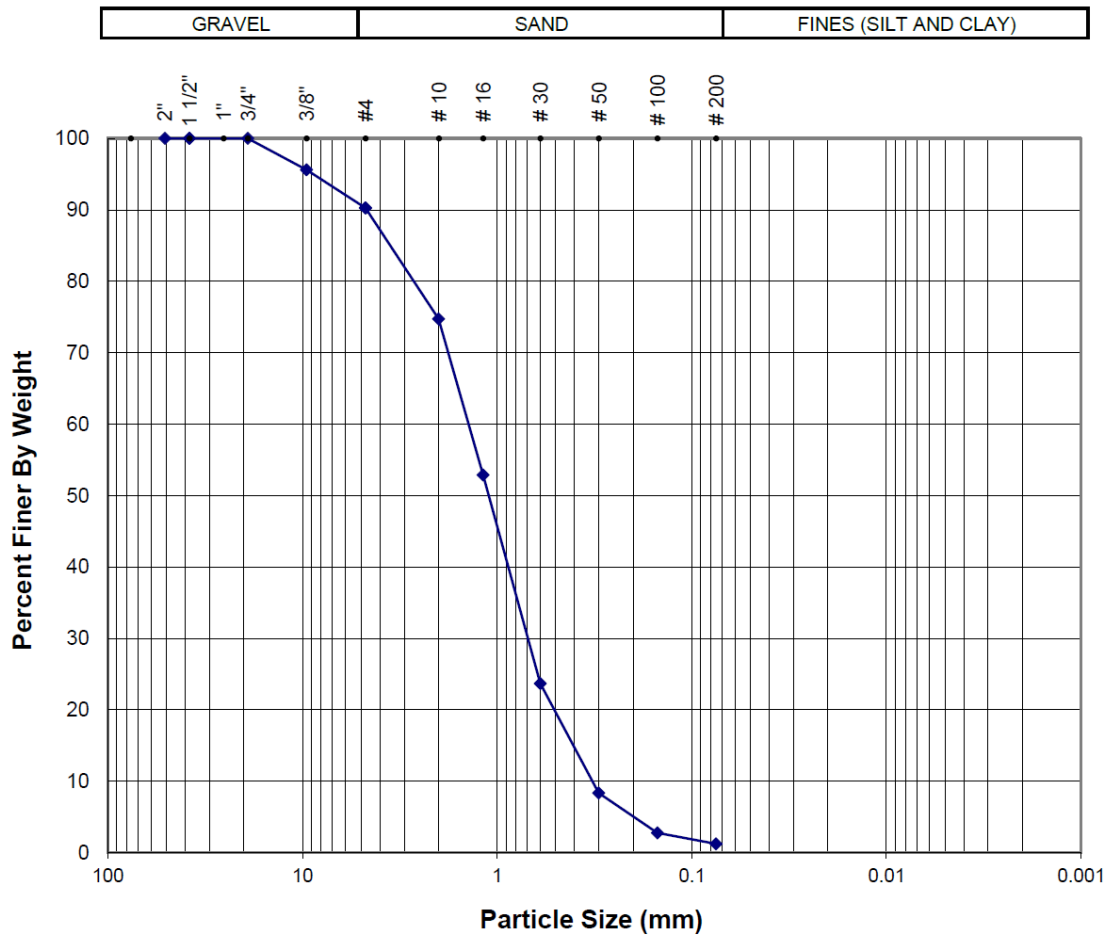


Figure 3. Flood Series Hydrograph (5- to 100-Year Storm Events)



Location:	Sample No.:	Depth	Soil Type	Gravel (%)	Sand (%)	Fines (%)
Northern Sample	G-1	Creek Bottom	SP	10	89	1

Sample Description: Dark gray poorly graded SAND



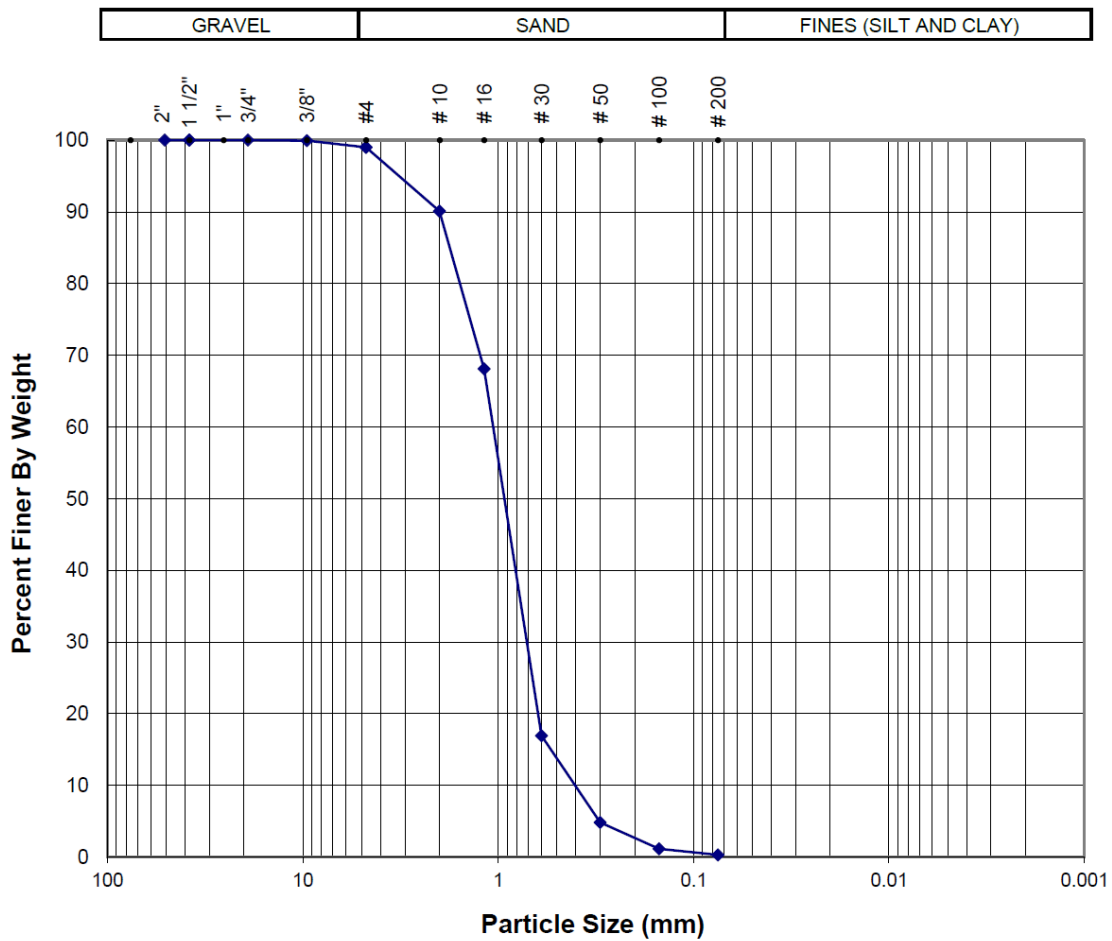
PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 22011-01

Date: Feb-23

Compass, San Juan Capistrano

Figure 4. Soil Sample G-1 (Northern)



Location:	Sample No.:	Depth	Soil Type	Gravel (%)	Sand (%)	Fines (%)
Southern Sample	G-3	Creek Bottom	SP	1	99	0

Sample Description: Gray poorly graded SAND

	PARTICLE SIZE ANALYSIS (ASTM D 422)	Project Number: 22011-01
		Date: Feb-23
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Figure 6. Soil Sample G-3 (Southern)

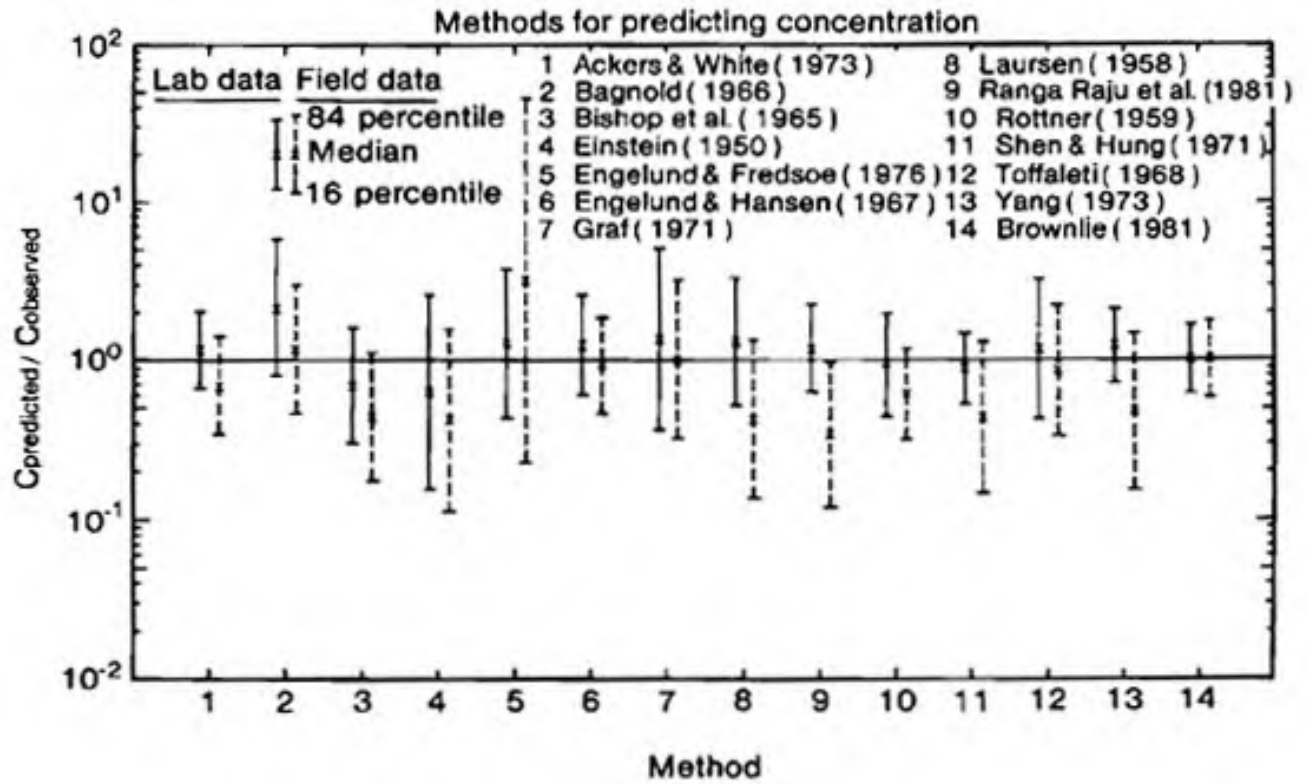


Figure 7. Evaluation of Sediment Transport Formulas by Brownlie

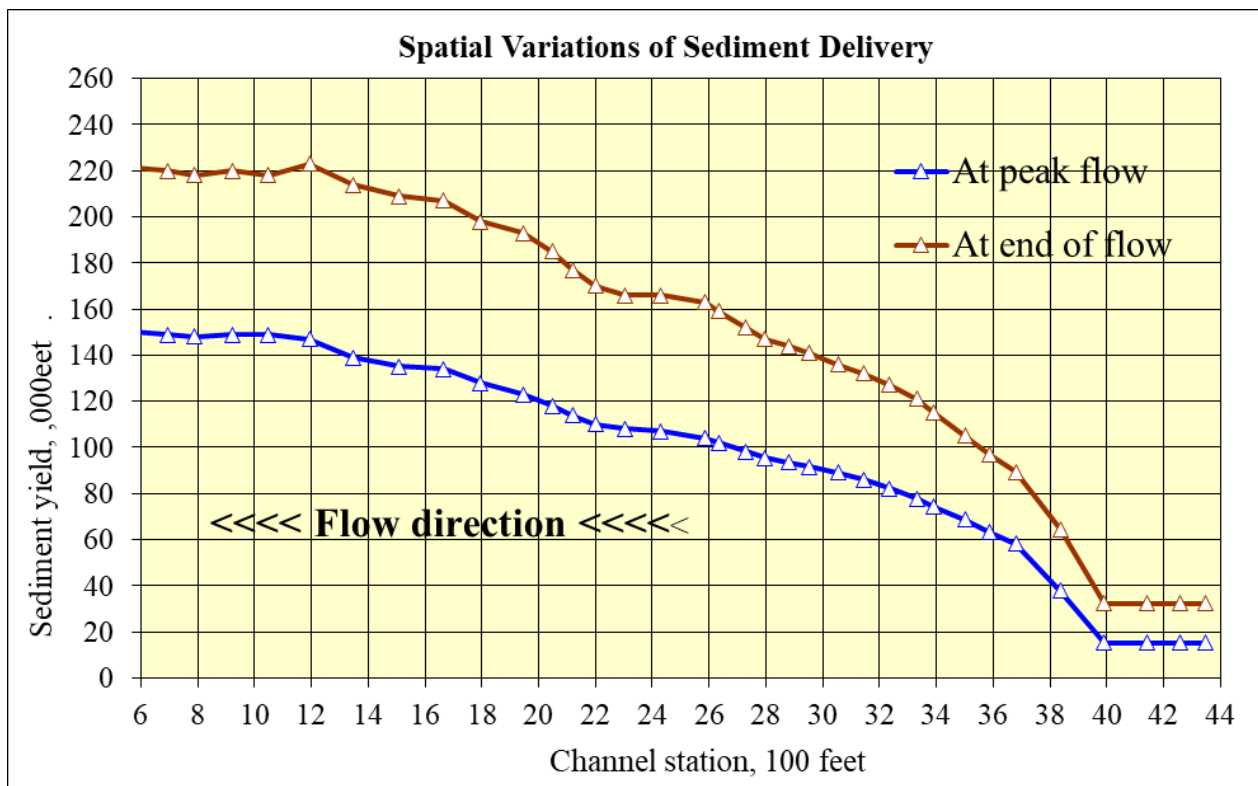


Figure 8. Sediment Delivery during Flood Series

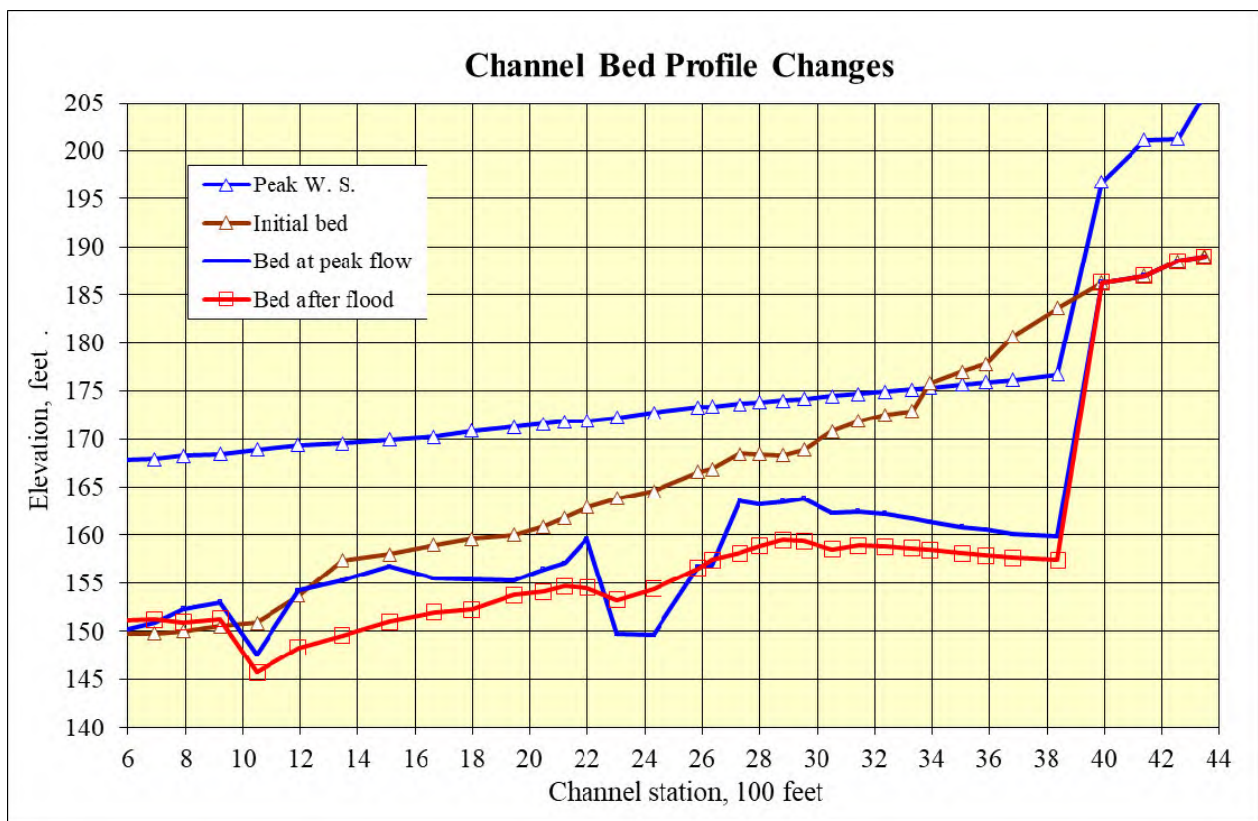


Figure 9. Channel Bed Profile Changes

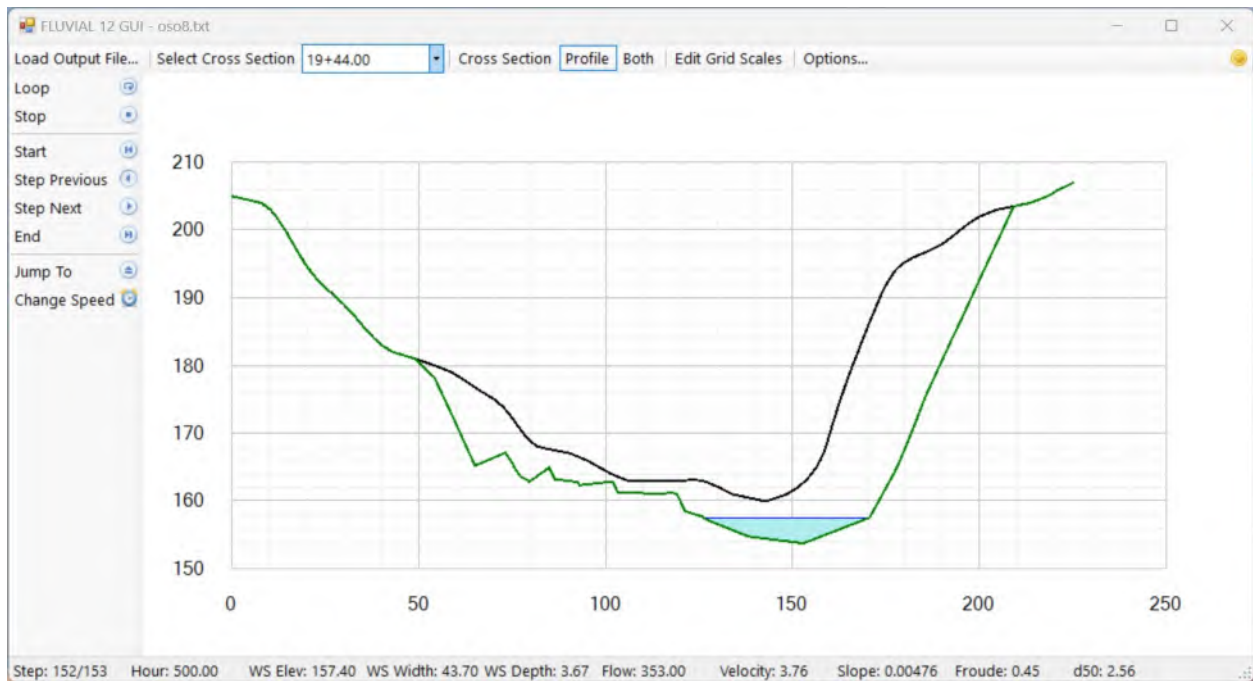


Figure 10. Cross-section 1944

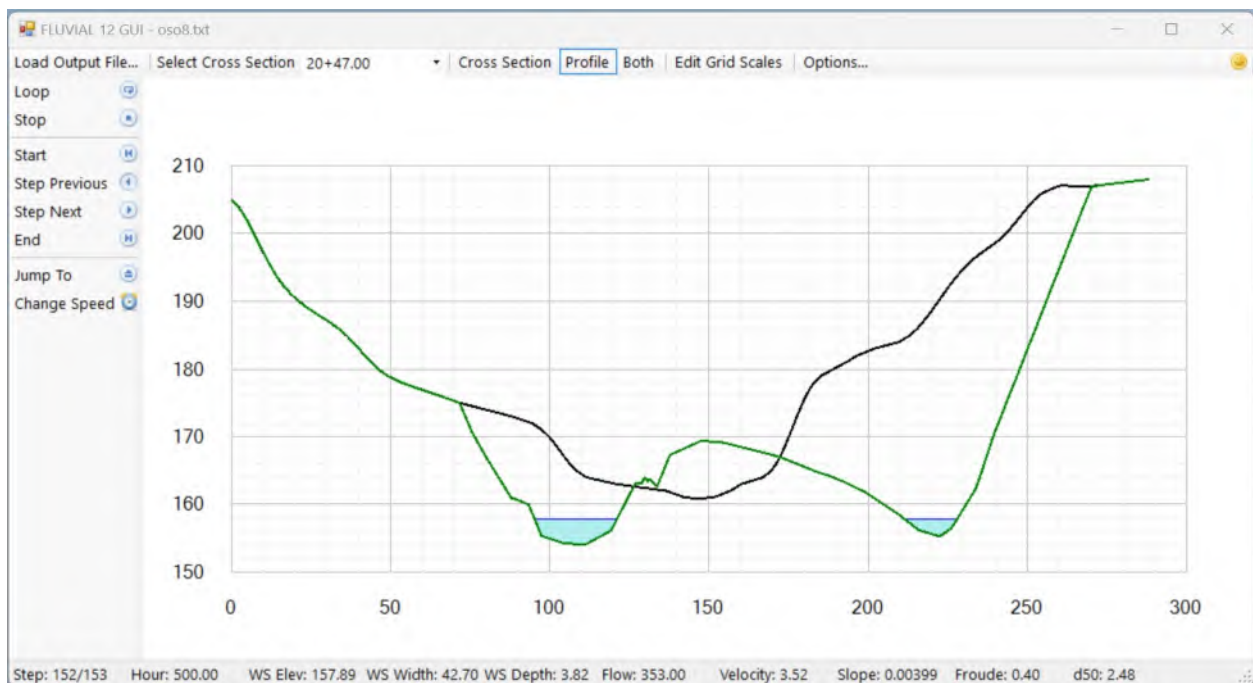


Figure 11. Cross-section 2047

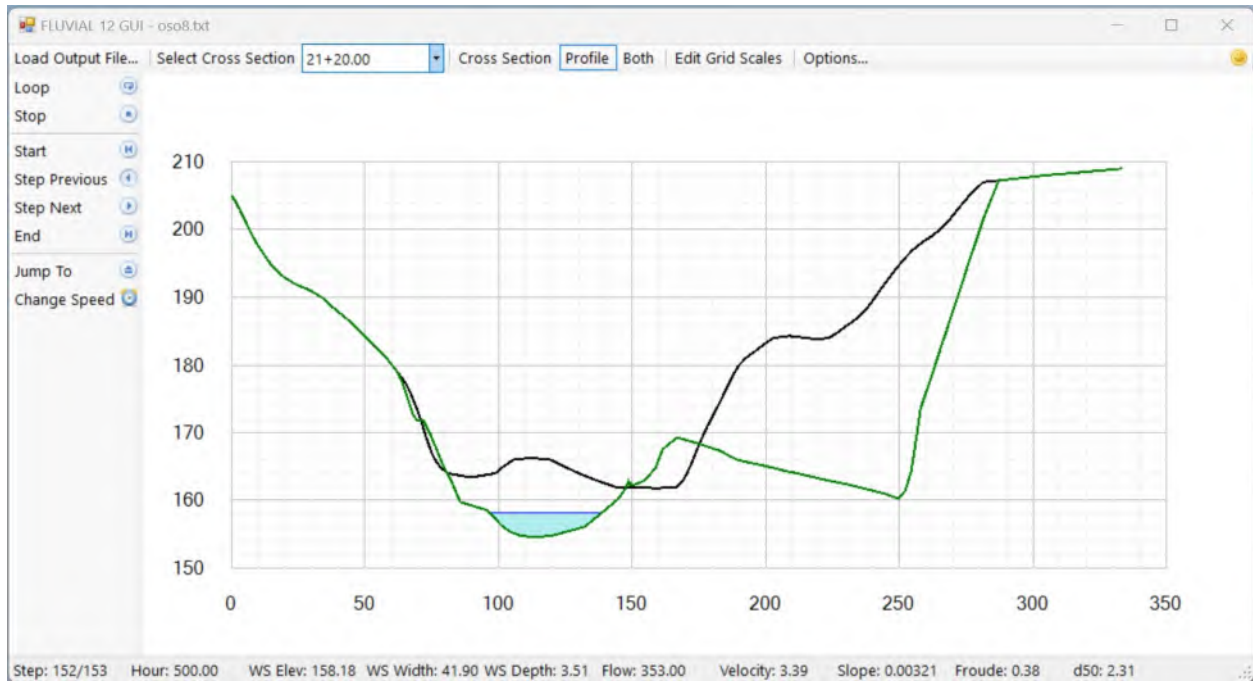


Figure 12. Cross-section 2120

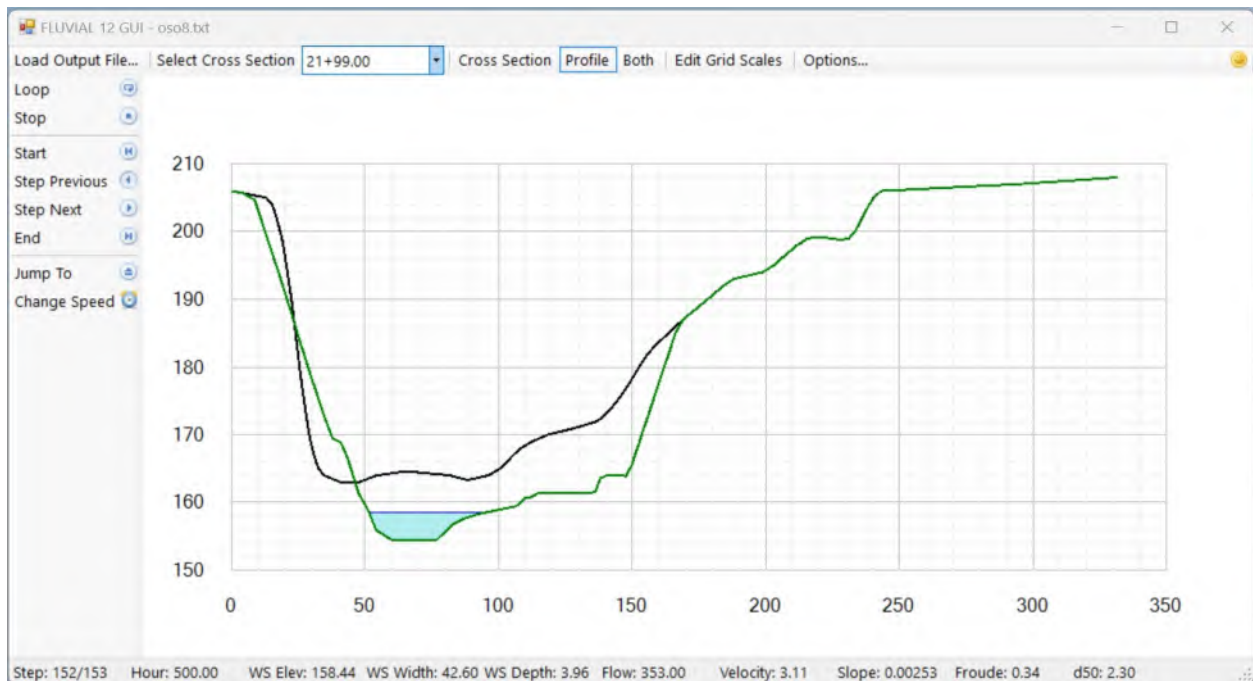


Figure 13. Cross-section 2199

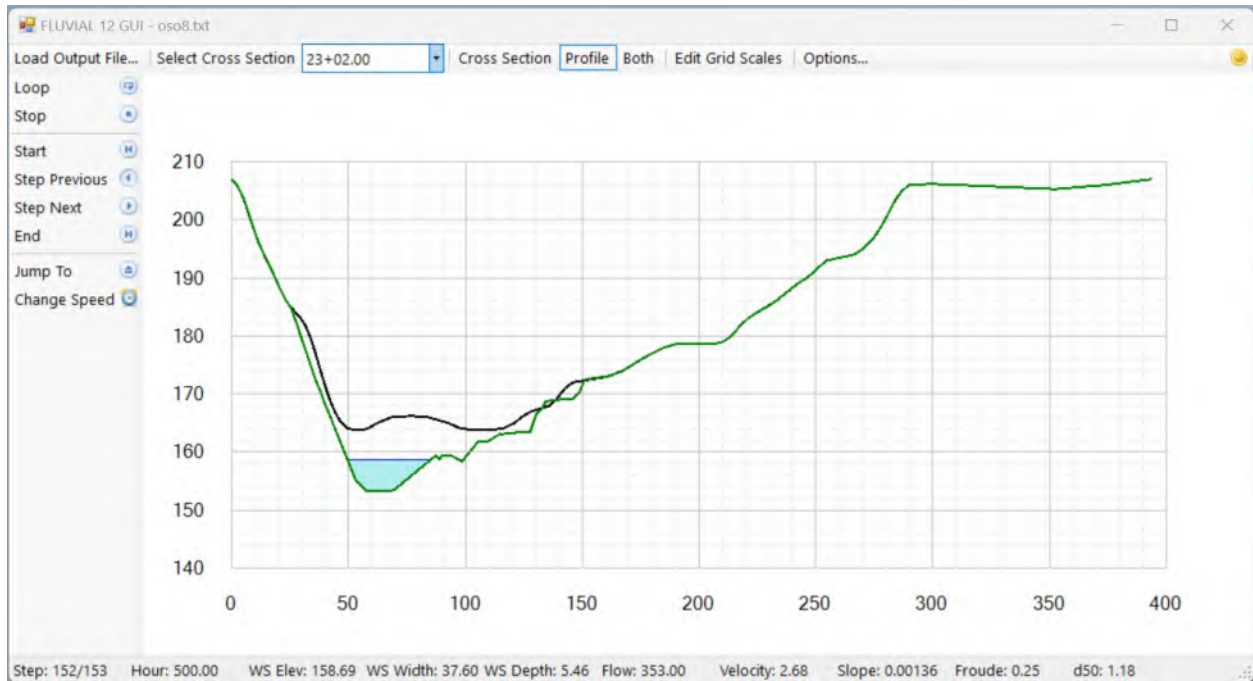


Figure 14. Cross-section 2302

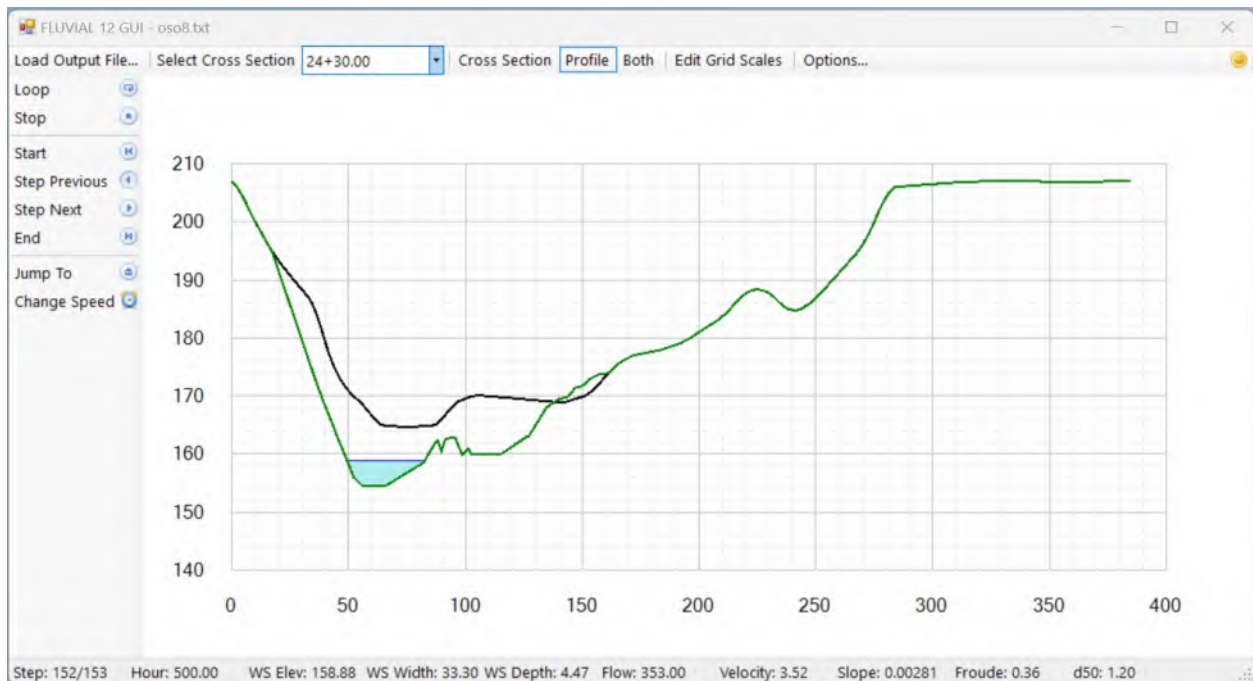


Figure 15. Cross-section 2430

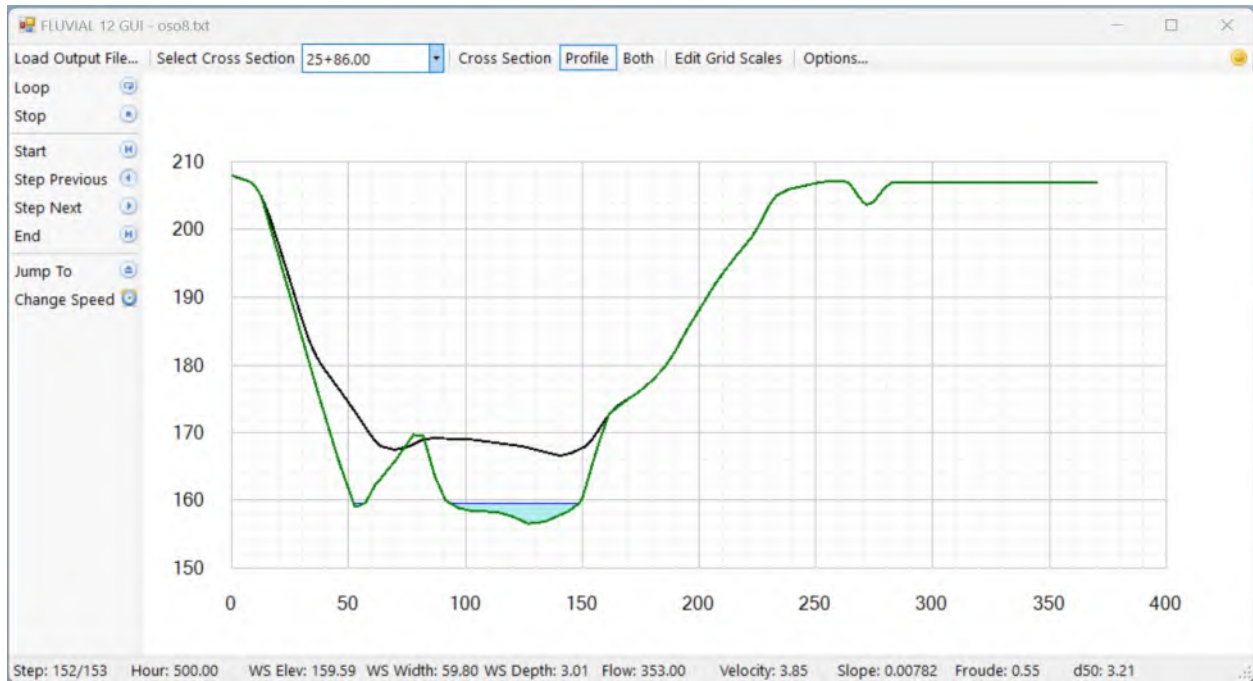


Figure 16. Cross-section 2586

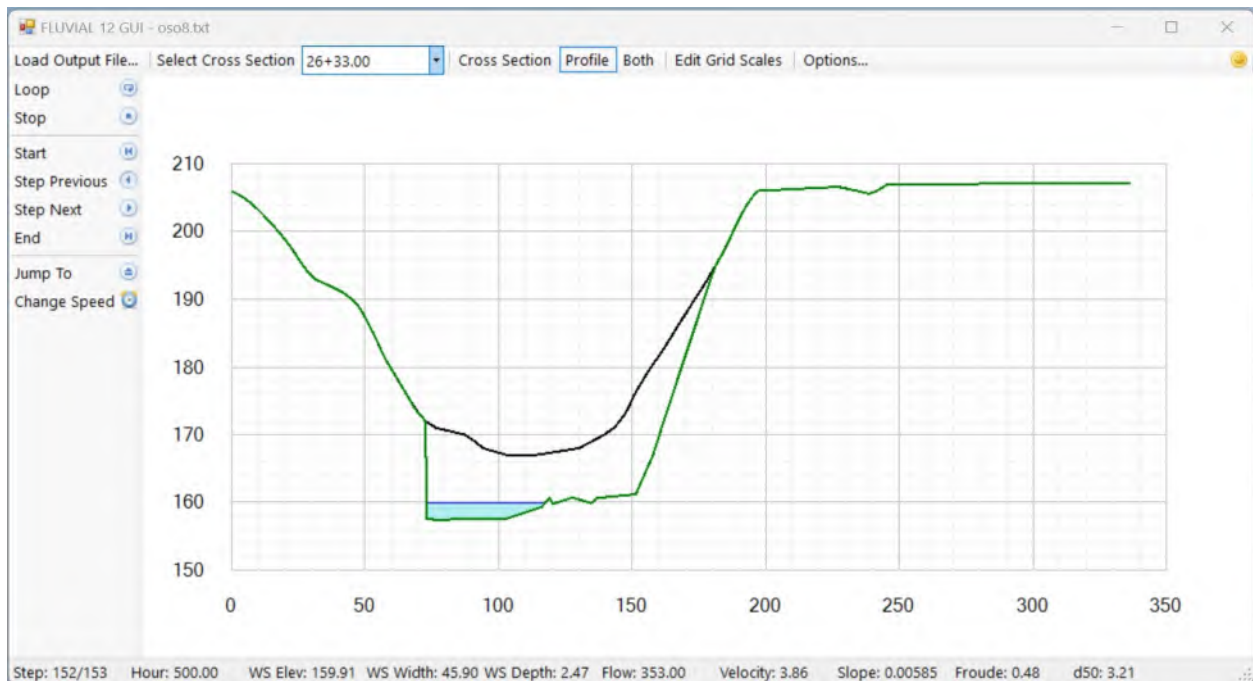


Figure 17. Cross-section 2633

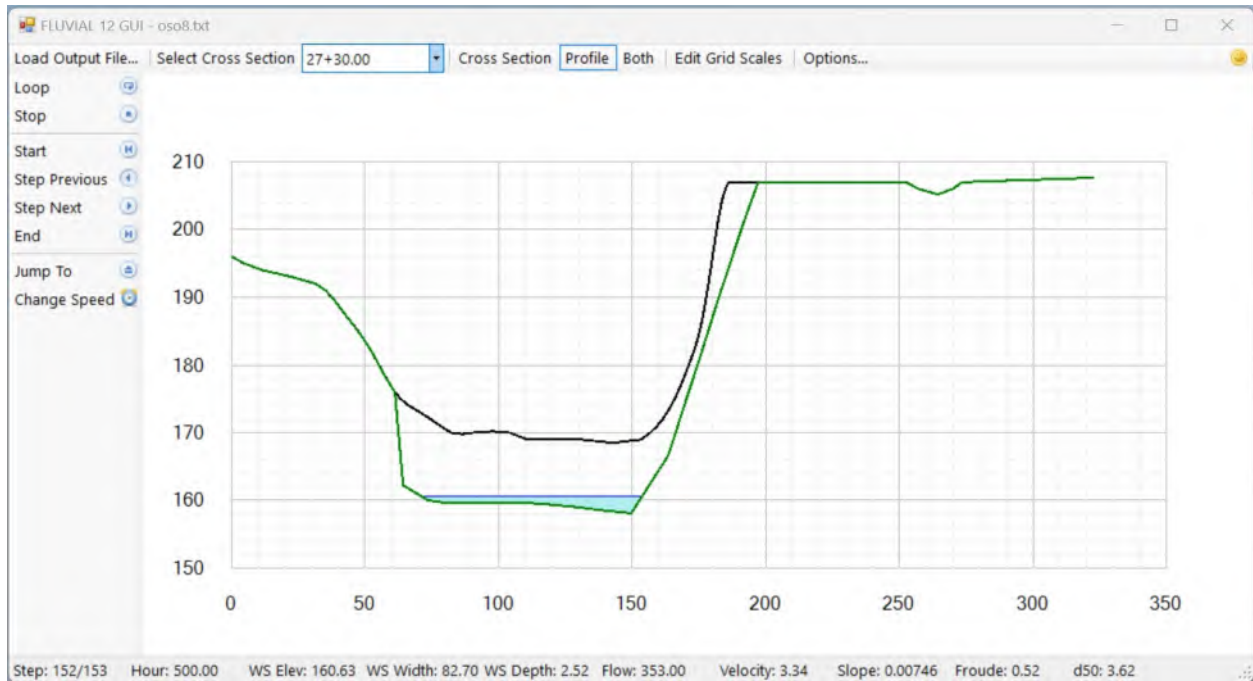


Figure 18. Cross-section 2730

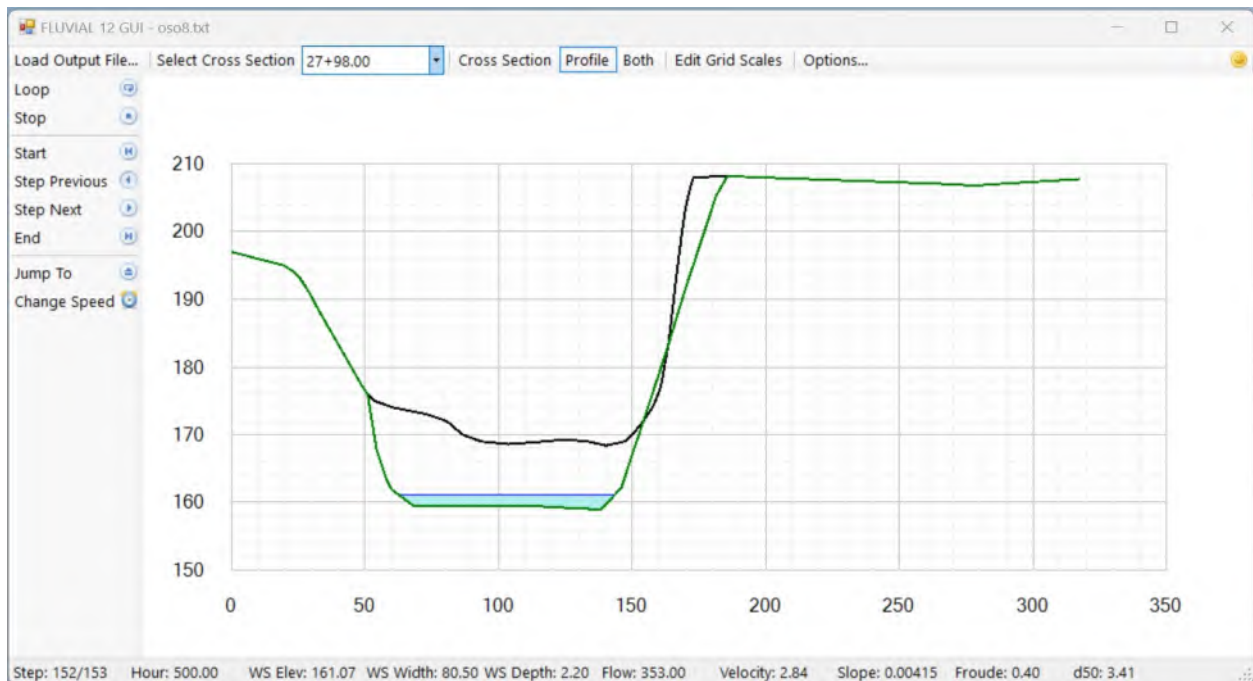


Figure 19. Cross-section 2798

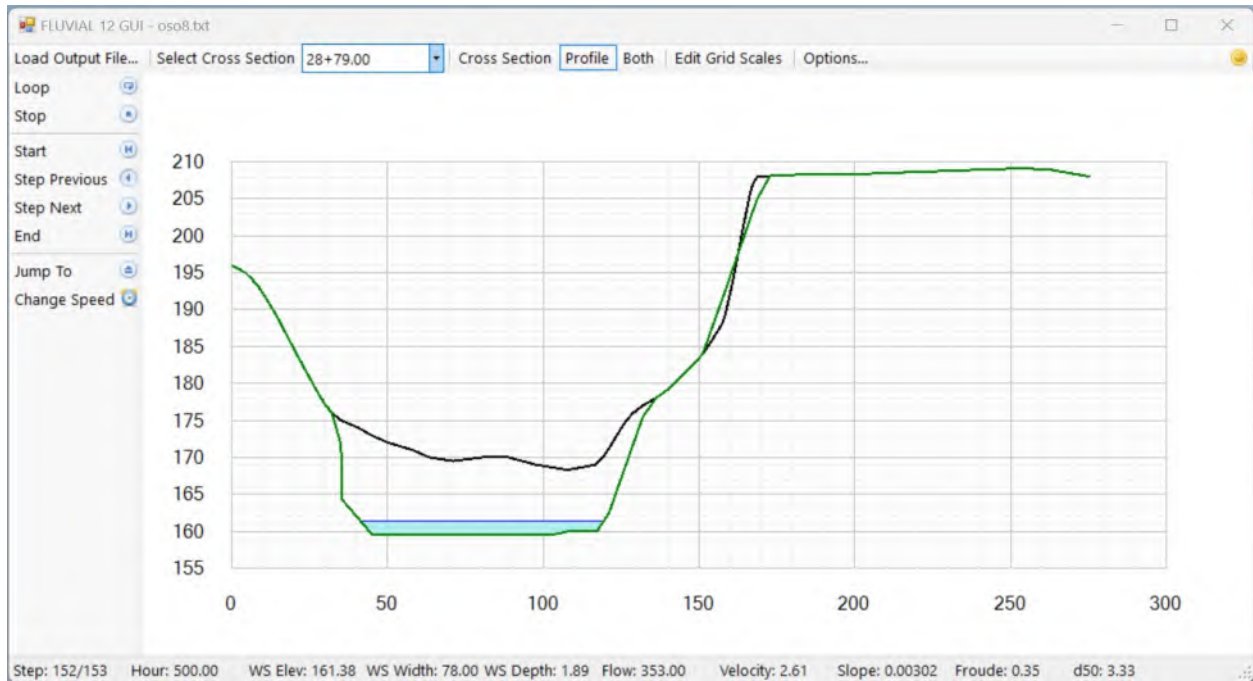


Figure 20. Cross-section 2879

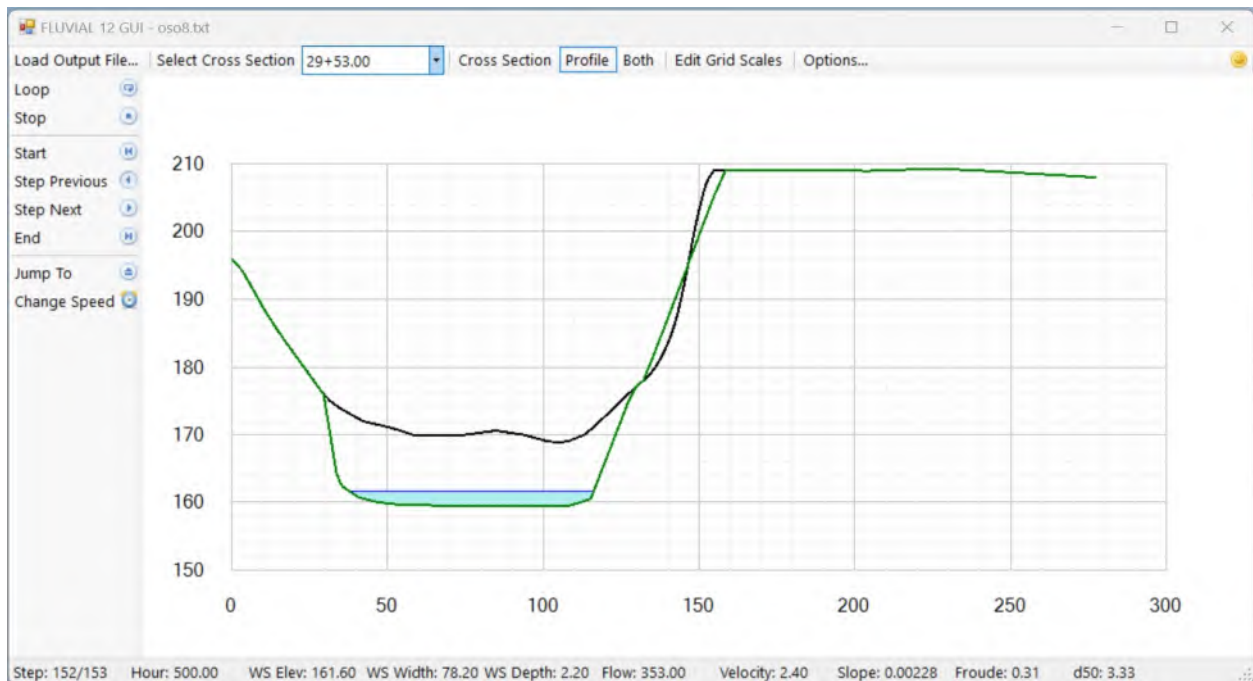


Figure 21. Cross-section 2953



Figure 22. Cross-section 3053

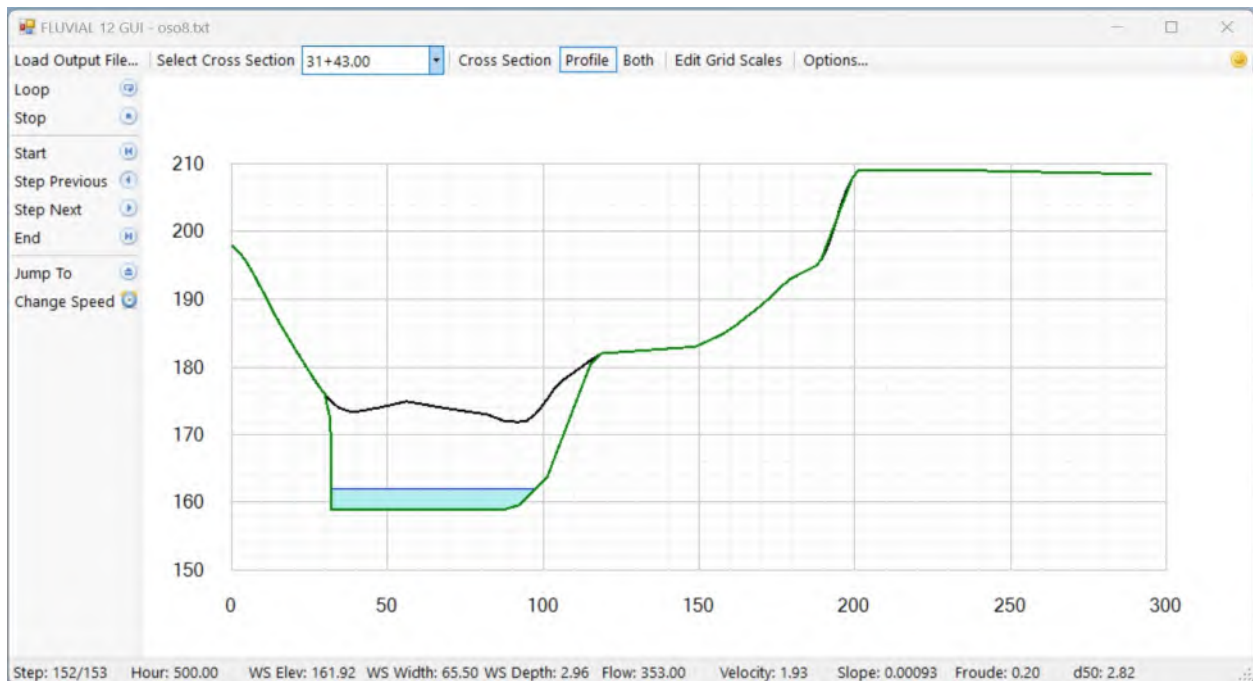


Figure 23. Cross-section 3143

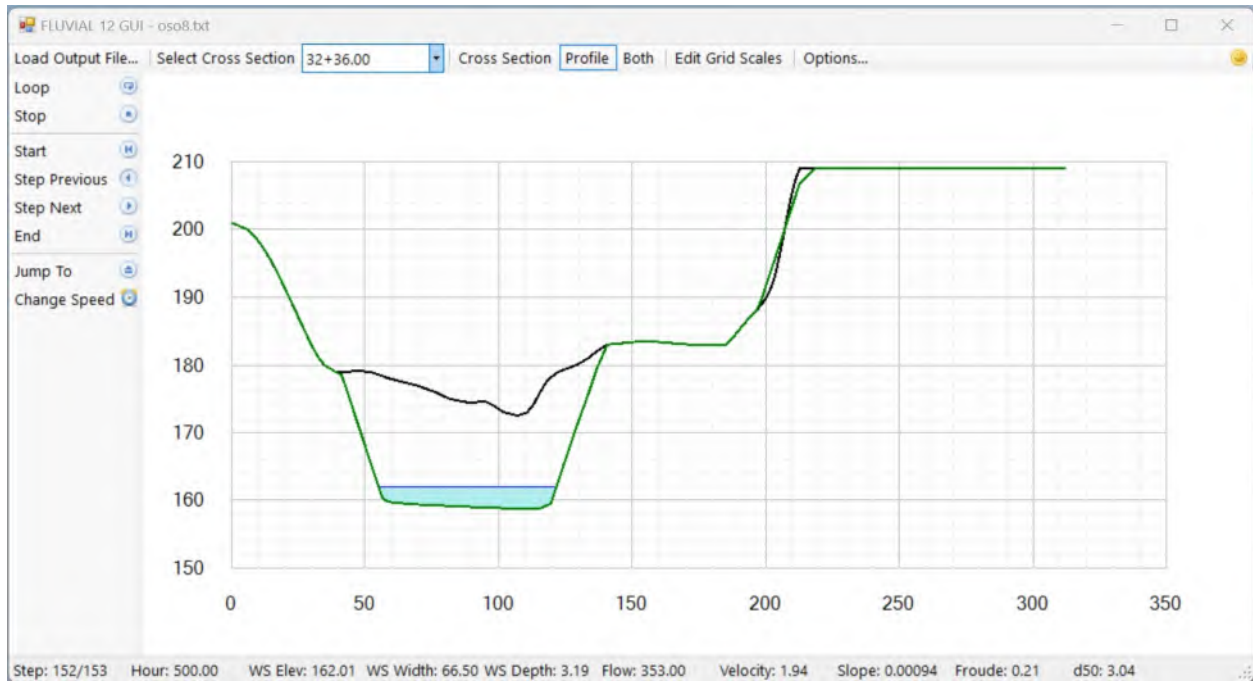


Figure 24. Cross-section 3236

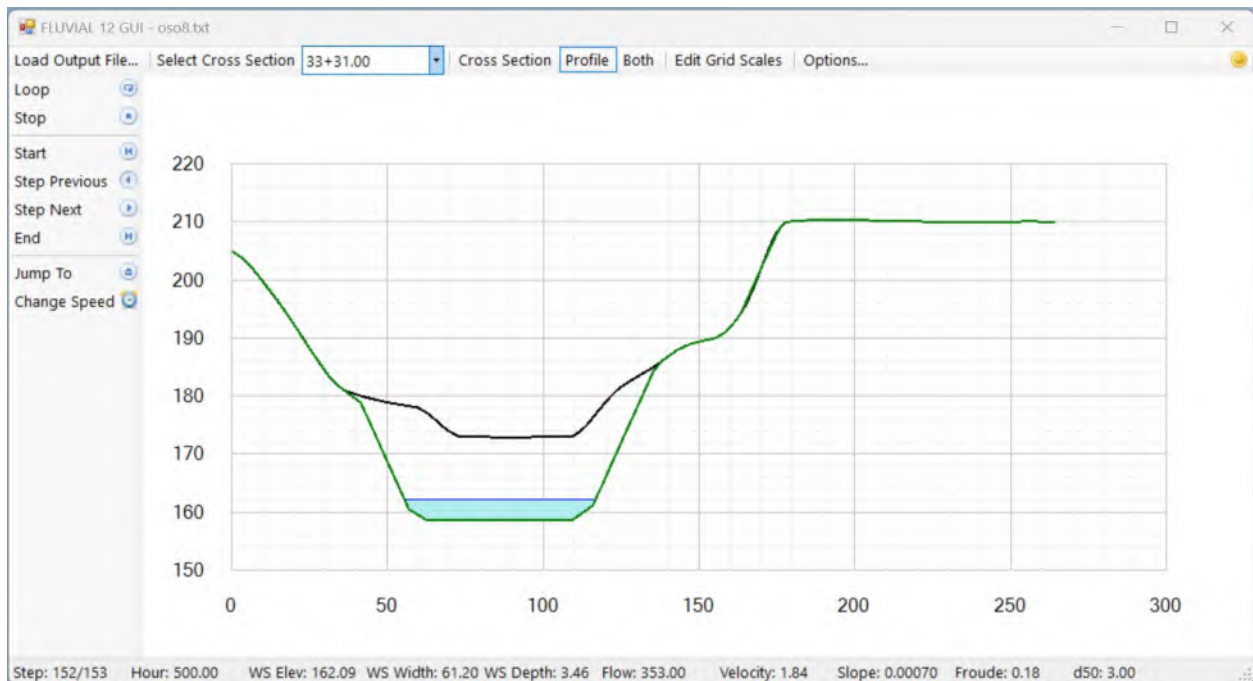


Figure 25. Cross-section 3331

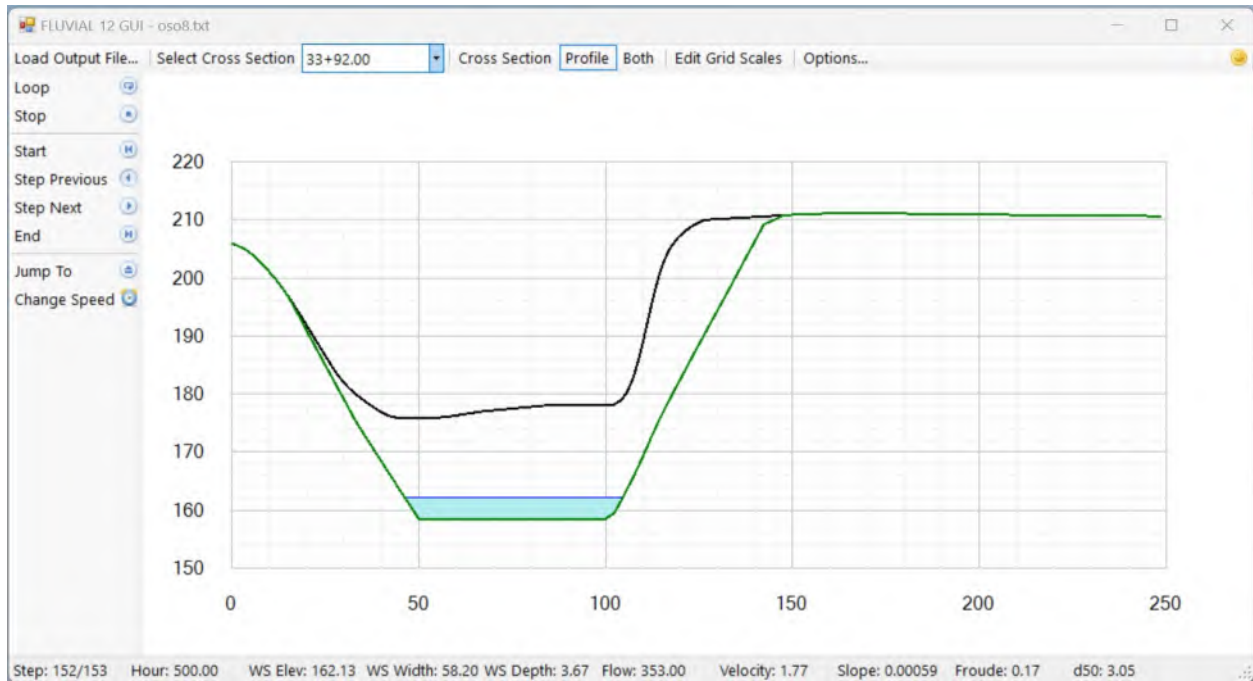


Figure 26. Cross-section 3392

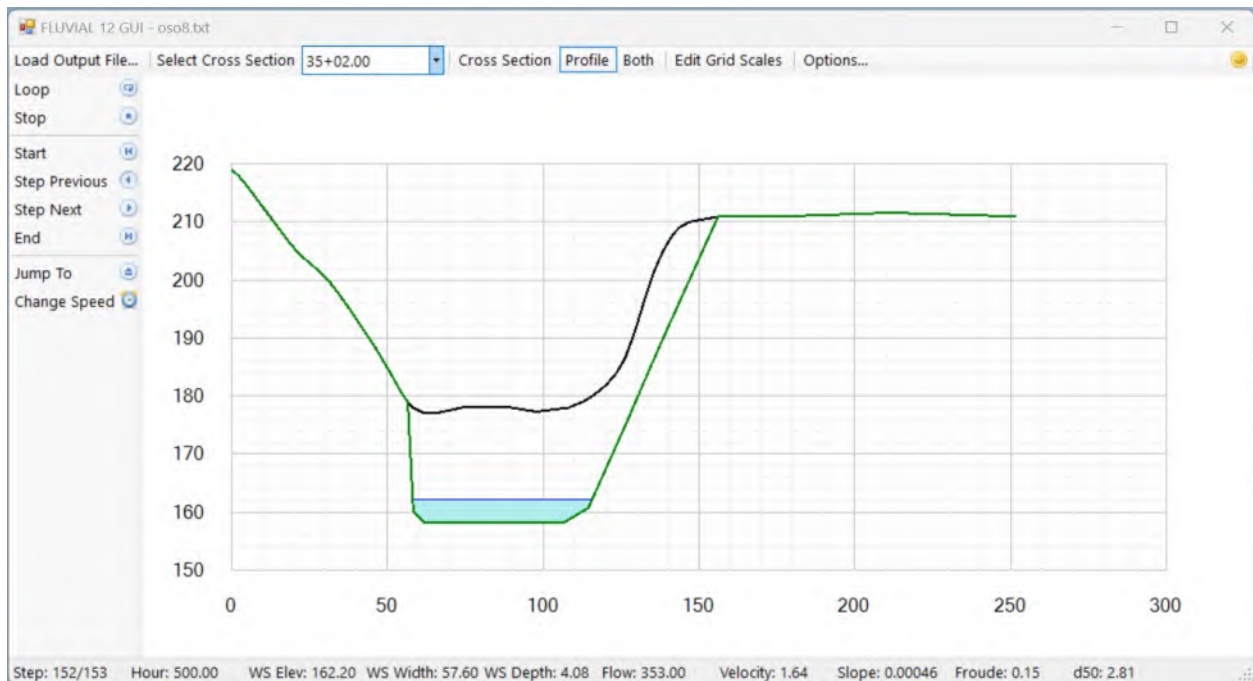


Figure 27. Cross-section 3502

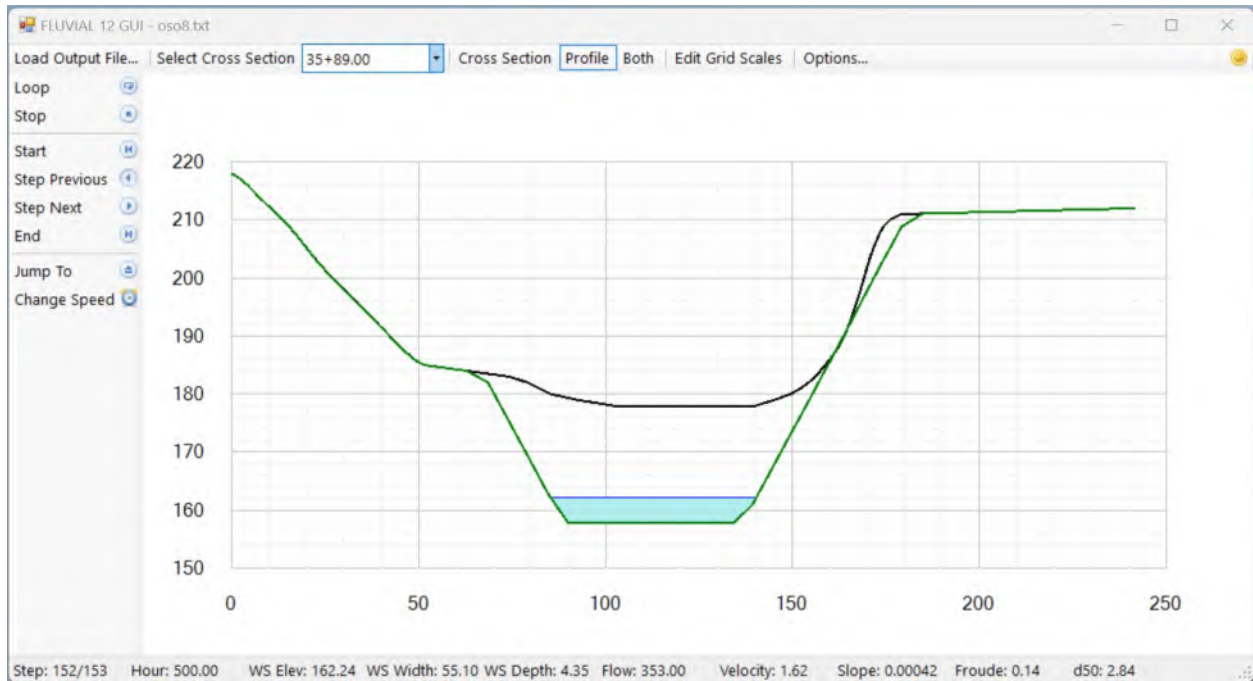


Figure 28. Cross-section 3589

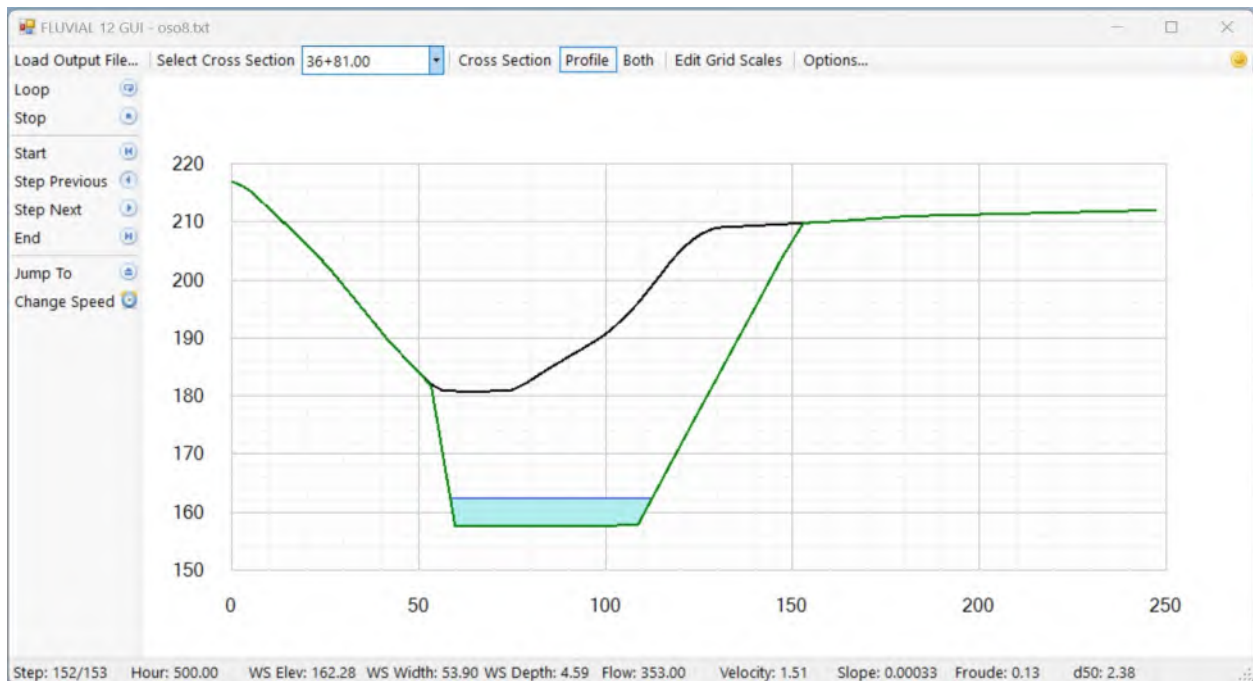


Figure 29. Cross-section 3681

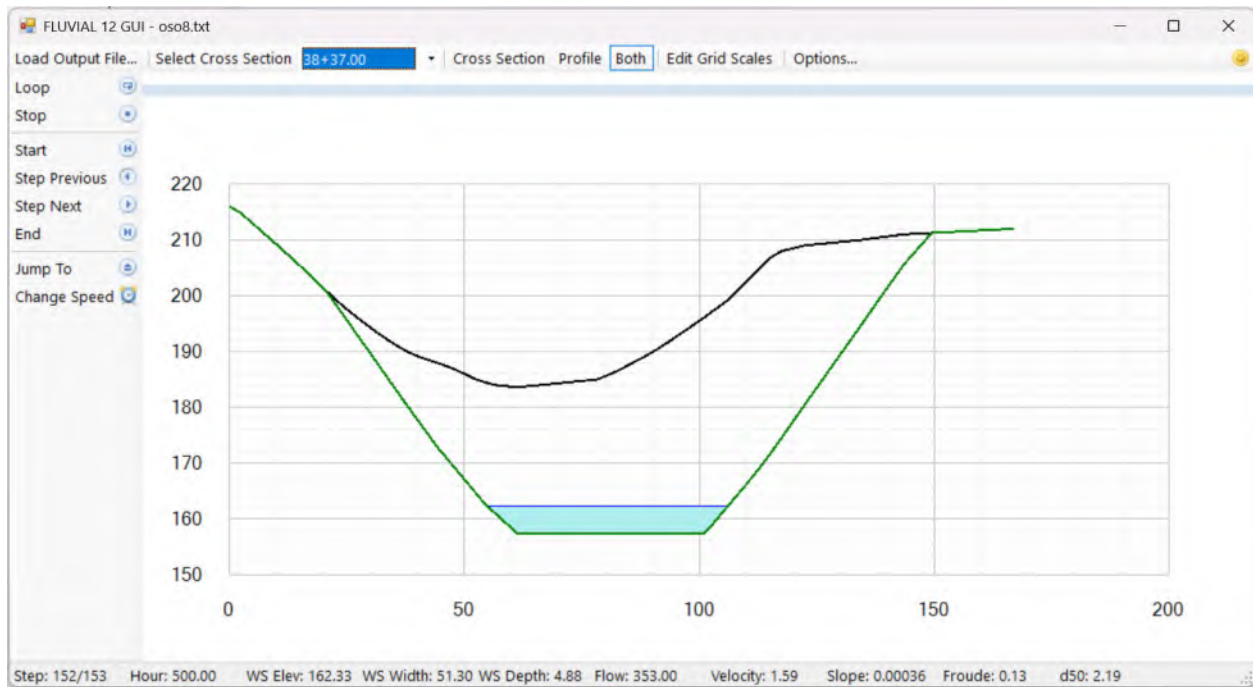


Figure 30. Cross-section 3837

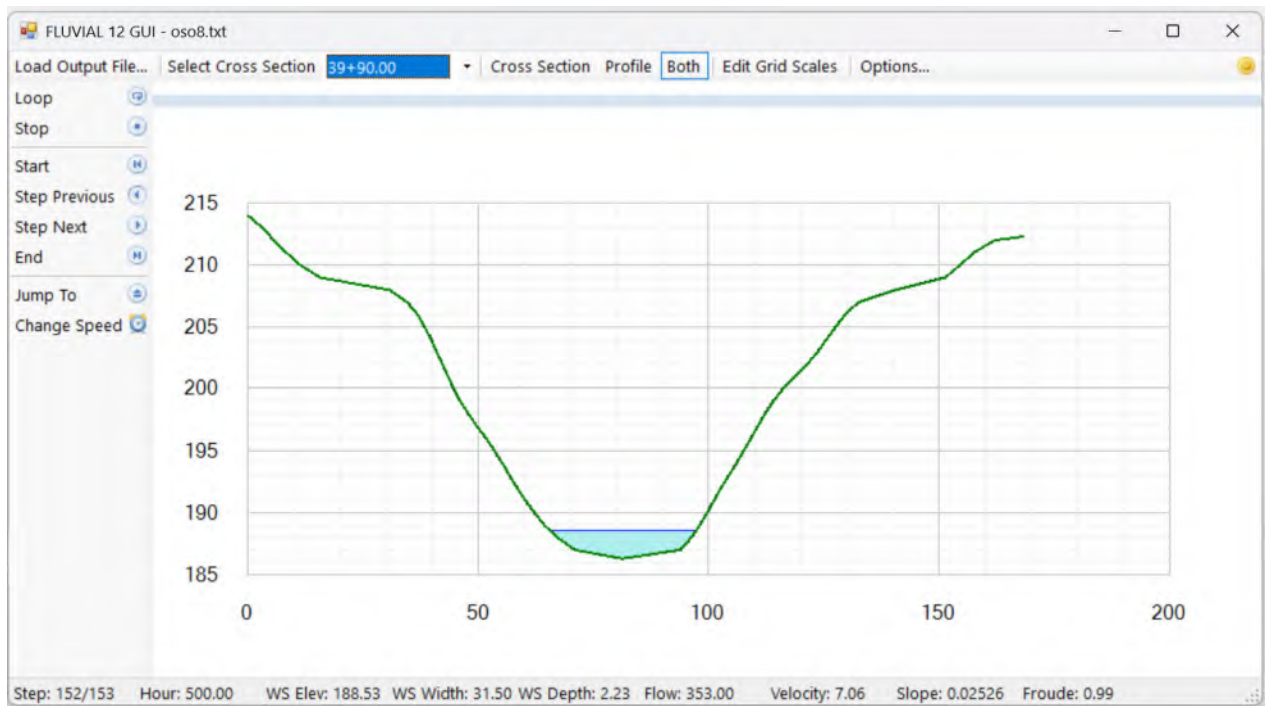


Figure 31. Cross-section 39+90

APPENDIX A

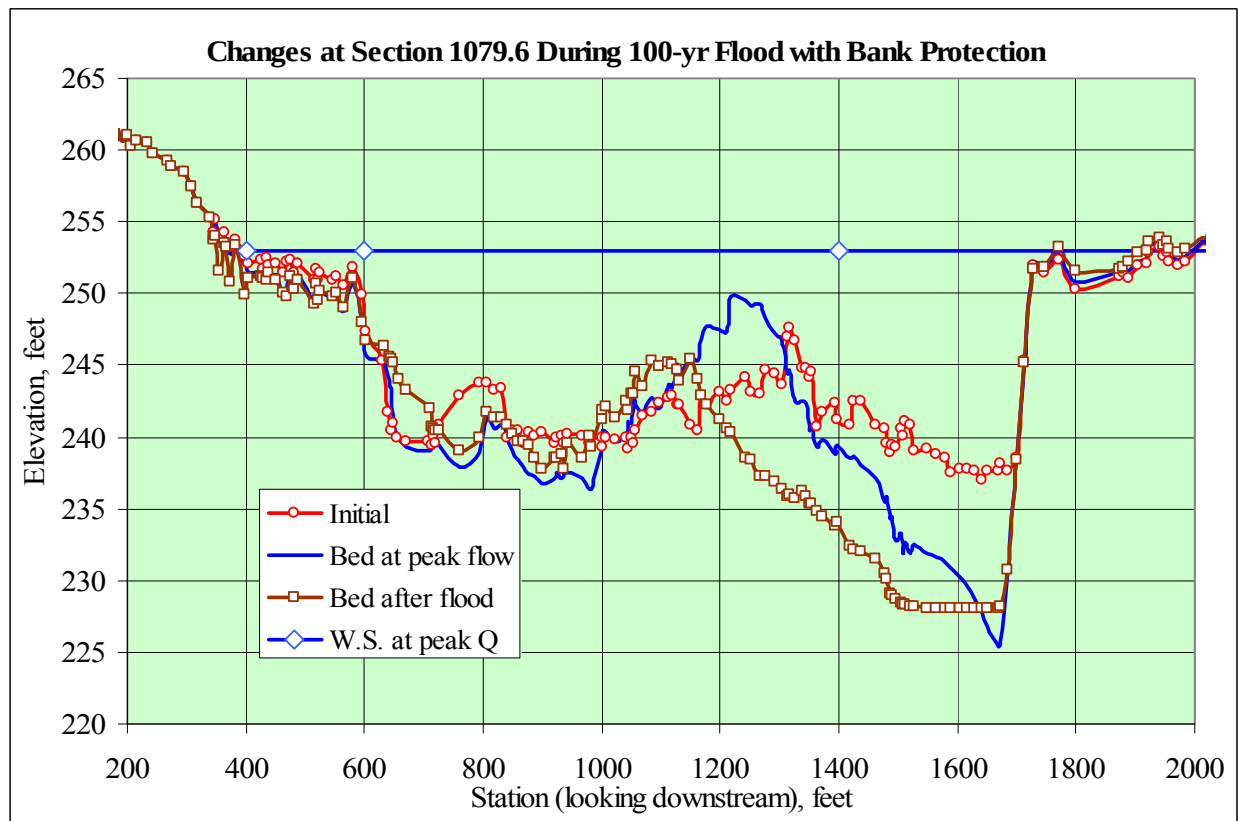
HEC-RAS ANALYSES

Generalized Computer Program

FLUVIAL-12

Mathematical Model for Erodible Channels

Users Manual



Updated In January 2006

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This program is developed and furnished by Howard H. Chang and is accepted and used by the recipient upon the express understanding that the developer makes no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the information and data contained in this program or furnished in connection therewith, and the developer shall be under no liability whatsoever to any person by reason of any use made thereof.

PROGRAM SUMMARY FOR FLUVIAL-12

River channel behavior often needs to be studied for its natural state and response to human regulation. Studies of river hydraulics, sediment transport, and river channel changes may be through physical modeling, or mathematical modeling, or both. Physical modeling has been relied upon traditionally for river projects, but mathematical modeling is becoming more popular as its capabilities expand rapidly. The computer program FLUVIAL-12 is a mathematical model that is formulated and developed for water and sediment routing in natural and man-made channels. The combined effects of flow hydraulics, sediment transport and river channel changes are simulated for a given flow period.

River channels changes simulated by the model include channel bed scour and fill (or aggradation and degradation), width variation, and changes in bed topography induced by the curvature effect. These inter-related changes are coupled in the model for each time step. While this model is for erodible channels, physical constraints, such as bank protection, grade-control structures and bedrock outcroppings, may also be specified. Applications of this model include evaluations of general scour at bridge crossings, sediment delivery, channel responses to sand and gravel mining, channelization, etc. It has been applied to many designs for bank protection and grade-control structures which must extended below the potential channel bed scour and withstand the design flood.

This model is applicable to ephemeral rivers as well as rivers with long-term flow; it has also been tested and calibrated with field data from several rivers, in both semi-arid and humid regions. Because of the transient behavior in dynamic changes, ephemeral rivers require more complicated techniques in model formulation. This model may be used on any main frame computer; it may be used on a personal computer with adequate capacity.

The FLUVIAL-12 model is an *erodible-boundary model*; it simulated inter-related changes in channel-bed profile, channel width and bed topography induced by the channel curvature. The erodible-boundary model is different from an *erodible-bed model* in the following ways.

- (1) An erodible-bed model does not simulate changes in channel width. Since changes in channel-bed profile is closely related to changes in width, these changes may not be separated.
- (2) The change in bed profile in an erodible-bed model is assumed to be uniform in the erodible zone. All points adjust up and down by an equal amount during aggradation and degradation. Actual bed changes are by no means uniform and therefore they may not be simulated by an erodible-bed model.
- (3) An erodible-bed model does not consider the channel curvature. In reality, the bed topography is highly non-uniform in a curved channel, especially during a high flow.
- (4) The erodible zone needs to be specified at all cross sections in an erodible-bed model. This means the model does not provide the extent of erosion in the channel, but the user has to inform the model about the erodible part of the channel bed. The boundary of erosion is computed and provided by the FLUVIAL-12 model, this boundary changes with the discharge and time.
- (5) Sediment inflow into the channel reaches needs to be specified for many other models. This

requires the sediment rating curve which is usually not available for stream channels. In the FLUVIAL-12 model, the sediment inflow may be specified and it may also be computed based on the hydraulics of flow at the upstream section at every time step.

(6) The FLUVIAL-12 has been calibrated using many sets of river data (see Section XI). An erodible-bed model may not be calibrated with field data of natural streams.

Development of the FLUVIAL computer model dates back to 1972. Several publications describing the physical foundation, analytical background, and applications are included in this manual. Publications documenting the successive stages of development and calibration of the model are listed below.

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I. INTRODUCTION

Alluvial rivers are self-regulatory in that they adjust their characteristics in response to any change in the environment. These environmental changes may occur naturally, as in the case of climatic variation or changes in vegetative cover, or may be a result of such human activities as damming, river training, diversion, sand and gravel mining, channelization, bank protection, and bridge and highway construction. Such changes distort the natural quasi-equilibrium of a river; in the process of restoring the equilibrium, the river will adjust to the new conditions by changing its slope, roughness, bed-material size, cross-sectional shape, or meandering pattern. Within the existing constraints, any one or a combination of these characteristics may adjust as the river seeks to maintain the balance between its ability to transport and the load provided.

River channel behavior often needs to be studied for its natural state and responses to the aforementioned human activities. Studies of river hydraulics, sediment transport and river channel changes may be through physical modeling or mathematical modeling, or both. Physical modeling has been relied upon traditionally to obtain the essential design information. It nevertheless often involves large expenditure and is time consuming in model construction and experimentation. What limits the accuracy of physical modeling is the scale distortion which is almost unavoidable whenever it involves sedimentation.

Mathematical modeling of erodible channels has been advanced with the progress in the physics of fluvial processes and computer techniques. An evaluation of existing models was made by the National Academy of Sciences (1983). Recommendations in this report have been beneficial for subsequent model development. Since the actual size of a river is employed in mathematical modeling, there is no scale distortion. The applicability and accuracy of a model depend on the physical foundation and numerical techniques employed.

The traditional regime analyses of rivers are limited to regime rivers and their long-term adjustments in equilibrium. The hydraulic geometry, flow and sediment transport processes exhibited in the process of adjustments are outside the scope of regime approach but they are included in the mathematical modeling. This manual addresses the more rapid process-response or the transient behavior of alluvial rivers. The subject is on unsteady flow and sediment transport in river channels with a changing boundary under given physical constraints. In the following, the physical foundation and numerical techniques for the transient process-response of the FLUVIAL model are described. Users' instructions are provided. Applications of the FLUVIAL model are illustrated by examples given in the appendixes.

II. PHYSICAL FOUNDATION OF FLUVIAL PROCESS-RESPONSE

Mathematical modeling of river channel changes requires adequate and sufficient physical relationships for the fluvial processes. While the processes are governed by the principles of continuity, flow resistance, sediment transport and bank stability, such relations are insufficient to explain the time and spatial variations of channel width in an alluvial river. Generally, width adjustment occurs concurrently with changes in river bed profile, slope, channel pattern, roughness, etc. These changes are closely interrelated; they are delicately adjusted to establish or to maintain the dynamic state of equilibrium. While any factor imposed upon the river is usually absorbed by a combination of the above responses. The extent of each type of response is inversely related to the

resistance to change.

The dynamic equilibrium is the direction toward which each river channel evolves. The transient behavior of an alluvial river undergoing changes must reflect its constant adjustment toward dynamic equilibrium, although, under the changing discharge, the true equilibrium may never be attained. For a short river reach of uniform discharge, the conditions for dynamic equilibrium are: (1) Equal sediment discharge along the channel, and (2) uniformity in power expenditure γQS , where γ is the unit weight of the water-sediment mixture, Q is the discharge, and S is the energy gradient. If the energy gradient is approximated by the water-surface slope, then uniform power expenditure or energy gradient is equivalent to the linear (straight-line) water-surface profile along the channel. A river channel undergoing changes usually does not have a linear water-surface profile or uniform sediment discharge, but river channel adjustments are such that the non-uniformities in water-surface profile and sediment discharge are effectively reduced. The rate of adjustment is limited by the rate of sediment movement and subject to the rigid constraints such as grade-control structures, bank protection, abutments, bedrock, etc.

The energy gradient at a river cross section varies wildly. This variable is usually included in a hydraulic computation such as that of a HEC-2 study. The output of any HEC-2 study, even if it is for a fairly uniform river channel, usually exhibits non-uniformity in energy gradient along the channel. This variation is much more pronounced in disturbed rivers. A mathematical modeler realizes that a river channel will change in order to attain stream wise uniformity in sediment load. It is equally important to perceive that it will also adjust toward equal energy gradient along the channel. Because sediment discharge is a direct function of γQS , channel adjustment in the direction of equal power expenditure also favors the uniformity in sediment discharge. The sediment discharge in the reach will match the inflow rate when the equilibrium is reached.

III. CHANNEL WIDTH ADJUSTMENTS DURING SCOUR AND FILL

A stream channel's adjustment in the direction of equal power expenditure, or straight water-surface profile, provides the physical basis for the modeling of channel width changes. However, this adjustment does not necessarily mean movement toward uniformity in channel width. For one thing, the power expenditure is also affected by channel roughness and channel-bed elevation, in addition to the width. But, more importantly, the adjustment toward uniformity in power expenditure is frequently accomplished by significant streamwise variation in width. Such spatial width variation generally occurs concurrently with streambed scour or fills to be illustrated in the following by several examples.

The transient behavior can be more clearly demonstrated by more dramatic river channel changes in the short term. Field examples of this nature are selected herein to illustrate how the significant spatial variation in width is related to river channel's adjustment toward uniform power expenditure. This example will also show why the regime approach may not be employed to simulate river channel changes.

Figure 1 shows a short reach of the San Diego River at Lakeside, California on February 25, 1981 during the initial stage of a storm. The estimated discharge of 600 cfs persisted for several subsequent days. Prior to the storm, this sandy streambed was graded, because of sand mining, to a wavy profile. During the initial period of flow, the water-surface profile was not straight because its

gradient was steeper over higher streambed areas than over lower areas. Gradually, these higher streambed areas were scoured while lower places were filled. Small widths formed with streambed scour, whereas large widths developed with fill as shown in the figure. The width development in this case was rapid in occurrence in the sandy material, its significant streamwise variation is depicted by the natural streamlines visible on the water surface. This pattern of significant spatial variation in width actually represents the stream's adjustment toward equal energy gradient, as explained in the following.



Fig. 1 Streamwise variation in width during stream channel adjustment toward establishing straight water-surface profile, San Diego River at Lakeside, California

The streambed area undergoing scour had a steeper energy gradient (or water-surface slope) than its adjacent areas. Formation of a narrower and deeper channel was effective to reduce the energy gradient due to decreased boundary resistance and lowered streambed elevation. In addition, the cross section developed a somewhat circular shape, which conserved power as a result of being closer to the best hydraulic section. On the other hand, the streambed area undergoing fill had a lower streambed elevation and a flatter energy gradient. Channel widening at this area was effective to steepen its energy gradient due to the increasing boundary resistance and rising streambed elevation. In summary, these adjustments in channel width effectively reduced the spatial variation in power expenditure or non-linearity in water-surface profile. Because sediment discharge is a direct function of stream power γQS , channel adjustment in the direction of equal power expenditure also favors the equilibrium, or uniformity, in sediment discharge.

The significant spatial width variation shown in Fig. 1 was temporary. The small width lasted while streambed scour continued and the large width persisted with sustained fill. At a later

stage when scour and fill ceased, the energy gradient or water-surface slope associated with the small width became flatter than that for the large width. The new profile of energy gradient or water surface became a reversal of the initial profile. Then, the small width started to grow wider while the large width began to slide back into the channel, resulting in a more uniform width along the channel.

The above example illustrates that a regime relationship for channel width may not be used in simulating transient river channel changes. Under the regime relationship, the width is a direct function of the discharge, i.e., $B \propto Q^{0.5}$; but under transient changes, the channel can have very different widths even though the discharge is essentially uniform along the channel.

The characteristic changes in channel width during channel-bed scour and fill were also observed by Andrews (1982) on the East Fork River in Wyoming. This river was in its natural state, undisturbed by human activities. River channel changes were induced by the variation in discharge.

In 1906, the Associated Press filed a well-written report that seemed to end one of the world's most spectacular stories. In the story, the AP reported that the Colorado River flooded; the water moved from the All American Canal to the New River and poured down to the Salton Sea. The sea rose 7 in. per day. The water became a cascade and its force cut back the banks. Soon the bank was receding faster and faster, moving upstream into the valley at a pace of 4000 ft a day; widening the New River channel to a gorge of more than 1000 feet. This example also illustrates the dramatic widening of river channel associated with a rising bed elevation.

A field study by the U. S. Bureau of Reclamation (1963) upstream of Milburn Diversion Dam on the Middle Loup River, central Nebraska also exemplifies the aggradation of a channel and associated channel widening.

The construction of Milburn Diversion Dam was completed in May, 1956 ... By May 1957, two months after the reservoir was impounded for the first irrigation season, the channel had aggraded an average of 1.6 feet, with a rise in the channel thalweg elevation of 2.2 feet; and by October of the same year, the total rise in the streambed averaged 2.2 feet. The cross section obtained in December 1957 shows a continued rise in the thalweg elevation. During the same period, the width of the channel had increased by 70 feet, from 475 feet in 1951 to 545 feet in 1957. One-third of this increase occurred during the June, 1956 - December, 1957 period.

For these two case histories, both alluvial rivers entered reservoirs with a rising base level. The transient changes are characterized by rising channel bed and increasing channel width. Although measurements of the discharge and other parameters are not available, it is possible to describe, at least in trend, the nature of power transformation in the river channel. At the river mouth, the base level was controlled in the reservoir. The rising base level first caused a lower velocity and energy gradient in the river channel near the mouth in relation to its upstream reach. In response to this change, channel adjustments through widening and aggradation near the mouth provided greater flow resistance and power expenditure at this location partly due to the increased boundary resistance. This process resulted in a more uniform power expenditure per unit channel length along the river.

A lowering base level, on the other hand, would result in a higher energy gradient in the river channel near the mouth. The higher energy gradient could be reduced through the development of a narrower and deeper channel at this location. This process would also result in a more uniform power expenditure along the channel. Such morphological features for deltas are also applicable to alluvial fans and hill slopes.

IV. ANALYTICAL BASIS OF THE FLUVIAL MODEL

The FLUVIAL model with different versions has been developed for water and sediment routing in rivers while simulating river channel changes as documented in a series of publications listed in Section I. River channel changes simulated by the model include channel-bed scour and fill (or aggradation and degradation), width variation, and changes caused by curvature effects. Because changes in channel width and channel-bed profile are closely inter-related, modeling of erodible channels must include both changes. In fact, width changes are usually greater than the concomitant scour and fill in the bed, particularly in ephemeral streams. The analytical background of the FLUVIAL model is described in the following.

The FLUVIAL model has the following five major components: (1) Water routing, (2) sediment routing, (3) changes in channel width, (4) changes in channel-bed profile, and (5) changes in geometry due to curvature effect. These inter-related components are described in the following sections. A flow chart showing the major steps of the computation is given in Fig. 2.

This model employs a space-time domain in which the space domain is represented by the discrete cross sections along the channel; the time domain is represented by discrete time increments. Temporal and spatial variations in flow, sediment transport and channel geometry are computed following an iterative procedure. Water routing, which is coupled with the changing curvature, is assumed to be uncoupled from the sediment processes because sediment movement and changes in channel geometry are slow in comparison to the flow hydraulics.

V. WATER ROUTING

Water routing provides temporal and spatial variations of the stage, discharge, energy gradient and other hydraulic parameters in the channel. The water routing component has the following three major features: (1) Numerical solution of the continuity and momentum equations for longitudinal flow, (2) evaluation of flow resistance due to longitudinal and transverse flows, and (3) upstream and downstream boundary conditions. The continuity and momentum equations in the longitudinal direction are

$$\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial s} - q = 0 \quad (1)$$

$$\frac{1}{A} \frac{\partial Q}{\partial t} + g \frac{\partial H}{\partial s} + \frac{1}{A} \frac{\partial}{\partial s} \left(\frac{Q^2}{A} \right) + gS - \frac{Q}{A^2} q = 0 \quad (2)$$

where Q is the discharge, A is the cross-sectional area of flow, t is the time, s is the curvilinear

coordinate along discharge centerline measured from the upstream entrance, q is the lateral inflow rate per unit length, H is the stage or water-surface elevation, and S is the energy gradient. The upstream boundary condition for water routing is the inflow hydrographs; the downstream condition is the stage-discharge relation or the base-level variation. Techniques for numerical solution of Eqs. 1 and 2 are described by Chen (1973) and Fread (1971, 1974), among others.

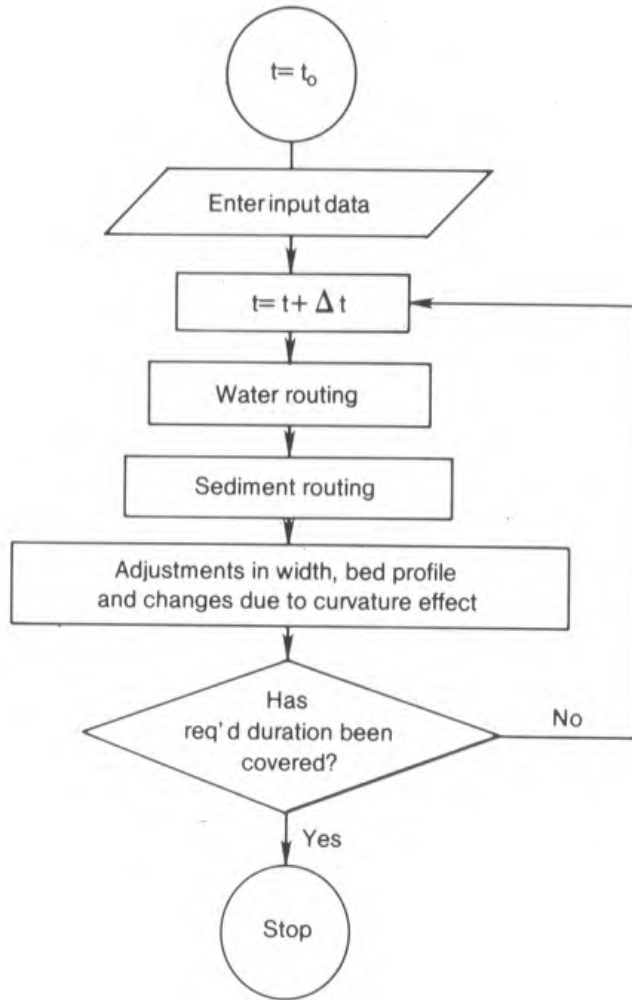


Fig. 2 Flow chart showing major steps of computation for FLUVIAL model

In a curved channel, the total energy gradient, S , in Eq. 2 is partitioned into the longitudinal energy gradient, S' , and the transverse energy gradient, S'' , due to secondary currents, i.e.

$$S = S' + S'' \quad (3)$$

The longitudinal energy gradient can be evaluated using any valid flow resistance relationship. If Manning's formula is employed, the roughness coefficient n must be selected by the modeler. However, if a formula for alluvial bed roughness (e.g., Brownlie's formula, 1983) is used, the roughness coefficient is predicted by the formula.

Method for evaluating the transverse energy gradient by Chang (1983) is used in the model. Because of the streamwise changing curvature, the transverse energy loss varies with the growth and decay of secondary currents. Analytical relationships pertaining to curved channels are often based upon the mean channel radius, r_c . Under the streamwise changing curvature, the application of such relationships is limited to fully-developed transverse flow for which the curvature is defined. Streamwise variation of transverse flow, over much of the channel length, is characterized by its growth and decay. In order to describe this spatial variation, the mean flow curvature defined as the flow curvature along the discharge centerline is employed. It is assumed that analytical relationships for developed transverse flows are applicable for developing transverse flows when the mean channel curvature, r_c , is replaced by the mean flow curvature, r_f . Upon entering a bend, the mean flow curvature increases with the growth in transverse circulation. In a bend, the transverse flow becomes fully developed if the flow curvature approaches the channel curvature. In the case of exiting from a bend to the downstream tangent in which the channel curvature is zero, the flow curvature decreases with the decay of transverse circulation.

The reason that the flow curvature lags behind the channel curvature during circulation growth and decay is attributed to the internal turbulent shear that the flow has to overcome in transforming from parallel flow into the spiral pattern and vice versa. From the dynamic equation for the transverse velocity, an equation governing the streamwise variation in transverse surface velocity, v , was derived (Chang, 1984). In finite difference form, the change in v over the distance Δs is given by

$$v_{i+1} = \left\{ v_i + F_1(f) \frac{U}{r_c} \exp[F_2(f) \Delta s] \Delta s \right\} \exp[-F_2(f) \Delta s] \quad (4)$$

where v is the transverse surface velocity along discharge centerline, U is the average velocity of a cross section, i and $i+1$ are s -coordinate indices, F_1 and F_2 are functions of f (friction factor) and depth, and the overbar denotes averaging over the incremental distance between i and $i+1$. Eq. 4 provides the spatial variation in v , from which the mean flow curvature may be obtained using the transverse velocity profile. From the transverse velocity profile by Kikkawa, et al. (1976), the mean flow curvature, r_f , is related to the transverse surface velocity as

$$r_f = \frac{D_c}{\kappa} \frac{U}{v} \left\{ \frac{10}{3} - \frac{1}{\kappa} \frac{5}{9} \left(\frac{f}{2} \right) \right\} \quad (5)$$

where D_c is the flow depth at discharge centerline (thalweg) and κ is the Karman constant. At each time step, the mean flow curvature at each cross section is obtained using Eqs. 4 and 5. Accuracy of computation for the finite-difference equation (Eq. 4) is maintained if the step size $\Delta s \leq 2D_c$. For this reason, the distance between two adjacent cross sections is divided into smaller increments if necessary. Flow parameters for these increments are interpolated from values known at adjacent cross sections.

If the temporal terms in Eqs. 1 and 2 are ignored, water routing may be simplified by computing water-surface profiles at successive time steps. This option is available in the model. Computation of the water-surface profile at each time step is based upon the standard-step method (see Chow, 1957) using techniques similar to the HEC-2 computer model (U. S. Army Corps of

Engineers, 1982). For many cases, spatial variation in discharge due to channel storage is small and this technique produces closely similar results as the unsteady routing.

VI. SEDIMENT ROUTING

The sediment routing component for the FLUVIAL model has the following major features: (1) Computation of sediment transport capacity using a suitable formula for the physical conditions, (2) determination of actual sediment discharge by making corrections for sorting and diffusion, (3) upstream conditions for sediment inflow, and (4) numerical solution of the continuity equation for sediment. These features are evaluated at each time step, the results so obtained are used in determining the changes in channel configuration.

Determination of Sediment Discharge

To treat the time-dependent and non-equilibrium sediment transport, the bed material at each section is divided into several, say five, size fractions; the size for each fraction is represented by its geometric mean. For each size fraction, sediment transport capacity is first computed using a sediment-transport formula. The FLUVIAL model currently provides the choices of the following six sediment formulas: (1) Engelund-Hansen formula (1967), (2) Yang's unit stream power formula (1972, 1986), (3) Graf's formula (1970), (4) Ackers-White formula, (5) Parker, et al. formula for gravel (1982), and (6) Meyer-Peter and Muller bedload formula. The actual sediment rate is obtained by considering sediment material of all size fractions already in the flow as well as the exchange of sediment load with the bed using the method by Borah et al. (1982). If the stream carries a load in excess of its capacity, it will deposit the excess material on the bed. In the case of erosion, any size fraction available for entrainment at the bed surface will be removed by the flow and added to the sediment already in transport. During sediment removal, the exchange between the flow and the bed is assumed to take place in the active layer at the surface. Thickness of the active layer is based upon the relation defined by Borah, et al. This thickness is a function of the material size and composition, but also reflects the flow condition. During degradation, several of these layers may be scoured away, resulting in the coarsening of the bed material and formation of an armor coat. However, new active layers may be deposited on the bed in the process of aggradation. Materials eroded from the channel banks, excluding that portion in the wash load size range, are included in the accounting. Bed armoring develops if bed shear stress is too low to transport any available size.

The non-equilibrium sediment transport is also affected by diffusion, particularly for finer sediments. Because of diffusion, the deposition or entrainment of sediment is a gradual process and it takes certain travel time or distance to reach the transport capacity for a flow condition. Therefore, the actual sediment discharge at a section depends not only on the transport capacity at the section but also on the supply from upstream and its gradual adjustment toward the flow condition of this section. In the model, the sediment discharge is corrected for the diffusion effects on deposition and entrainment using the method by Zhang, et al. (1983). The procedures for computing sediment transport rate, sediment sorting and diffusion are applied to the longitudinal and transverse directions. They are also coupled with bed-profile evolution, which is described later in this section.

Sediment discharge may be limited by availability, as exemplified by the flow over a grade-

control structure or bed rock. The very high transport capacity at such a section, associated with the high velocity, is limited by the supply rate from upstream; that is, the sediment discharge at such a section is under upstream control.

Upstream Boundary Conditions for Sediment Inflow

The rate of sediment inflow into the study reach is provided by the upstream boundary condition for sediment. If this rate is known, it may be included as a part of the input and used in the simulation. Unfortunately, sediment rating data are rarely very reliable or simply not available. For such cases, it is assumed that the river channel remains unchanged above the study reach, and sediment inflow rate is computed at the upstream section at each time step, the same way they are computed at other cross sections. For this reason, the study reach should extend far enough upstream so that the channel beyond may be considered basically stable. Factors that may induce river channel changes must be included in the study reach.

Numerical Solution of Continuity Equation for Sediment

Changes in cross-sectional area, due to longitudinal and transverse imbalances in sediment discharge, are obtained based upon numerical solution of continuity equations for sediment in the respective directions. First, the continuity equation for sediment in the longitudinal direction is

$$(1 - \lambda) \frac{\partial A_b}{\partial t} + \frac{\partial Q_s}{\partial s} - q_s = 0 \quad (6)$$

where λ is the porosity of bed material, A_b is the cross-sectional area of channel within some arbitrary frame, Q_s is the bed-material discharge, and q_s is the lateral inflow rate of sediment per unit length. According to this equation, the time change of cross-sectional area $\partial A_b / \partial t$ is related to the longitudinal gradient in sediment discharge $\partial Q_s / \partial s$ and lateral sediment inflow q_s . In the absence of q_s , longitudinal imbalance in Q_s is absorbed by channel adjustments toward establishing uniformity in Q_s .

The change in cross-sectional area ΔA_b for each section at each time step is obtained through numerical solution of Eq. 6. This area change will be applied to the bed and banks following correction techniques for channel width and channel-bed profile.

From Eq. 6, the correction in cross-sectional area of channel bed for a time increment can be written as

$$\Delta A_b = - \frac{\Delta t}{1 - \lambda} \left(\frac{\partial Q_s}{\partial s} - q_s \right) \quad (7)$$

At a section i , the lateral sediment inflow may be written as

$$q_{s_i} = \frac{1}{2} (q_{s_i}^j + q_{s_i}^{j+1}) \quad (8)$$

where superscripts j and $j+1$ are the times at t and $t+\Delta t$, respectively. This model employs an upstream difference in s and a centered difference in t for the partial derivative, $\partial Q_s/\partial s$, in Eq. 6, i.e.

$$\left(\frac{\partial Q_s}{\partial s}\right)_i = \frac{2}{\Delta s_i + \Delta s_{i-1}} \left(\frac{Q_{s_i}^j + Q_{s_i}^{j+1}}{2} - \frac{Q_{s_{i-1}}^j + Q_{s_{i-1}}^{j+1}}{2} \right) \quad (9)$$

where Δs_i is the distance between sections i and $i+1$, Δs_{i-1} is the distance between $i-1$ and i . With this upstream difference for $\partial Q_s/\partial s$, the change in bed area at a section i depends on sediment rates at this section and its upstream section $i-1$; it is independent of the sediment rate at the downstream section. In other words, it is under upstream control. Contrary to this, the stage at a section in subcritical flow depends on the downstream stage and is independent of the upstream stage; i.e., the stage is under downstream control in a subcritical flow.

VII. SIMULATION OF CHANGES IN CHANNEL WIDTH

The change in cross-sectional area ΔA_b obtained in sediment routing represents the correction for a time increment Δt that needs to be applied to the bed and banks. With ΔA_b being the total correction, it is possible for both the bed and banks to have deposition or erosion; it is also possible to have deposition along the banks but erosion in the bed and vice versa. The direction of width adjustment is determined following the stream power approach and the rate of change is based upon bank erodibility and sediment transport described in the following.

Direction of Width Adjustment

For a time step, width corrections at all cross sections are such that the streamwise distribution of stream power for the reach moves toward uniformity; these corrections are subject to the physical constraint of rigid banks and limited by the amount of sediment removal or deposition along the banks within the time step. A river channel undergoing changes usually has nonuniform spatial distribution in power expenditure or γQS . Usually the spatial variation in Q is small, but that in S is pronounced. An adjustment in width reflects the river's adjustment in flow resistance, that is, in power expenditure. A reduction in width at a cross section is usually associated with a decrease in energy gradient for the section, whereas an increase in width is accompanied by an increase in energy gradient. To determine the direction of width change at a section I , the energy gradient at this section, S_i , is compared with the weighted average of its adjacent sections, S_i . Here

$$S_i = \frac{S_{i+1} \Delta s_{i-1} + S_{i-1} \Delta s_i}{\Delta s_i + \Delta s_{i-1}} \quad (10)$$

If the energy gradient S_i is greater than S_i , channel width at this section is reduced so as to decrease the energy gradient. On the other hand, if S_i is lower, channel width is increased in order to raise the energy gradient. These changes are subject to the rate of width adjustment and physical constraints.

Width changes in alluvial rivers are characterized by widening during channel-bed aggradation (or fill) and reduction in width at the time of degradation (or scour). Such river channel changes represent the river's adjustments in resistance to seek equal power expenditure along its course. A degrading reach usually has a higher channel-bed elevation and energy gradient than do its adjacent sections. Formation of a narrower and deeper channel at the degrading reach decreases its energy gradient due to reduced boundary resistance. On the other hand, an aggrading reach is usually lower in channel-bed elevation and energy gradient. Widening at the aggrading reach increases its energy gradient due to increasing boundary resistance. These adjustments in channel width reduce the spatial variation in energy gradient and total power expenditure of the channel.

Rate of Width Adjustment

For a time increment, the amount of width change depends on the sediment rate, bank configuration and bank erodibility. The slope of an erodible bank is limited by the angle of repose of the material. The rate of width change depends on the rate at which sediment material is removed or deposited along the banks. For the same sediment rate, width adjustment at a tall bank is not as rapid as that at a low bank. The rates of width adjustment for cases of width increase and decrease are somewhat different as described below separately.

An increase in width at a channel section depends on sediment removal along the banks. The maximum rate of widening occurs when sediment inflow from the upstream section does not reach the banks of this section while bank material at this section is being removed. River banks have different degrees of resistance to erosion; therefore, the rate of sediment removal along a bank needs to be modified by a coefficient. For this purpose, the bank erodibility factor is introduced as an index for the erosion of bank material and the four bank types reflecting the variation in erodibility are classified as follows

- (1) Non-erodible banks.
- (2) Erosion-resistant banks, characterized by highly cohesive material or substantial vegetation, or both.
- (3) Moderately erodible banks having medium bank cohesion.
- (4) Easily erodible banks with noncohesive material.

Values of the bank erodibility factor vary from 0 for the first type to 1 for the last type of banks. The values of 0.2 and 0.5 have been empirically determined for the second and third types, respectively, based upon test and calibration of the model using field data from rivers in the western U. S. However, the bank erodibility factor should still be calibrated whenever data on width changes are available.

A decrease in channel width is accomplished by sediment deposition along the banks or by a decrease in stage, or both. For practical reasons, deposition does not exceed the stage in the model. The maximum amount of width reduction at a section occurs when sediment inflow from the upstream section is spread out at this section and the sediment removal from the bank areas at this section is zero. Within the limit of width adjustment, changes in width are made at all cross sections in the study reach toward establishing uniformity in power expenditure.

VIII. SIMULATION OF CHANGES IN CHANNEL-BED PROFILE

After the banks are adjusted, the remaining correction for ΔA_b is applied to the bed.

Distributions of erosion and deposition, or scour and fill, at a cross section are usually not uniform. Generally speaking, deposition tends to start from the low point and is more uniformly distributed because it tends to build up the channel bed in nearly horizontal layers. This process of deposition is often accompanied by channel widening. On the other hand, channel-bed erosion tends to be more confined with greater erosion in the thalweg. This process is usually associated with a reduction in width as the banks slip back into the channel. Such characteristic channel adjustments are effective in reducing the streamwise variation in stream power as the river seeks to establish a new equilibrium. In the model, the allocation of scour and fill across a section during each time step is assumed to be a power function of the effective tractive force $\tau_o - \tau_c$, i.e.

$$\Delta z = \frac{(\tau_o - \tau_c)^m}{\sum_B (\tau_o - \tau_c)^m \Delta y} \Delta A_b \quad (11)$$

where Δz is the local correction in channel-bed elevation, τ_o (given by γDS) is the local tractive force, τ_c is the critical tractive force, m is an exponent, and y is the horizontal coordinate, and B is the channel width. The value of τ_c is zero in the case of fill.

The m value in Eq. 11 is generally between 0 and 1; it affects the pattern of scour-fill allocation. For the schematic cross section shown in Fig. 3, a small value of m , say 0.1, would mean a fairly uniform distribution of Δz across the section; a larger value, say 1, will give a less uniform distribution of Δz and the local change will vary with the local tractive force or roughly the depth. The value of m is determined at each time step such that the correction in channel-bed profile will result in the most rapid movement toward uniformity in power expenditure, or linear water-surface profile, along the channel.

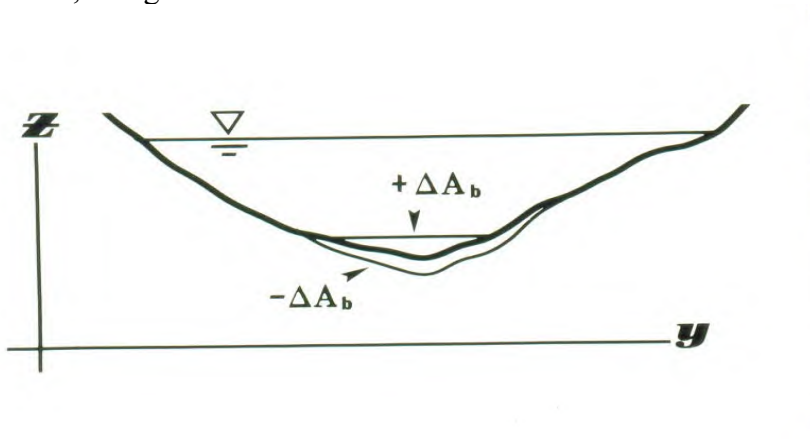


Fig. 3. Corrections of bed profile for aggradation and degradation. They are made in such ways that water-surface profile or power expenditure moves toward uniformity.

Equation 11 may only be used in the absence of channel curvature. The change in bed area at a cross section in a curved reach is

$$\Delta A_b = \frac{1}{r_f} \int r dz dr \quad (12)$$

where r_f is the radius of curvature at the discharge centerline or thalweg. Because of the curvature, adjacent cross sections are not parallel and the spacing Δs between them varies across the width. Therefore, the distribution of Δz given in Eq. 11 needs to be weighted according to the r -coordinate with respect to the thalweg radius, r_f/r , i.e.

$$\Delta z = \frac{(\tau_o - \tau_c)^{m/r}}{\sum_B (\tau_o - \tau_c)^{m/r} \Delta r} \Delta A_b \quad (13)$$

IX. SIMULATION OF CHANGES DUE TO CURVATURE EFFECT

Simulation of curvature-induced scour and deposition is based upon the flow curvature for which the streamwise variation is given by Eq. 4. The major features of transverse sediment transport and changes in bed topography are described below.

Sediment transport, in the presence of transverse flow, has a component in that direction. Sediment movement in the transverse direction contributes to the adjustment of transverse bed profile. In an unsteady flow, the transverse bed profile varies with time, and it is constantly adjusted toward equilibrium through scour and deposition. The transverse bed load per unit channel length q_b' can be related to the streamwise transport q_b . Such a relationship by Ikeda (1982) can be written in parametric form as

$$\frac{q_b'}{q_b} = F \left(\tan \delta, \frac{\partial z}{\partial r} \right) \quad (14)$$

where δ is the angle of deviation of bottom currents from the streamwise direction. The near-bed transverse velocity is a function of the curvature, and it is computed using the flow curvature.

Equation 14 relates the direction of bed-load movement to the direction of near-bed velocity and transverse bed slope $\partial z / \partial r$. As transverse velocity starts to move sediment away from the concave bank, it creates a transverse bed slope that counters the transverse sediment movement. An equilibrium is reached, i.e., $q_b' = 0$, when the effects of these opposing tendencies are in balance. Transverse bed-profile evolution is related to the variation in bed-material load. Ikeda and Nishimura (1986) developed a method for estimating transport and diffusion of fine sediments in the transverse direction by vertical integration of suspended load over the depth. Their model for predicting the transverse bed slope is also employed.

Changes in channel-bed elevation at a point due to transverse sediment movement are computed using the transverse continuity equation for sediment

$$\frac{\partial z}{\partial t} + \frac{1}{1 - \lambda} \frac{1}{r} \frac{\partial}{\partial r} (r q_s') = 0 \quad (15)$$

Written in finite difference form with a forward difference for q_s' , this equation becomes

$$\Delta z_k = \frac{\Delta t}{1 - \lambda} \frac{2}{r_k} \frac{r_{k+1} q'_{s\ k+1} - r_k q'_{s\ k}}{r_{k+1} - r_{k-1}} \quad (16)$$

where k is the radial (transverse) coordinate index measured from the center of radius. Equation 16 provides the changes in channel-bed elevation for a time step due to transverse sediment movement.

These transverse changes, as well as the longitudinal changes, are applied to the stream bed at each time step. Bed-profile evolution is simulated by repeated iteration along successive time steps.

X. TEST AND CALIBRATION OF FLUVIAL-12

The accuracy of a mathematical model depends on the physical foundation, numerical techniques, and physical relations for momentum, flow resistance and sediment transport. Test and calibration are important steps to be taken for more effective use of a model. Because of the difference in sensitivity of simulated results to each relation or empirical coefficient, more attention needs to be paid to those that generate sensitive results. Major items that require calibration include the roughness coefficient, sediment transport equation, bank erodibility factor, bed erodibility factor, and so on.

To determine the sensitivity of flow, the sediment transport, and the channel changes caused by the variation of each variable, different values of the variable need to be used in simulation runs and the results so obtained are compared. Generally speaking, the rate of channel changes is more sensitive to the sediment rate computed from a sediment equation but the equilibrium channel configuration is less sensitive. For example, the constriction scour at a bridge crossing, or the equilibrium local scour at a bridge pier, is found to be more or less independent of the sediment equation, or sediment size, since both inflow and outflow rates of sediment are affected by about the same proportion. It may also be stated that the rate of widening is sensitive to the bank erodibility factor but that the equilibrium width is not nearly as sensitive.

Field data are generally used for test and calibration of a model. The required information includes channel configuration before and after the changes, a flow record, and sediment characteristics. Data sets with more complete information are also more useful. The FLUVIAL-12 has undergone test and calibration using many data sets. Such studies together with their respective references are given below. Many such data sets are also useful for the test and calibration of other models.

(1) Test and Calibration Study Using Data from the San Diego River in Southern California. Chang, H. H., 1982, "Mathematical Model for Erodible Channels", *Journal of the Hydraulics Division*, ASCE, 108(HY5), 678-689. Closure in 109(HY4), 655-656.

(2) Test and Calibration Study Using Data from the Inlet Channel of San Elijo Lagoon in Southern California. Chang, H. H., and Hill, J. C., 1977, "Minimum Stream Power for Rivers and Deltas," *Journal of the Hydraulics Division*, ASCE, 103(HY12), 1375-89.

(3) Test and Calibration Study Using Data from the San Dieguito River in Southern California.

Chang, H. H., 1984, "Modeling of River Channel Changes", *Journal of Hydraulic Engineering*, ASCE, 110(2), 157-172. Closure in 113(2), 1987, 265-267.

(4) Test and Calibration Study Using Data from the San Lorenzo River in Northern California. Chang, H. H., 1985, "Water and Sediment Routing through Curved Channels", *Journal of Hydraulic Engineering*, ASCE, 111(4), 644-658.

(5) Test and Calibration Study Using Data from San Juan Creek in Southern California. Chang, H. H., 1987, "Modeling Fluvial Processes in Streams with Gravel Mining," in *Sediment Transport in Gravel-Bed Rivers*, Thorne, et al. editors, John Wiley & Sons, pp. 977-988. Also presented at the International Workshop on Problems of Sediment Transport in Gravel-Bed River, Colorado State University, August 12-17, 1985.

(6) Test and Calibration Using the Missouri River Data in Iowa. Chang, H. H., 1988, "Test and Calibration Study of the FLUVIAL Model Using the Missouri River Data", Prepared for the Waterways Experiment Station, U.S. Army Corps of Engineers, Under Contract "Computer-Based Design of River Bank Protection", No. DACW39-87-0039.

(7) Test and Calibration Study Using Data from the Santa Clara River in Southern California. Chang, H. H. and Stow, D., 1989, "Mathematical Modeling of Fluvial Sediment Delivery", *Journal of Waterway, Port, Coastal, and Ocean Engineering*, ASCE, 115(3), 311-326.

(8) Test and Calibration Study Using Data from the Fall River in Colorado. Chang, H. H., 1991, "Simulation of Bed Topography in a Meandering River", *Proceedings of the Fifth Interagency Sedimentation Conference*, Las Vegas, NV, March 21-28.

(9) Test and Calibration Study Using Data from the San Luis Rey River in Southern California. Chang, H. H., 1991, "Computer Simulation of River Channel Changes Induced by Sand Mining", *Proceedings of International Conference on Computer Applications in Water Resources*, July 3-6, Taipei, Taiwan, Vol. 1, 226-234.

(10) Test and Calibration Study Using Data from Stony Creek in Northern California. Chang, H. H., Harris, C., Lindsay, W., Nakao, S. S., and Kia, R., 1993, "Selecting Sediment Transport Equation for Scour Simulation at Bridge Crossing", *Proceedings of the 1993 National Conference on Hydraulic Engineering*, San Francisco, CA, July 25-30, pp. 1744-1949. Chang, H. H., 1994, "Selection of Gravel-Transport Formula for Stream Modeling", *Journal of Hydraulic Engineering*, ASCE, Vol. 120, No. 5, May, pp. 646-651.

(11) Test and Calibration Study Using Data from the Feather River in Northern California. Chang, H. H., 1993, "Numerical Modeling for Sediment-Pass-Through Operations of Reservoirs on North Fork Feather River", prepared for Pacific Gas & Electric Company, San Francisco. Chang, H. H., Harrison, L., Lee, W., and Tu, S., 1996, "Numerical Modeling for Sediment-Pass-Through Reservoirs", *Journal of Hydraulic Engineering*, ASCE, Vol. 122, No. 7, pp. 381-388.

(12) Test and Calibration Study Using Data from the San Dieguito River in Southern California for the 1993 Floods. Chang, H. H., Grove, R., and Pearson, D., 2001, "Modeling Changes in an Ephemeral Coastal River", *Journal of Floodplain Management*, Floodplain Management

Association, Vol. 2, No. 2, April, pp. 17-28.

(13) Test and Calibration Study Using Data from a Tidal Inlet with Oscillating Tidal Flow. Chang, H. H., 1997, "Modeling Fluvial Processes in Tidal Inlet", *Journal of Hydraulic Engineering*, ASCE, Vol. 123, No. 12, pp. 1161-1165.

(14) Correlation Study of FLUVIAL-12 Model Using Flume Data from National Taiwan University, Master's Thesis by Thomas Macchiarella, San Diego State University, May 2001.

(15) Chang, H.H., "A Case Study of Fluvial Modeling of River Responses to Dam Removal", *Journal of Hydraulic Engineering*, ASCE, 2006.

APPENDIX A. REFERENCES

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APPENDIX B. USERS INSTRUCTIONS FOR THE FLUVIAL MODEL

I. INPUT DESCRIPTION

The basic data requirements for a modeling study include (1) topographic maps of the river reach from the downstream end to the upstream end of study, (2) digitized data for cross sections in the HEC-2 format with cross-sectional locations shown on the accompanying topographic maps, (3) flow records or flood hydrographs and their variations along the study stream reach, if any, and (4) size distributions of sediment samples along the study reach. Additional data are required for special features of a study river reach.

The HEC-2 format for input data is used in all versions of the FLUVIAL model. Data records for HEC-2 pertaining to cross-sectional geometry (X1 and GR), job title (T1, T2, and T3), and end of job (EJ), are used in the FLUVIAL model. If a HEC-2 data file is available, it is not necessary to delete the unused records except that the information they contain are not used in the computation. For the purpose of water- and sediment-routing, additional data pertaining to sediment characteristics, flood hydrograph, etc., are required and supplied by other data records. Sequential arrangement of data records are given in the following.

Records	Description of Record Type
T1,T2,T3	Title Records
G1	General Use Record
G2	General Use Records for Hydrographs
G3	General Use Record
G4	General Use Record for Selected Cross-Sectional Output
G5	General Use Record
G6	General Use Record for Selecting Times for Summary Output
G7	General Use Record for Specifying Erosion Resistant Bed Layer
GS	General Use Records for Initial Sediment Compositions
GB	General Use Records for Time Variation of Base-Level
GQ	General Use Records for Stage-Discharge Relation of Downstream Section
GI	General Use Records for Time Variation of Sediment Inflow
X1	Cross-Sectional Record
XF	Record for Specifying Special Features of a Cross Section
GR	Record for Ground Profile of a Cross Section
SB	Record for Special Bridge Routine
BT	Record for Bridge Deck Definition
EJ	End of Job Record

Variable locations for each input record are shown by the field number. Each record has an input format of (A2, F6.0, 9F8.0). Field 0 occupying columns 1 and 2 is reserved for the required record identification characters. Field 1 occupies columns 3 to 8; Fields 2 to 10 occupy 8 columns each. The data records are tabulated and described in the following.

T1, T2, T3 Records - These three records are title records that are required for each job.

Field	Variable	Value	Description
0	IA	T1	Record identification characters
1-10	None		Numbers and alphanumeric characters for title

G1 Record - This record is required for each job, used to enter the general parameters listed below. This record is placed right after the T1, T2, and T3 records.

Field	Variable	Value	Description
0	IA	G1	Record identification characters
1	TYME	+	Starting time of computation on the hydrograph, in hours
2	ETIME	+	Ending time of computation on the hydrograph, in hours
3	DTMAX	+	Maximum time increment Δt allowed, in seconds
4	ISED	1 2 3 4 5 6 7	Select Graf's sediment transport equation. Select Yang's unit stream power equation. The sediment size is between 0.063 and 10 mm. Select Engelund-Hansen sediment equation. Select Parker gravel equation. Select Ackers-White sediment equation. Select Meyer-Peter Muller equation for bed load. Select Singer-Dunne sediment formula (2004).
5	BEF	+	Bank erodibility factor for the study reach. This value is used for each section unless otherwise specified in Field 9 of the XF record. Use 1 for highly erodible banks; 0.5 for moderately erodible banks; and 0.2 for erosion-resistant banks. Any value between 0 and 1 may be used.
6	IUC	0 1	English units are used in input and output. Metric units are used in input and output.
7	CNN	+	Manning's n value for the study reach. This value is used for a section unless otherwise specified in Field 4 of the XF record. If bed roughness is computed based upon alluvial bedforms as specified in Field 5 of the G3 record, only an approximate n value needs to be entered here.
8	PTM1	+	First time point in hours on the hydrograph at which summary out-

put and complete cross-sectional output are requested. It is usually the peak time, but it may be left blank if no output is requested.

9	PTM2	+	Second time point on the hydrograph in hours at which summary output and complete cross-sectional output are requested. It is usually the time just before the end of the simulation. This field may be left blank if no output is needed.
10	KPF	+	Frequency of printing summary output, in number of time steps. The default value is 1.

G2 Records - These records are required for each job, used to define the flow hydrograph(s) in the channel reach. The first one (or two) G2 records are used to define the spatial variation in water discharge along the reach; the succeeding ones are employed to define the time variation(s) of the discharge. Up to 10 hydrographs, with a maximum of 120 points for each, are currently dimensioned. See section II for tributaries. These records are placed after the G1 record.

Field	Variable	Value	Description
First G2			
0	IA	G2	Record identification characters
1	IHP1	+	Number of last cross section using the first (downstream most) hydrograph. The number of section is counted from downstream to upstream with the downstream section number being one. See also section II.
2	NP1	+	Number of points connected by straight segments used to define the first hydrograph.
3	IHP2	+	Number of last section using the second hydrograph if any. Otherwise leave it blank.
4	NP2	+	Number of points used to define the second hydrograph if any. Otherwise leave it blank.
5	IHP3	+	Number of last section using the third hydrograph if any. Otherwise leave it blank.
6	NP3	+	Number of points used to define the third hydrograph if any. Otherwise leave it blank.
7	IHP4	+	Number of last section using the fourth hydrograph if any. Otherwise leave it blank.
8	NP4	+	Number of points used to define the fourth hydrograph if any. Otherwise leave it blank.

9	IHP5	+	Number of last section using the fifth hydrograph if any. Otherwise leave it blank.
10	NP5	+	Number of points used to define the fifth hydrograph if any. Otherwise leave it blank.

Second G2: Note that this record is used only if more than 5 hydrographs are used for the job. It is necessary to place a negative sign in front of NP5 located in the 10th field of the first G2 record as a means to specify that more than 5 hydrographs are used.

0	IA	G2	Record identification characters
1	IHP6	+	Number of last cross section using the sixth hydrograph if any. Otherwise leave it blank.
2	NP6	+	Number of points connected by straight segments used to define the sixth hydrograph if any. Otherwise leave it blank.
3	IHP7	+	Number of last section using the seventh hydrograph if any. Otherwise leave it blank.
4	NP7	+	Number of points used to define the seventh hydrograph
5	IHP8	+	Number of last section using the eighth hydrograph if any. Otherwise leave it blank.
6	NP8	+	Number of points used to define the eighth hydrograph
7	IHP9	+	Number of last section using the ninth hydrograph if any. Otherwise leave it blank.
8	NP9	+	Number of points used to define the ninth hydrograph
9	IHP10	+	Number of last section using the tenth hydrograph if any. Otherwise leave it blank.
10	NP10	+	Number of points used to define the tenth hydrograph

Succeeding G2 Record(s)

1	Q11, Q21 Q31	+	Discharge coordinate of point 1 for each hydrograph, in ft ³ /sec or m ³ /sec
2	TM11, TM21 TM31	+	Time coordinate of point 1 for each hydrograph, in hours
3	Q12, Q22 Q32	+	Discharge coordinate of point 2 for each hydrograph, in cfs or cms

4 TM12,TM22 + Time coordinate of point 2 for each hydrograph, in hours
 TM32

Continue with additional discharge and time coordinates. Note that time coordinates must be in increasing order.

G3 Record - This record is used to define required and optional river channel features for a job as listed below. This record is placed after the G2 records.

Field	Variable	Value	Description
0	IA	G3	Record identification characters
1	S11	+	Slope of the downstream section, required for a job
2	BSP	0 +	One-on-one slope for rigid bank or bank protection Slope of bank protection in BSP horizontal units on 1 vertical unit. In the case of vertical bank, use 0.05 for BSP. This value is used for all cross sections unless otherwise specified in Field 8 of the XF record for a section.
3	DSOP	0 1	Downstream slope is allowed to vary during simulation. Downstream slope is fixed at S11 given in Field 1.
4	TEMP	0 +	Water temperature is 15°C. Water temperature in degrees Celsius
5	ICNN	0 1	Manning's n defined in Field 7 of the G1 record or those in Field 4 of the XF records are used. Brownlie's formula for alluvial bed roughness is used to calculate Manning's n in the simulation.
6	TDZAMA	0 +	Thickness of erodible bed layer is 100 ft (30.5 m). Thickness of erodible bed layer in ft or m. This value is applied to the entire channel reach but it may be redefined for a section using Field 10 of the XF record.
7	SPGV QMIN	0 + +	Specific gravity of sediment is 2.65. A value between 1 and 10 is for the specific gravity of sediment A value greater than 10 is the minimum discharge in cfs included in modeling. Discharges lower than QMIN carrying no bed sediment are ignored in modeling.
8	KGS	0 +	The number of size fractions for bed material is 5. The number of size fractions for bed material. Its maximum value is

9	PHI	0	8.
		+	The angle of repose for bed material is 36°.
			Angle of repose for bed material

G4 Record - This is an optional record used to select cross sections (up to 4) to be included at each summary output. Each cross section is identified by its number which is counted from the downstream section. An alternative way to select a section to be included at each summary output is to use field 10 of the X1 record. The G4 record also contains other options; it is placed after the G3 record.

Field	Variable	Value	Description
0	IA	G4	Record identification characters
1	IPLI1	+ 10000	Number of cross section All cross sections included in each summary output
2	IPLI2	+	Number of cross section
3	IPLI3	+	Number of cross section
4	IPLI4	+	Number of cross section
5	IEXCAV	+	A positive integer indicates number of cross section where sand/gravel excavation occurs.
6	GIFAC	+	A non-zero constant is used to modify sediment inflow at the upstream section.
7	PZMIN	0 1	Minimum bed profile during simulation run is not requested. Output file entitled TZMIN for minimum bed profile is requested.
10	REXCAV	+	A non-zero value specifies rate of sand/gravel excavation at Section IEXCAV.

G5 Record - This is an optional record used to specify miscellaneous options, including unsteady-flow routing for the job based upon the dynamic wave, bend flow characteristics. If the unsteady flow option is not used, the water-surface profile for each time step is computed using the standard-step method. When the unsteady flow option is used, the downstream water-surface elevation must be specified using the GB records.

Field	Variable	Value	Description
0	IA	G5	Record identification characters

1	DT	0 +	The first time step is 100 seconds. Size of the first time step in seconds.
2	IROUT	0 1	Unsteady water routing is not used; water-surface profiles are computed using standard-step method. Unsteady water-routing based upon the dynamic wave is used to compute stages and water discharges at all cross sections for each time step.
3	PQSS	0 3	No output of gradation of sediment load Gradation of sediment load is included in output in 1,000 ppm by weight.
5	TSED	0 +	Rate of tributary sediment inflow is 1 times the discharge ratio. Rate of tributary sediment inflow is TSED times the discharge ratio.
6	PTV	0 1	No output of transverse distribution of depth-averaged velocity Transverse distribution of depth-averaged velocity is printed. The velocity distribution is for bends with fully developed transverse flow.
10	DYMAX	0 +	No GR points are inserted for cross sections. Maximum value of spacing between adjacent points at a cross section (ft or m). If this value is exceeded, intermediate points will be inserted by interpolation. The number of points inserted is given in Field 10 of the X3 record in output.

G6 Record - This is an optional record used to select time points for summary output. Up to 30 time points may be specified. The printing frequency (KPF) in Field 10 of the G1 Record may be suppressed by using a large number such as 9999.

Field	Variable	Value	Description
First G6 Record			
0	IA	G6	Record identification characters
1	NKPS	+	Number of time points
Succeeding G6 Record(s)			
0	IA	G6	Record identification characters
1	SPTM(1)	+	First time point, in hours
2	SPTM(2)	+	Second time point, in hours

Continue with additional time points.

G7 Record - This is an optional record used to specify erosion resistant bed layer, such as a caliche layer, that has a lower rate of erosion.

Field	Variable	Value	Description
First G7 Record			
0	IA	G7	Record identification characters
1	KG7	+	Number of time points used to define the known erosion rate in relation to flow velocity
2	THICK	+	Thickness of erosion resistant layer, in feet
Succeeding G7 Record(s)			
0	IA	G7	Record identification characters
1	ERATE(1)	+	Erosion rate, in feet per hour
2	G7V(2)	+	Velocity, in feet per second

Continue with additional time points.

GS Record - At least two GS records are required for each job, used to specify initial bed-material compositions in the channel at the downstream and upstream cross sections. The first GS record is for the downstream section; it should be placed before the first X1 record and after the G4 record, if any. The second GS record is for the upstream section; it should be placed after all cross-sectional data and just before the EJ record. Additional GS records may be inserted between two cross sections within the stream reach, with the total number of GS records not to exceed 15. Each GS record specifies the sediment composition at the cross section located before the record. From upstream to downstream, exponential decay in sediment size is assumed for the initial distribution. Sediment composition at each section is represented by five size fractions.

Field	Variable	Value	Description
0	IA	GS	Record identification characters
1	DFF	+	Geometric mean diameter of the smallest size fraction in mm
2	PC	+	Fraction of bed material in this size range

Continue with other DFF's and PC's in the increasing order of sediment diameter.

GB Records - These optional records are used to define time variation of stage (water-surface elevation) at a cross section. The first set of GB records is placed before all cross section records (X1); it specifies the downstream stage. When the GB option is used, it supersedes other methods for determining the downstream stage. Other sets of GB records may be placed in other parts of the

data set; each specifies the time variation of stage for the cross section immediately following the GB records.

Field	Variable	Value	Description
First GB Record			
0	IA	GB	Record identification characters
1	KBL	+	Number of points used to define base-level changes
Succeeding GB Record(s)			
0	IA	GB	Record identification characters
1	BSLL(1)	+	Base level of point 1, in ft or m
2	TMBL(1)	+	Time coordinate of point 1, in hours
3	BSLL(2)	+	Base level of point 2, in ft or m
4	TMBL(2)	+	Time coordinate of point 2, in hours

Continue with additional elevations and time coordinates, in the increasing order of time.

GQ Records - These optional records are used to define stage-discharge relation at the downstream section. The GQ input data may not be used together with the GB records.

Field	Variable	Value	Description
First GQ Record			
0	IA	GQ	Record identification characters
1	KQL	+	Number of points used to define base-level changes
Succeeding GQ Record(s)			
0	IA	GQ	Record identification characters
1	BSLL(1)	+	Base level of point 1, in ft or m
2	TMQ(1)	+	Discharge of point 1, in cfs or cms
3	BSLL(2)	+	Base level of point 2, in ft or m
4	TMQ(2)	+	Discharge of point 2, in cfs or cms

Continue with additional elevations and discharges, in the increasing order of discharge.

GI Records - These optional records are used to define the sediment discharge entering the study reach through the upstream cross section. The GI input data, if included, will supersede other methods for determining sediment inflow. The sediment inflow is specified in the three following ways:

Case 1. Sediment inflow at the upstream section as a time series - For the first case, bed material composition is based on the GS record of the upstream section. The geometry of the upstream section does not change.

Case 2. Sediment feeding such as from a dam breach or from a sediment feeder – For this case, an additional imaginary section needs to be added, located at the distance of DXU upstream from the upstream section. A set of GS records is used to specify the sediment composition of the inflow sediment. The imaginary section does not change in geometry but the upstream section may undergo geometry changes.

Case 3. Sediment rating curve – For this case, sediment inflow is defined by a rating curve in the form $Q_s = C Q^N$. In which, Q_s is the sediment discharge in tons per day; C is a coefficient; and N is an exponent.

Field	Variable	Value	Description
First GI Record			
0	IA	GI	Record identification characters
1	KGI	+	Number of points used to define time variation of sediment inflow. This parameter is used for cases 1 and 2. It is left blank for case 3
2	DXU	+	Distance of sediment feeding point to the upstream section, in ft or m.
3	EXPORAT	+	Exponent N for the sediment rating curve used for case 3. This field is left blank for cases 1 and 2.
4	COERAT	+	Coefficient for the sediment rating curve used for case 3. This field is left blank for cases 1 and 2.
Succeeding GI Record(s)			
0	IA	GI	Record identification characters
1	QSU(1)	+	Sediment discharge of point 1, in cubic ft or m (net volume) per second
2	TMGI(1)	+	Time coordinate of point 1, in hours
3	QSO(2)	+	Sediment discharge of point 2
4	TMGI(2)	+	Time coordinate of point 2.

Continue with additional sediment discharges and time coordinates, in the increasing order of time coordinates.

X1 Record - This record is required for each cross section (175 cross sections can be used for the study reach); it is used to specify the cross-sectional geometry and program options applicable to that cross-section. Cross sections are arranged in sequential order starting from downstream.

Field	Variable	Value	Description
0	IA	X1	Record identification characters
1	SECNO	+	Original section number from the map
2	NP	+	Total number of stations or points on the next GR records for current cross section
3-6			These fields (Fields 3 to 6) are not used in the model. Numbers in these fields are ignored.
7	DX	+	Length of reach between current cross section and the next downstream section along the thalweg, in feet or meters
8	YFAC	0 +	Cross-section stations are not modified by the factor YFAC. Factor by which all cross-section stations are multiplied to increase or decrease area. It also multiplies YC1, YC2 and CPC in the XF record, and applies to the CI record.
9	PXSECE	0 ±	Vertical or Z coordinate of GR points are not modified. Constant by which all cross-section elevations are raised or lowered
10	NODA	0 1 10	Cross section is subject to change. Cross section is not subject to change. This cross section to be included in each summary output

XF Record - This is an optional record used to specify special features of a cross section.

Field	Variable	Value	Description
0	IA	XF	Record identification characters
1	YC1	0 +	Regular erodible left bank Station of rigid left bank in ft or m, to the left of which channel is nonerodible. Note: This station is located at toe of rigid bank; its value must be non-zero and must be equal to one of the Y coordinates in GR records but not the first Y coordinate.
2	YC2	0	Regular erodible right bank

		+	Station of rigid right bank, to the right of which channel is non-erodible. Note: This station is located at toe of rigid bank; its value must be equal to one of the Y coordinates in GR records but not the last Y coordinate.
3	RAD	0	Straight channel with zero curvature
		+	Radius of curvature at channel centerline in ft or m. Center of radius is on same side of channel where the station (Y-coordinate) starts.
		-	Radius of curvature at channel centerline in ft or m. Center of radius is on opposite side of zero station. Note: RAD is used only if concave bank is rigid and so specified using the XF record. RAD produces a transverse bed scour due to curvature.
4	CN	0	Roughness of this section is the same as that given in Field 7 of the G1 record.
		+	Manning's <i>n</i> value for this section
5	CPC	0	Center of thalweg coincides with channel invert at this section.
		+	Station (Y-coordinate) of the thalweg in ft or m
6	IRC	0	Regular erodible cross section
		1	Rigid or nonerodible cross section such as drop structure or road crossing. There is no limit on the total number of such cross sections.
8	BSP	0	Slope of bank protection is the same as that given in Field 2 of the G3 record.
		+	Slope of bank protection at this section in BSP horizontal units on 1 vertical unit. Use 0.05 for vertical bank.
		5	Slope of rigid bank is defined by the GR coordinates.
9	BEFX	0	Bank erodibility factor is defined in Field 5 of the G1 record.
		+	A value between 0.1 and 1.0 for BEFX specifies the bank erodibility factor at this section.
	RWD	+	RWD is the width of bank protection of a small channel in the floodplain. Areas outside this zone remains erodible. RWD is specified by a value greater than 1 (ft or m) in this field. When RWD is used, BEFX is not specified.
10	TDZAM	0	Erodible bed layer at this section is defined by TDZAMA in Field 6 of the G3 record.
		+	Thickness of erodible bed layer in ft or m. Only one decimal place is allowed for this number.
	ENEB	±	Elevation of non-erodible bed, used to define the crest elevation of a grade-control structure which may be above or below the existing channel bed. In order to distinguish it from TDZAM, ENEB must have the value of 1 at the second decimal place. For example, the ENEB value of 365 should be inputted as 365.01 and the ENEB value

of -5.2 should be inputted as -5.21. When ENEB is specified, it supersedes TDZAM and TDZAMA

CI Record - This is an optional record used to specify channel improvement options due to excavation or fill. The excavation option modifies the cross-sectional geometry by trapezoidal excavation. Those points lower than the excavation level are not filled. The fill option modifies the cross-sectional geometry by raising the bed elevations to a prescribed level. Those points higher than the fill level are not lowered. Excavation and fill can not be used at the same time. This record should be placed after the X1 and XF records but before the GR records. The variable ADDVOL in Field 10 of this record is used to keep track of the total volume of excavation or fill along a channel reach. ADDVOL specifies the initial volume of fill or excavation. A value greater or less than 0.1 needs to be entered in this field to keep track of the total volume of fill or excavation until another ADDVOL is defined.

Field	Variable	Value	Description
0	IA	G5	Record identification characters
1	CLSTA	+	Station of the centerline of the trapezoidal excavation, expressed according to the stations in the GR records, in feet or meter.
2	CELCH	+	Elevation of channel invert for trapezoidal channel, in feet or meters.
4	XLSS	+	Side slope of trapezoidal excavation, in XLSS horizontal units for 1 vertical unit.
5	ELFIL	+	Fill elevation on channel bed, in feet or meters.
6	BW	+	Bed width of trapezoidal channel, in feet or meters. This width is measured along the cross section line; therefore, a larger value should be used if a section is skewed.
10	ADDVOL	0	Volume of excavation or fill, if any, is added to the total volume already defined.
		+	Initial volume of fill on channel bed, in cubic feet or cubic meters.
		-	Initial volume of excavation from channel bed, in cubic feet or meters.

GR Record - This record specifies the elevation and station of each point for a digitized cross section; it is required for each X1 record.

Field	Variable	Value	Description
0	IA	GR	Record identification characters

1	Z1	"	Elevation of point 1, in ft or m. It may be positive or negative.
2	Y1	"	Station of point 1, in ft or m
3	Z2	"	Elevation of point 2, in ft or m
4	Y2	"	Station of point 2, in ft or m

Continue with additional GR records using up to 399 points to describe the cross section. Stations should be in increasing order.

SB Record - This special bridge record is used to specify data in the special bridge routine. This record is used together with the BT and GR records for bridge hydraulics. This record is placed between cross sections that are upstream and downstream of the bridge.

Field	Variable	Value	Description
0	IA	SB	Record identification characters
1	XK	+	Pier shape coefficient for pier loss
2	XKOR	+	Total loss coefficient for orifice flow through bridge opening
3	COFQ	+	Discharge coefficient for weir flow overtopping bridge roadway
4	IB	+	Bridge index, starting with 1 from downstream toward upstream
5	BWC	+	Bottom width of bridge opening including any obstruction
6	BWP	0	No obstruction (pier) in the bridge
		i	Total width of obstruction (piers)
7	BAREA	+	Net area of bridge opening below the low chord in square feet
9	ELLC	+	Elevation of horizontal low chord for the bridge
10	ELTRD	+	Elevation of horizontal top-of-roadway for the bridge

BT Record - This record is used to compute conveyance in the bridge section. The BT data defines the top-of -roadway and the low chord profiles of bridge. The program uses the BT, SB and GR data to distinguish and to compute low flow, orifice flow and weir flow.

Field	Variable	Value	Description
0	IA	BT	Record identification characters

1	NRD	+	Number of points defining the bridge roadway and bridge low chord to be read on the BT records
2	RDST(1)	+	Roadway station corresponding to RDEL(1) and XLCEL(1)
3	RDEL(1)	+	Top of roadway elevation at station RDST(1)
4	XLCEL(1)	+	Low chord elevation at station RDST(1)
5	RDST(2)	+	Roadway station corresponding to RDEL(2) and XLCEL(2)
6	RDEL(2)	+	Top of roadway elevation at station RDST(2)
7	XLCEL(2)	+	Low chord elevation at station RDST(2)

Continue with additional sets of RDST, RDEL, and XLCEL.

EJ Record - This record is required following the last cross section for each job. Each group of records beginning with the T1 record is considered as a job.

Field	Variable	Value	Description
0	IA	EJ	Record identification characters
1-10			Not used

II. INPUT PREPARATION FOR TRIBUTARIES

Tributaries may be included in the simulation following either a simplified approach or a detailed approach. Mixed usage of these two approaches is not currently permitted.

In the simplified approach, cross-sectional data for a tributary are not required; the tributary water discharge is specified in the G2 record; and tributary inflow of sediment is related to the water inflow.

Cross-sectional data are required in the detailed approach. Such cross sections are arranged in sequence from the confluence toward upstream just as for the main channel cross sections. They are placed in the input file after the main channel cross sections. In addition, the following input specifications are required:

- (1) Use a negative sign for the first tributary section number, SECNO, in Field 1 of the X1 record. This section number is designated as ITR in the model.
- (2) Use a negative sign for a section number IHP1, IHP2, etc. in the G2 record. This section

number in the main channel is designated as ITM in the model.

(3) Include a GS record just after the cross-sectional data of the main stream. Place another GS record after the cross-sectional data of the tributary and just before the EJ record. This GS record is used to specify the bed-material composition at the upstream section of the tributary.

Nine tributaries for detailed analysis are currently allowed for a job. When selecting this option, unsteady routing may not be used.

III. OUTPUT DESCRIPTION

Output of the model includes initial bed-material compositions, time and spatial variations of the water-surface profile, channel width, flow depth, water discharge, velocity, energy gradient, median sediment size, and bed-material discharge. In addition, cross-sectional profiles are printed at different time intervals.

Symbols used in the output are generally descriptive, some of them are defined below:

SECTION	Cross section
TIME	Time on the hydrograph
DT	Size of the time step or Δt in sec
W.S.ELEV	Water-surface elevation in ft or m
WIDTH	Surface width of channel flow in ft or m
DEPTH	Depth of flow measured from channel invert to water surface in ft or m
Q	Discharge of flow in cfs or cms
V	Mean velocity of a cross-section in fps or mps
SLOPE	Energy gradient
D50	Median size or d_{50} of sediment load in mm
QS	Bed-material discharge for all size fractions in cfs or cms
FR	Froude number at a cross section
N	Manning's roughness coefficient
SED.YIELD	Bulk volume or weight of sediment having passed a cross section since beginning of simulation, in cubic yards or tons.
WSEL	Water-surface elevation, in ft or m
Z	Vertical coordinate (elevation) of a point on channel boundary at a cross-section, in ft or m
Y	Horizontal coordinate (station) of a point on channel boundary at a cross-section, in ft or m
DZ	Change in elevation during the current time step, in ft or m
TDZ	Total or accumulated change in elevation, in ft or m

IV. RUNNING THE MODEL

The executable file of FLUVIAL-12, FL12.EXE, may be run on a Personal Computer or a main-frame computer. To run it on a PC, just type the command FL12. The computer will respond by requesting the input file name and then the output file name. A math coprocessor is required for the PC.

The device codes for running this program on a main-frame computer are as follows: 1 for READ, 3 for WRITE into an output file, and 5 for WRITE at the terminal.

V. IMPORTANT MESSAGES FOR INPUT PREPARATION

1. The computing time of this program is sensitive to the reach length between two adjacent cross sections, DX. Very small reach lengths which may result in excessive computing time should be avoided. In HEC-2, a downstream section and an upstream section are usually used at each bridge crossing, but these two sections should be combined into one, if possible, for the FLUVIAL application.

2. The GR points used to define the ground profile should be selected to provide an accurate definition of the initial profile. As such, sufficient points should be used for each cross section. Also, large spacing between adjacent points should be avoided even if there is no difference in initial elevation. Detailed results rely upon the adequate number of points used. Use Field 10 of G5 record to insert points by interpolation.

3. The number of GR points used in defining the ground profile also affects the computing time because these points are executed a great number of times for each job. Points that are definitely outside the flow boundary level should be deleted during initial editing. However, because of the possibility for bank erosion, there should be sufficient points to cover any such potential changes.

4. Ineffective flow areas should be specified, either by excluding them from the GR points or by raising the GR elevations above the water level.

5. Very fine sediments with a grain size less than 0.0625 mm constitute the wash load and should normally be excluded from the size-fraction data on GS records.

6. The bank erodibility factor, BEF, in Field 5 of Record G1, is a control for the rate of channel widening. A small value slows down widening. This value should be calibrated against field data whenever possible.

7. The radius of curvature, RAD, in Field 3 of the XF record should be specified if lateral migration is simulated. The rate of lateral migration is controlled by RAD and the bank erodibility factor BEFX in Field 9 of the G3 record. In using this option, YC1 or YC2 should not be specified.

8. The radius of curvature r_c (or RAD) along a reach between two adjacent cross sections is computed by interpolating those defined at the cross sections. Since r_c has infinite value at a straight section, its adjacent reaches also have infinite r_c . For this reason, a curved reach must be between cross sections with finite r_c values.

APPENDIX C. SAMPLE INPUT LISTINGS

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T1      UPPER SAN DIEGO RIVER NEAR CHANNEL ROAD
T2      FOR SCOUR PREDICTION AT CHANNEL ROAD AFFECTED BY SAND MINING
T3      100-YEAR FLOOD, PEAK Q = 32000 CFS
G1  5.1  190.20    720    3    0.5          0.04  19.98  189.00    12.0
G2    11    40
G2 1250    0    1800    2    3200    8.5  10880    14  32000    19.8
G2 32000  20.1  22400   26   9600   34   7540   38   3200    50
G2 1400   50.1   4760   54  14000   60   9800   66   2800    70
G2 1250   70.1   3040   73   3800   75   2800   80   1250    90
G2 1250   90.1   3040   93   3800   95   2800  100   1250   120
G2 1250  120.1   3040  123   3800  125   2800  130   1250   140
G2 1400  140.1   4760  144  14000  150   9800  156   2800   170
G2 1250  170.1   3040  173   3800  175   2800  180   1250   190
G3 0.005
GS  0.2    0.2    0.75    0.2    1.50    0.2    2.80    0.2    6.5    0.2
GQ    5
GQ 365    500    367    1400    368    2500    374    7000    378  34000
NC  0.04    0.04    0.050    0.1    0.3
ET      5.1    7.1    5.1    1480    2200    1480    2050
X1  730    33  1442.0  2506.4    770    670    889.
XF      0.045
GR 381.4  1240.4  385.5  1248.9  385.1  1281.3  381.9  1287.2  381.8  1344.2
GR 380.9  1418.1  383.3  1423.8  383.7  1442.0  380.2  1450.2  373.6  1462.3
GR 371.3  1477.7  370.2  1538.5  369.6  1639.5  369.1  1690.7  367.9  1700.8
GR 366.9  1768.1  364.9  1794.5  363.8  1813.3  364.7  1867.4  368.5  1881.3
GR 369.2  1928.7  368.9  1962.0  366.4  1972.1  364.5  1981.5  366.1  1987.1
GR 365.8  2005.0  365.2  2006.3  365.2  2164.4  367.0  2167.6  380.0  2214.7
GR 380.0  2264.0  380.0    2300  380.0    2400
ET      5.1    7.1    9.1  1167.7    1800  1167.7    1700  1167.7    1850
X1  734    23  1167.7  1880.1    470    695    550    .95
GR 383.7  1100.0  383.7  1167.8  375.2  1179.4  371.2  1192.3    372  1221.7
GR 370.6  1266.5  370.9  1297.9  372.2  1314.7  371.1  1333.6  367.8  1347.4
GR 366.0  1382.7  367.4  1394.9  369.7  1408.6  371.2  1440.4  370.6  1523.1
GR 370.7  1629.9  371.8  1700.0  386.0  1735.0  386.4  1794.7  386.8  1821.3
GR 387.0  1900.0  387.4    1950  387.8    2000
NC      .3    .5
ET      5.1    7.1    5.1    820    1575    820    1470    1000    1350
X1  738    30    785  1773.9    300    255    298    .82
GR 393.6    785  393.6    785.1  392.4    793.5    387    810    382.3    823.8
GR 371    860    371    967.1    371  1006.6    371  1028.3    371  1040.8
GR 371.0  1059.7    371  1074.3    371  1101.2  369.5  1112.6  367.3  1144.7
GR 368.5  1158.1  368.7  1175.8  370.0  1187.1  372.7  1203.2  372.3  1268.1
GR 373.7  1297.5  373.3  1372.5  371.9  1382.6  371.6  1417.4  369.6  1441.5
GR 369.6  1470.0  388.0  1507.0  388.5  1597.4  389.0  1694.1  390.0  1800.3
QT    3  32000  32000    3200
NC  .060  .050  .035
ET      5.1    7.1    5.1    720    1475    720    1370    315    1150
X1  740    30    680  1751.8    130    130    172    .82

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XF				750						
GR	390	680	390	680.05	390	680.1	375	731.3	375	813.5
GR	375	840.4	374.7	856.6	372.7	867.8	372.6	982.3	372.7	1028.6
GR	373.6	1063.3	374.8	1074.1	373.8	1084.6	373.6	1101.5	376.3	1116.0
GR	373.6	1132.8	373.6	1157.4	373.6	1184.7	373.6	1197.2	373.2	1210.1
GR	373.0	1224.9	373.7	1261.1	372.3	1294.9	374.4	1318.2	372.9	1370.8
GR	389.0	1403.0	389.6	1540.3	390.0	1629.5	390.3	1674.2	390.5	1750.0
ET		5.1	7.1	5.1	680	950	680	905	550	800
X1	741	18	680	905	0	875	350			
XF				800						
GR	390	680	385	720	380	770	375	790	373	800
GR	373	810	373	860	373	870	375	880	380	900
GR	385	905	385	950	385	1175	391	1187	391.5	1250
GR	391.5	1300	391.7	1400	392	1500				
ET		5.1	7.1	5.1	420	700	420	700		
X1	744	44	420	655.0	195	205	315			
XF				0.035						
GR	401.6	0.0	399.9	40.8	395.7	62.5	394.4	95.7	394.6	151.7
GR	394.4	206.1	392.8	272.1	392.5	356.9	392.3	420	390	430
GR	385	455	380	480	375	490	373	500	373	581.8
GR	373.0	600	373	610	375	620.0	380.0	630.0	385.0	640
GR	390.0	655	391.0	700	391.6	835.7	389.6	1194.5	389.9	1316.4
GR	390.6	1407.6	392.6	1454.4	392.7	1537.6	393.8	1614.2	393.5	1656.5
GR	391.9	1705.9	392.7	1792.7	392.9	1881.6	393.5	1973.0	394.0	2089.8
GR	393.6	2185.3	393.5	2206.6	393.0	2216.3	393.7	2228.0	394.5	2288.3
GR	403.0	2315.7	413.5	2335.4	414.8	2337.6	416.2	2358.3		
NC	.050	.050	.045							
ET		5.1	7.1	5.1	50	870	300	730		
X1	750	45	115.6	629.2	245	250	307			
GR	400.8	0.0	401.0	16.9	399.1	29.3	396.5	35.6	394.6	59.4
GR	394.7	86.3	390.9	99.6	389.6	115.6	385.9	123.9	381.4	133.0
GR	380.0	182.8	379.6	255.9	377.3	281.8	377.3	415.2	377.3	527.8
GR	379.0	532.9	379.1	584.9	377.5	595.6	377.5	605.7	380.0	616.1
GR	390.7	629.2	391.7	691.1	393.2	760.5	409.3	763.4	409.3	834.1
GR	393.8	837.5	393.8	908.5	392.3	919.5	393.2	926.6	393.6	1040.7
GR	393.2	1152.6	393.1	1222.8	393.8	1320.3	393.3	1416.1	393.9	1526.0
GR	394.8	1646.2	396.9	1679.0	397.4	1735.9	398.3	1810.4	398.1	1885.5
GR	396.6	1908.9	399.2	1926.1	402.8	1940.8	406.2	1974.6	407.0	1998.3
NC	.035	.050	.070	.1	.3					
ET		5.1	7.1	5.1	1	744.6	70	620		
X1	760	44	73.3	620.7	415	715	547			
GR	406.1	0.0	406.5	29.9	399.9	41.2	398.6	57.7	394.3	73.3
GR	386.7	87.9	381.9	95.6	382.3	129.4	378.3	136.2	377.9	186.8
GR	377.4	258.2	377.8	283.5	380.1	294.7	381.2	335.6	380.9	401.8
GR	383.3	426.0	383.3	480.5	380.8	498.6	383.1	508.7	384.2	539.1
GR	382.3	554.2	382.9	583.2	385.4	601.0	392.4	620.7	394.0	641.7
GR	395.6	705.1	396.8	744.6	394.4	792.8	395.2	835.2	397.0	880.1
GR	398.9	987.4	398.3	1025.7	397.6	1086.3	397.9	1156.8	399.7	1168.8
GR	404.9	1187.5	408.2	1203.4	408.6	1266.0	409.3	1311.5	402.5	1325.9
GR	397.4	1341.7	397.9	1405.0	399.3	1476.3	398.3	1612.4		

ET			7.1				220	897.3		
X1	764	29	246.4	703.8	770	690	731			
GR	407.6	0.0	405.9	23.8	403.8	30.8	402.6	76.3	401.6	122.8
GR	402.4	204.5	395.4	216.4	386.7	233.6	388.9	246.4	386.3	272.7
GR	386.1	280.7	381.6	291.0	380.4	322.9	380.1	390.3	379.5	440.7
GR	380.4	469.4	381.7	532.9	381.4	556.4	379.6	569.3	379.3	620.9
GR	379.9	638.2	381.3	677.0	383.7	684.6	389.8	692.1	393.9	703.8
GR	395.6	731.1	395.9	793.7	396.9	850.8	396.7	897.3		
ET		5.1	7.1	5.1	380	1335	400	1335		
X1	765	42	493.7	1228.6	660	160	604			
GR	411.6	0.0	411.7	64.8	406.3	79.3	398.4	98.1	396.5	106.6
GR	396.4	191.7	397.2	285.4	395.9	335.7	396.2	444.8	395.7	493.7
GR	392.5	515.9	390.1	528.0	391.1	537.3	390.2	569.5	388.7	624.2
GR	385.4	630.8	384.3	653.4	383.2	658.0	384.9	663.7	387.9	668.6
GR	387.6	708.6	386.9	732.1	386.1	769.8	385.2	834.1	383.7	851.4
GR	383.9	875.9	385.6	894.3	388.9	959.4	388.7	1040.4	386.3	1054.1
GR	389.1	1065.0	390.3	1122.2	393.1	1186.4	395.5	1228.6	395.7	1312.3
GR	396.5	1369.3	399.1	1472.8	399.1	1582.3	400.0	1666.6	399.9	1791.8
GR	399.4	1905.3	399.6	2008.9						
X1	770	35	493.7	1228.6	400	400	400		1	
GR	396.4	191.7	397.2	285.4	395.9	335.7	396.2	444.8	395.7	493.7
GR	392.5	515.9	390.1	528.0	391.1	537.3	390.2	569.5	388.7	624.2
GR	385.4	630.8	384.3	653.4	383.2	658.0	384.9	663.7	387.9	668.6
GR	387.6	708.6	386.9	732.1	386.1	769.8	385.2	834.1	383.7	851.4
GR	383.9	875.9	385.6	894.3	388.9	959.4	388.7	1040.4	386.3	1054.1
GR	389.1	1065.0	390.3	1122.2	393.1	1186.4	395.5	1228.6	395.7	1312.3
GR	396.5	1369.3	399.1	1472.8	399.1	1582.3	400.0	1666.6	399.9	1791.8
GS	0.2	0.2	0.75	0.2	1.50	0.2	2.80	0.2	6.5	0.2
EJ										

APPENDIX D. SAMPLE OUTPUT LISTINGS

INITIAL BED MATERIAL COMPOSITION

SECTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION
730.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
734.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
738.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
740.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
741.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
744.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
750.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
760.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
764.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
765.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200
770.00	0.20	0.200	0.75	0.200	1.50	0.200	2.80	0.200	6.50	0.200

THE ENGELUND-HANSEN SEDIMENT FORMULA IS USED

TIME = 5.10 HRS DT = 100 SECS TIME STEP = 0

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD C. Y.
730.00	367.97	384.5	4.17	2467	2.71	0.00215	1.39	1.62	0.31	0.903E+01
734.00	371.32	384.6	5.32	2467	5.75	0.02074	1.67	32.80	0.96	0.182E+03
738.00	373.40	461.6	6.10	2467	2.23	0.00113	1.32	0.54	0.25	0.300E+01
740.00	374.29	390.6	1.99	2467	5.62	0.01967	1.69	29.81	0.94	0.166E+03
741.00	377.53	110.2	4.53	2467	5.98	0.00450	1.54	6.57	0.54	0.366E+02
744.00	378.60	144.4	5.60	2467	3.36	0.00073	1.45	0.61	0.26	0.339E+01
750.00	379.24	352.9	1.94	2467	4.52	0.00826	1.54	7.84	0.64	0.436E+02
760.00	381.81	292.5	4.41	2467	3.33	0.00234	1.50	1.35	0.37	0.752E+01
764.00	383.07	395.0	3.77	2467	2.33	0.00106	1.39	0.52	0.25	0.287E+01
765.00	386.95	236.0	3.75	2467	6.74	0.01854	1.67	38.42	0.95	0.214E+03
770.00	389.87	432.7	5.67	2467	2.56	0.00164	1.50	0.99	0.30	0.553E+01

TIME = 9.96 HRS DT = 395 SECS TIME STEP = 60

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD C. Y.
730.00	371.65	706.9	6.55	5239	2.09	0.00075	0.54	0.58	0.20	0.349E+04
734.00	372.51	487.6	8.73	5239	4.43	0.00440	1.52	7.73	0.50	0.135E+05
738.00	374.04	512.6	4.87	5239	4.89	0.00649	1.93	11.97	0.60	0.104E+05
740.00	375.19	514.5	4.94	5239	5.13	0.00768	2.74	12.76	0.64	0.137E+05
741.00	376.90	117.4	6.10	5239	8.07	0.00500	2.94	12.69	0.60	0.121E+05
744.00	378.48	146.4	4.92	5239	7.63	0.00423	2.77	10.11	0.62	0.802E+04
750.00	380.56	452.5	3.80	5239	4.45	0.00403	1.49	8.22	0.49	0.825E+04
760.00	382.82	381.6	4.98	5239	4.97	0.00464	1.22	9.24	0.53	0.670E+04
764.00	385.35	404.2	4.06	5239	3.89	0.00221	0.57	5.23	0.38	0.716E+04
765.00	387.37	287.5	6.06	5239	6.09	0.00632	1.76	16.18	0.62	0.230E+05
770.00	390.07	454.1	5.87	5239	4.97	0.00586	1.50	13.30	0.57	0.151E+05

TIME = 16.80 HRS DT = 720 SECS TIME STEP = 96

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD C. Y.
730.00	376.08	735.7	7.75	21069	5.57	0.00322	0.88	12.01	0.43	0.362E+05
734.00	377.83	509.3	7.88	21069	7.65	0.00449	1.85	19.44	0.58	0.870E+05
738.00	379.18	509.8	10.27	21069	7.56	0.00432	1.44	15.02	0.57	0.100E+06
740.00	379.93	536.2	9.40	21069	8.05	0.00571	2.36	22.21	0.64	0.114E+06
741.00	381.02	210.2	11.29	21069	10.25	0.00374	2.22	19.74	0.58	0.121E+06
744.00	381.97	203.0	11.12	21069	10.77	0.00323	1.95	18.50	0.61	0.104E+06
750.00	384.27	488.6	7.52	21069	7.39	0.00379	1.40	16.65	0.54	0.921E+05

760.00	386.40	514.5	9.31	21069	7.32	0.00393	1.50	16.66	0.54	0.925E+05
764.00	389.22	469.7	6.61	21069	7.56	0.00391	1.59	16.68	0.55	0.912E+05
765.00	391.88	639.3	10.49	21069	6.85	0.00422	1.50	16.17	0.55	0.112E+06
770.00	393.59	659.4	9.39	21069	6.80	0.00429	1.50	16.21	0.55	0.104E+06

TIME = 19.99 HRS DT = 720 SECS TIME STEP = 117

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD C. Y.
730.00	377.70	745.4	8.27	32000	7.46	0.00495	1.80	19.75	0.55	0.161E+06
734.00	379.97	516.5	9.49	32000	8.99	0.00450	2.02	19.80	0.60	0.224E+06
738.00	381.35	531.7	8.92	32000	9.02	0.00472	2.04	22.86	0.62	0.244E+06
740.00	382.13	543.9	9.73	32000	9.47	0.00574	2.57	25.55	0.67	0.260E+06
741.00	383.83	413.5	14.37	32000	9.18	0.00362	1.95	18.76	0.56	0.271E+06
744.00	384.35	265.7	12.52	32000	11.08	0.00292	1.65	19.85	0.59	0.240E+06
750.00	386.33	500.1	9.44	32000	8.50	0.00358	1.41	19.72	0.55	0.218E+06
760.00	388.34	522.5	10.69	32000	8.33	0.00355	1.48	18.99	0.54	0.220E+06
764.00	390.87	475.3	8.66	32000	8.68	0.00361	1.62	19.25	0.55	0.220E+06
765.00	393.47	683.6	12.04	32000	7.78	0.00405	1.49	19.34	0.56	0.238E+06
770.00	395.11	699.4	10.91	32000	7.75	0.00410	1.50	19.34	0.56	0.230E+06

ID

10 SECTION 765.00 TIME = 19.99 HRS WS = 393.47 WIDTH = 683.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
411.60	0.00	0.00	0.0	411.70	0.00	0.00	64.8	406.30	0.00	0.00	79.3
398.40	0.00	0.00	98.1	396.50	0.00	0.00	106.6	396.40	0.00	0.00	191.7
397.20	0.00	0.00	285.4	395.90	0.00	0.00	335.7	396.20	0.00	0.00	444.8
395.70	0.00	0.00	493.7	392.50	0.00	0.00	515.9	390.12	0.00	0.02	528.0
391.12	0.00	0.02	537.3	390.22	0.00	0.02	569.5	388.09	0.00	-0.61	624.2
383.34	0.00	-2.06	630.8	381.43	0.00	-2.87	653.4	381.43	0.00	-1.77	658.0
383.66	0.00	-1.24	663.7	387.18	0.00	-0.72	668.6	387.61	0.00	0.01	708.6
386.85	0.00	-0.05	732.1	384.32	0.00	-1.78	769.8	383.09	0.00	-2.11	834.1
381.49	0.00	-2.21	851.4	381.80	0.00	-2.10	875.9	384.54	0.00	-1.06	894.3
388.93	0.00	0.03	959.4	388.74	0.00	0.04	1040.4	386.40	0.00	0.10	1054.1
389.13	0.00	0.03	1065.0	390.32	0.00	0.02	1122.2	393.10	0.00	0.00	1186.4
395.50	0.00	0.00	1228.6	395.70	0.00	0.00	1312.3	396.50	0.00	0.00	1369.3
399.10	0.00	0.00	1472.8	399.10	0.00	0.00	1582.3	400.00	0.00	0.00	1666.6
399.90	0.00	0.00	1791.8	399.40	0.00	0.00	1905.3	399.60	0.00	0.00	2008.9

ID

9 SECTION 764.00 TIME = 19.99 HRS WS = 390.87 WIDTH = 475.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
407.60	0.00	0.00	0.0	405.90	0.00	0.00	23.8	403.80	0.00	0.00	30.8
402.60	0.00	0.00	76.3	401.60	0.00	0.00	122.8	402.40	0.00	0.00	204.5

395.40	0.00	0.00	216.4	384.79	0.00	-1.91	232.4	388.88	0.00	-0.02	246.4
383.82	0.00	-2.48	271.2	384.70	0.00	-1.40	280.5	382.67	0.00	1.07	289.6
382.60	0.00	2.20	322.9	382.51	0.00	2.41	390.3	382.41	0.00	2.91	440.7
382.40	0.00	2.00	469.4	382.34	0.00	0.64	532.9	382.29	0.00	0.89	556.4
382.26	0.00	2.66	569.3	382.21	0.00	2.91	620.9	382.87	0.00	2.97	638.2
383.24	0.00	1.94	677.6	383.52	0.00	-0.18	687.0	387.25	0.00	-2.55	692.2
393.90	0.00	0.00	703.8	395.60	0.00	0.00	731.1	395.90	0.00	0.00	793.7
396.90	0.00	0.00	850.8	396.70	0.00	0.00	897.3				

ID

8 SECTION 760.00 TIME = 19.99 HRS WS = 388.34 WIDTH = 522.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
406.10	0.00	0.00	0.0	406.50	0.00	0.00	29.9	399.90	0.00	0.00	41.2
398.60	0.00	0.00	57.7	394.30	0.00	0.00	73.3	387.06	0.00	0.36	88.1
383.88	0.00	1.98	96.8	382.05	0.00	-0.25	129.4	377.81	0.00	-0.49	136.0
377.67	0.02	-0.23	186.8	377.67	0.02	0.27	258.2	377.67	0.02	-0.13	283.5
379.65	0.00	-0.45	294.7	380.53	0.00	-0.67	335.6	380.14	0.00	-0.76	402.1
383.28	0.00	-0.02	426.0	383.29	0.00	-0.01	480.5	380.34	0.00	-0.46	498.3
383.09	0.00	-0.01	508.7	384.23	0.00	0.03	539.1	382.30	0.00	0.00	554.1
384.82	0.00	1.92	582.1	385.99	0.00	0.59	600.7	392.40	0.00	0.00	620.7
394.00	0.00	0.00	641.7	395.60	0.00	0.00	705.1	396.80	0.00	0.00	744.6
394.40	0.00	0.00	792.8	395.20	0.00	0.00	835.2	397.00	0.00	0.00	880.1
398.90	0.00	0.00	987.4	398.30	0.00	0.00	1025.7	397.60	0.00	0.00	1086.3
397.90	0.00	0.00	1156.8	399.70	0.00	0.00	1168.8	404.90	0.00	0.00	1187.5
408.20	0.00	0.00	1203.4	408.60	0.00	0.00	1266.0	409.30	0.00	0.00	1311.5
402.50	0.00	0.00	1325.9	397.40	0.00	0.00	1341.7	397.90	0.00	0.00	1405.0
399.30	0.00	0.00	1476.3	398.30	0.00	0.00	1612.4				

ID

7 SECTION 750.00 TIME = 19.99 HRS WS = 386.33 WIDTH = 500.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
400.80	0.00	0.00	0.0	401.00	0.00	0.00	16.9	399.10	0.00	0.00	29.3
396.50	0.00	0.00	35.6	394.60	0.00	0.00	59.4	394.70	0.00	0.00	86.3
390.90	0.00	0.00	99.6	389.60	0.00	0.00	115.6	385.63	0.62	-0.27	123.7
383.82	-0.01	2.42	134.2	380.50	-0.02	0.50	182.8	380.18	-0.03	0.58	255.9
377.67	-0.04	0.37	281.9	376.82	-0.07	-0.48	415.2	376.82	-0.07	-0.48	527.8
379.05	-0.05	0.05	532.9	379.28	-0.05	0.18	584.9	377.45	-0.06	-0.05	595.6
378.05	-0.05	0.55	605.4	383.53	0.29	3.53	614.9	390.36	0.00	-0.34	629.2
391.70	0.00	0.00	691.1	400.26	0.00	7.06	760.5	402.37	0.00	-6.94	763.4
402.77	0.00	-6.53	834.1	400.30	0.00	6.50	837.5	393.80	0.00	0.00	908.5
392.30	0.00	0.00	919.5	393.20	0.00	0.00	926.6	393.60	0.00	0.00	1040.7
393.20	0.00	0.00	1152.6	393.10	0.00	0.00	1222.8	393.80	0.00	0.00	1320.3
393.30	0.00	0.00	1416.1	393.90	0.00	0.00	1526.0	394.80	0.00	0.00	1646.2
396.90	0.00	0.00	1679.0	397.40	0.00	0.00	1735.9	398.30	0.00	0.00	1810.4
398.10	0.00	0.00	1885.5	396.60	0.00	0.00	1908.9	399.20	0.00	0.00	1926.1
402.80	0.00	0.00	1940.8	406.20	0.00	0.00	1974.6	407.00	0.00	0.00	1998.3

ID

6 SECTION 744.00 TIME = 19.99 HRS WS = 384.35 WIDTH = 265.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
401.60	0.00	0.00	0.0	399.90	0.00	0.00	40.8	395.70	0.00	0.00	62.5
394.40	0.00	0.00	95.7	394.60	0.00	0.00	151.7	394.40	0.00	0.00	206.1
392.80	0.00	0.00	272.1	392.50	0.00	0.00	356.9	386.14	-0.42	-6.16	420.0
384.03	0.07	-5.97	422.9	372.89	0.00	-12.11	442.6	372.89	0.00	-7.11	469.9
372.89	0.00	-2.11	487.2	372.89	0.00	-0.11	500.0	372.89	0.00	-0.11	581.8
372.89	0.00	-0.11	600.0	372.10	0.27	-0.90	610.0	372.10	0.27	-2.90	622.3
372.10	0.27	-7.90	634.9	372.10	0.27	-12.90	652.0	372.10	0.27	-17.90	668.1
391.00	0.00	0.00	700.0	391.60	0.00	0.00	835.7	389.60	0.00	0.00	1194.5
389.90	0.00	0.00	1316.4	390.60	0.00	0.00	1407.6	392.60	0.00	0.00	1454.4
392.70	0.00	0.00	1537.6	393.80	0.00	0.00	1614.2	393.50	0.00	0.00	1656.5
391.90	0.00	0.00	1705.9	392.70	0.00	0.00	1792.7	392.90	0.00	0.00	1881.6
393.50	0.00	0.00	1973.0	394.00	0.00	0.00	2089.8	393.60	0.00	0.00	2185.3
393.50	0.00	0.00	2206.6	393.00	0.00	0.00	2216.3	393.70	0.00	0.00	2228.0
394.50	0.00	0.00	2288.3	403.00	0.00	0.00	2315.7	413.50	0.00	0.00	2335.4
414.80	0.00	0.00	2337.6	416.20	0.00	0.00	2358.3				

ID

5 SECTION 741.00 TIME = 19.99 HRS WS = 383.83 WIDTH = 413.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
390.00	0.00	0.00	680.0	373.57	-1.20	-11.43	715.3	370.65	1.00	-9.35	739.2
370.65	1.13	-4.35	781.6	370.65	1.19	-2.35	800.0	370.65	1.16	-2.35	810.0
370.65	1.00	-2.35	860.0	370.65	0.97	-2.35	870.0	370.65	0.91	-4.35	889.1
370.65	0.86	-9.35	904.3	370.65	0.76	-14.35	933.6	379.88	-1.20	-5.12	951.5
385.00	0.00	0.00	1175.0	391.00	0.00	0.00	1187.0	391.50	0.00	0.00	1250.0
391.50	0.00	0.00	1300.0	391.70	0.00	0.00	1400.0	392.00	0.00	0.00	1500.0

ID

4 SECTION 740.00 TIME = 19.99 HRS WS = 382.13 WIDTH = 543.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
390.00	0.00	0.00	557.6	390.00	0.00	0.00	557.8	390.00	0.00	0.00	558.0
371.78	-0.65	-3.22	596.8	374.89	-0.70	-0.11	667.1	375.22	-0.64	0.22	689.1
375.26	-0.61	0.56	702.6	371.85	-0.55	-0.85	711.8	372.43	-0.62	-0.17	805.5
373.61	-0.52	0.91	843.5	375.88	-0.35	2.28	872.0	377.27	-0.26	2.47	880.8
376.45	-0.29	2.65	889.3	376.26	-0.29	2.66	903.4	378.59	-0.16	2.29	915.1
376.73	-0.23	3.13	928.7	377.28	-0.19	3.68	949.1	377.56	-0.16	3.96	971.5
377.67	-0.14	4.07	981.7	377.56	-0.14	4.36	992.3	377.56	-0.12	4.56	1004.4
378.18	-0.08	4.48	1034.1	377.73	-0.06	5.43	1061.8	379.60	0.90	5.20	1080.4
382.17	0.00	9.27	1119.7	389.00	0.00	0.00	1150.5	389.60	0.00	0.00	1263.0
390.00	0.00	0.00	1336.2	390.30	0.00	0.00	1372.8	390.50	0.00	0.00	1435.0

ID

3 SECTION 738.00 TIME = 19.99 HRS WS = 381.35 WIDTH = 531.7

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393.60	0.00	0.00	643.7	393.60	0.00	0.00	643.9	392.40	0.00	0.00	650.7
387.00	0.00	0.00	664.2	382.30	0.00	0.00	675.5	375.05	0.15	4.05	701.6
373.55	0.16	2.55	793.0	374.38	0.16	3.38	825.4	374.05	0.16	3.05	843.2
373.90	0.16	2.90	853.5	373.68	0.16	2.68	869.0	373.50	0.17	2.50	880.9
373.17	0.17	2.17	903.0	373.02	0.17	3.52	912.3	372.60	0.17	5.30	938.7
372.78	0.17	4.28	949.6	373.01	0.17	4.31	964.2	373.16	0.17	3.16	973.4
373.92	0.16	1.21	986.6	374.14	0.16	1.84	1040.8	376.55	0.13	2.85	1063.9
375.54	0.14	2.24	1124.5	376.50	0.13	4.60	1133.7	376.74	0.13	5.14	1162.3
375.87	0.14	6.27	1182.0	379.79	0.08	10.19	1204.4	388.00	0.00	0.00	1235.7
388.50	0.00	0.00	1309.9	389.00	0.00	0.00	1389.2	390.00	0.00	0.00	1476.2

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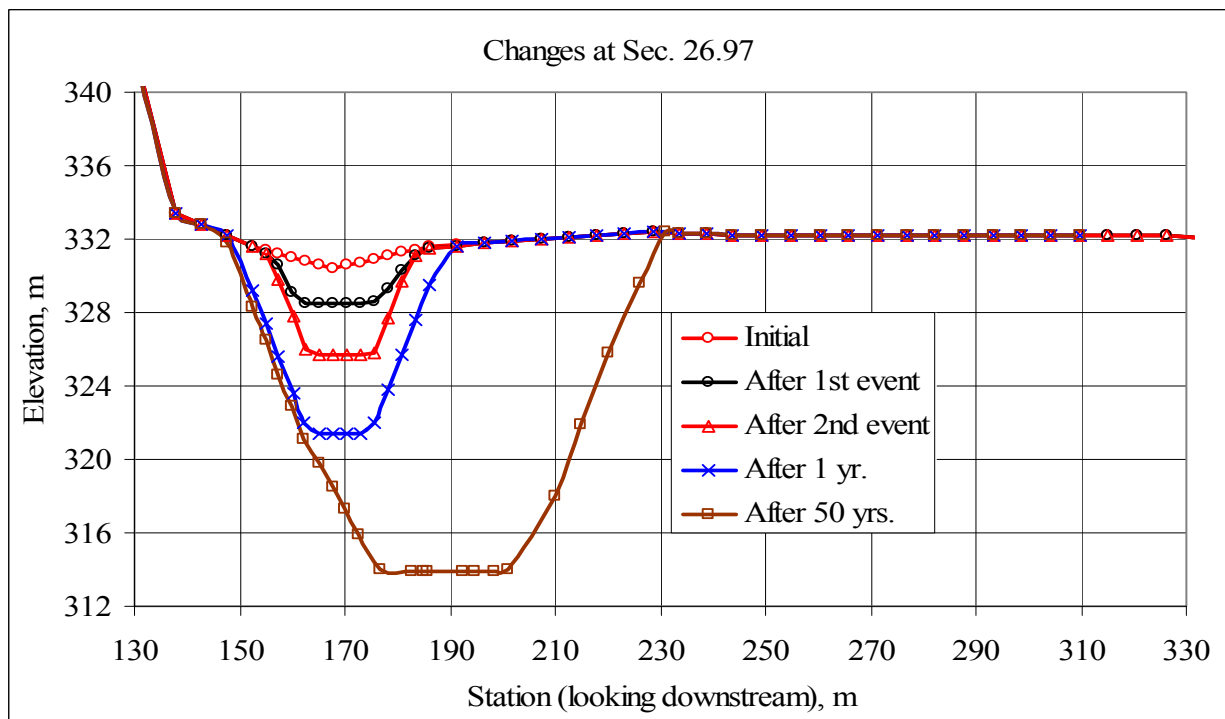
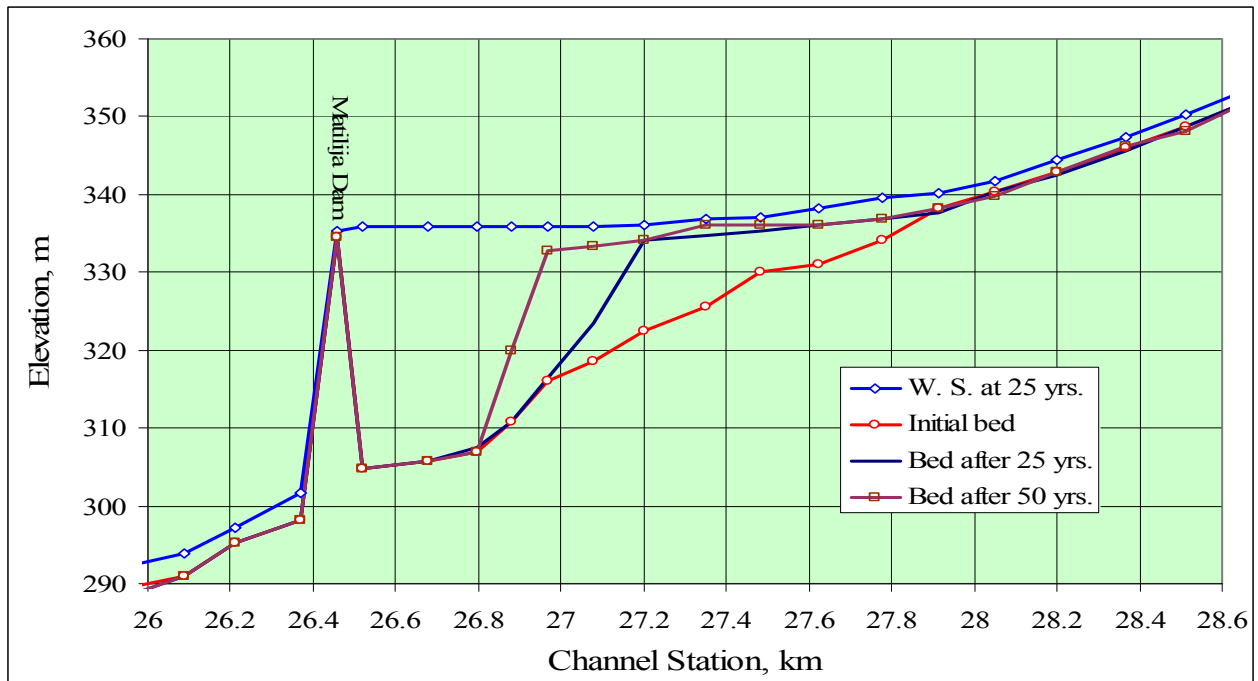
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373.59	0.09	2.39	1132.7	374.07	0.09	2.07	1160.6	372.86	0.10	2.26	1203.2
373.09	0.10	2.19	1233.0	374.06	0.09	1.86	1249.0	373.24	0.10	2.14	1266.9
370.64	0.12	2.84	1280.0	370.59	0.12	4.59	1313.6	370.61	0.12	3.21	1325.2
371.49	0.11	1.79	1338.2	373.36	0.10	2.16	1368.4	372.93	0.10	2.33	1446.9
373.30	0.10	2.60	1548.4	374.18	0.09	2.38	1615.0	386.00	0.00	0.00	1648.2
386.40	0.00	0.00	1705.0	386.80	0.00	0.00	1730.2	387.00	0.00	0.00	1805.0
387.40	0.00	0.00	1852.5	387.80	0.00	0.00	1900.0				

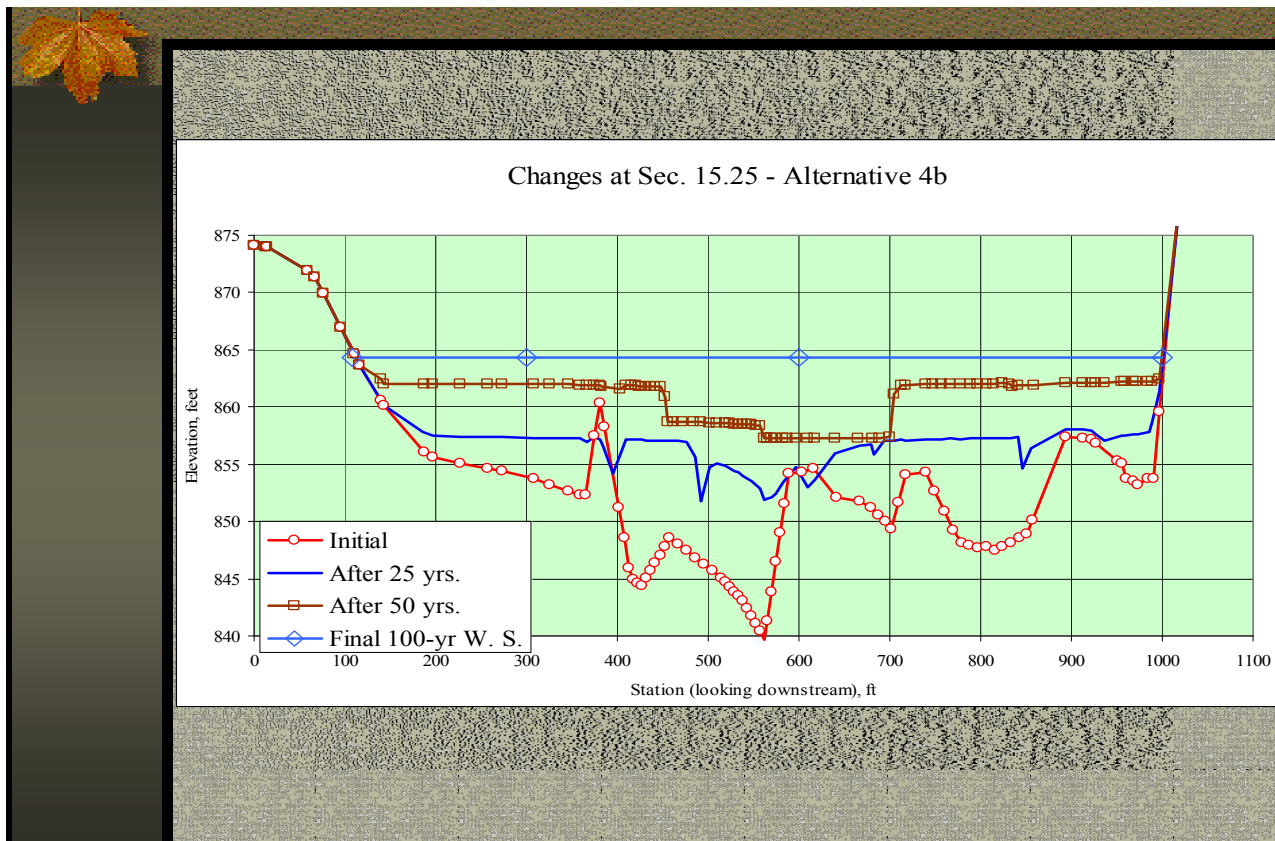
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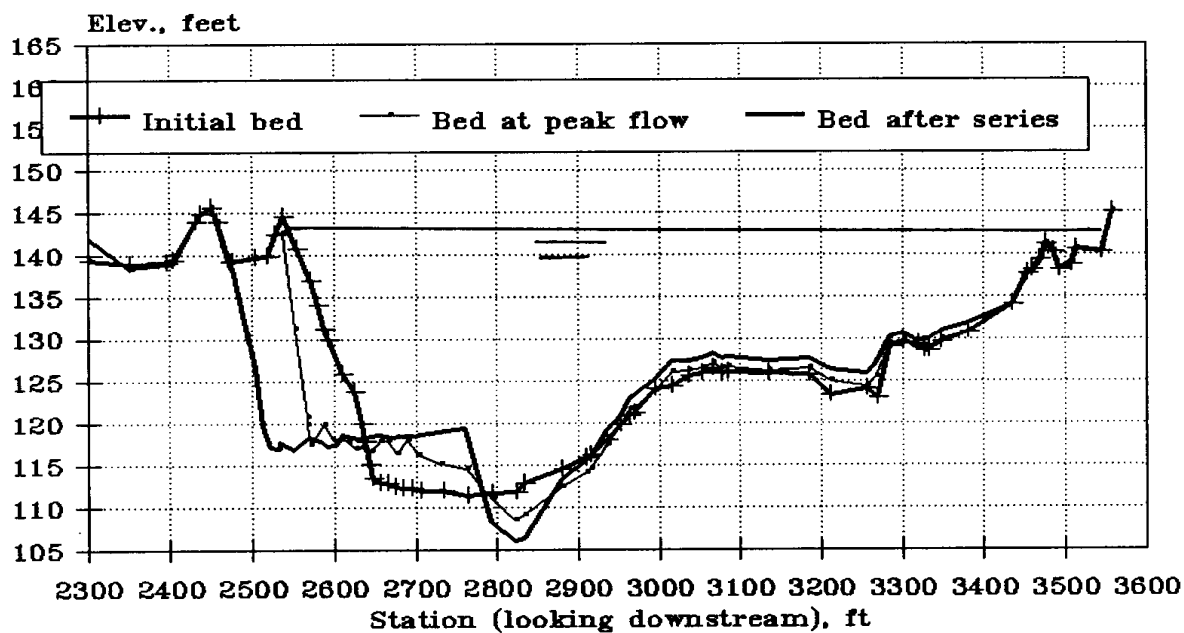
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381.40	0.00	0.00	1240.4	385.50	0.00	0.00	1248.9	385.10	0.00	0.00	1281.3
381.90	0.00	0.00	1287.2	381.80	0.00	0.00	1344.2	380.90	0.00	0.00	1418.1
383.30	0.00	0.00	1423.8	383.70	0.00	0.00	1442.0	380.20	0.00	0.00	1450.2
375.30	0.00	1.70	1462.3	374.03	0.00	2.73	1477.7	373.35	0.00	3.15	1538.5
372.97	0.00	3.37	1639.5	372.65	0.00	3.55	1690.7	372.09	0.00	4.19	1700.8
371.55	0.00	4.65	1768.1	370.22	0.00	5.32	1794.5	369.44	0.00	5.64	1813.3
370.08	0.00	5.38	1867.4	372.32	0.00	3.82	1881.3	372.71	0.00	3.51	1928.7
372.52	0.00	3.62	1962.0	371.23	0.00	4.83	1972.1	369.94	0.00	5.44	1981.5
371.04	0.00	4.94	1987.1	370.84	0.00	5.04	2005.0	370.43	0.00	5.23	2006.3
370.43	0.00	5.23	2164.4	371.61	0.00	4.61	2167.6	380.00	0.00	0.00	2214.7
380.00	0.00	0.00	2264.0	380.00	0.00	0.00	2300.0	380.00	0.00	0.00	2400.0

SAMPLE GRAPHICAL RESULTS

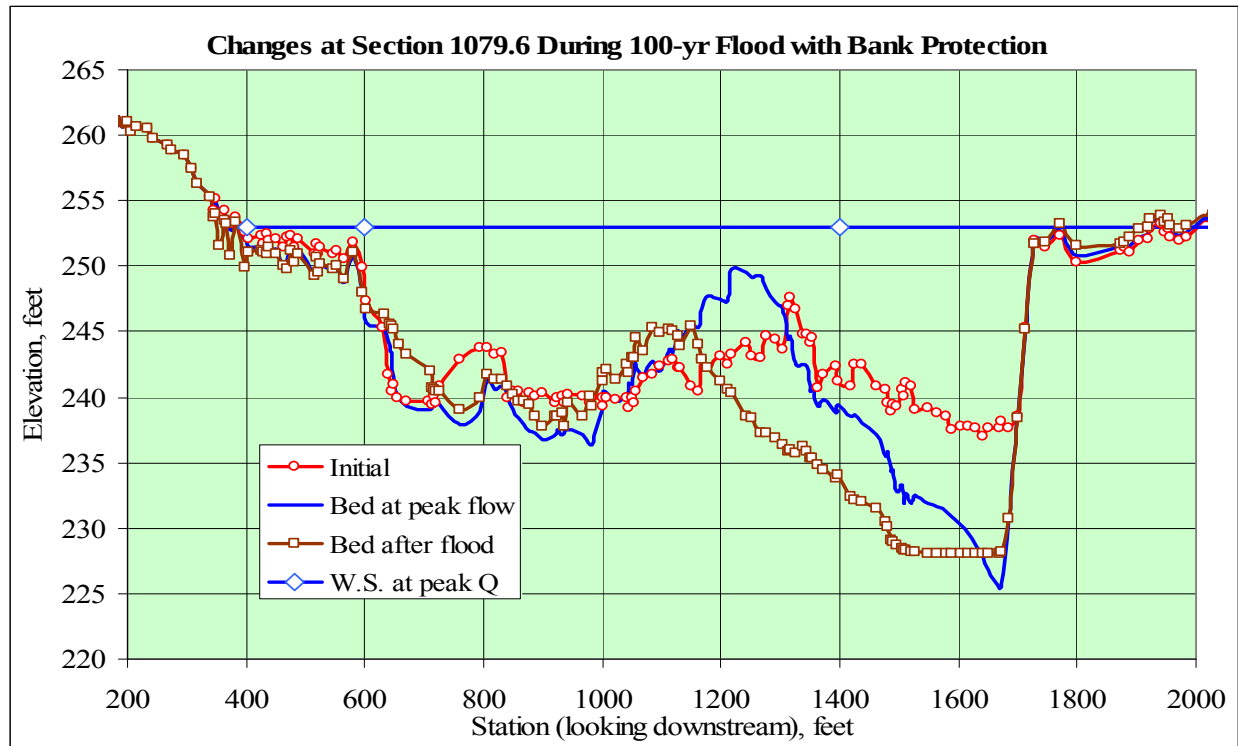




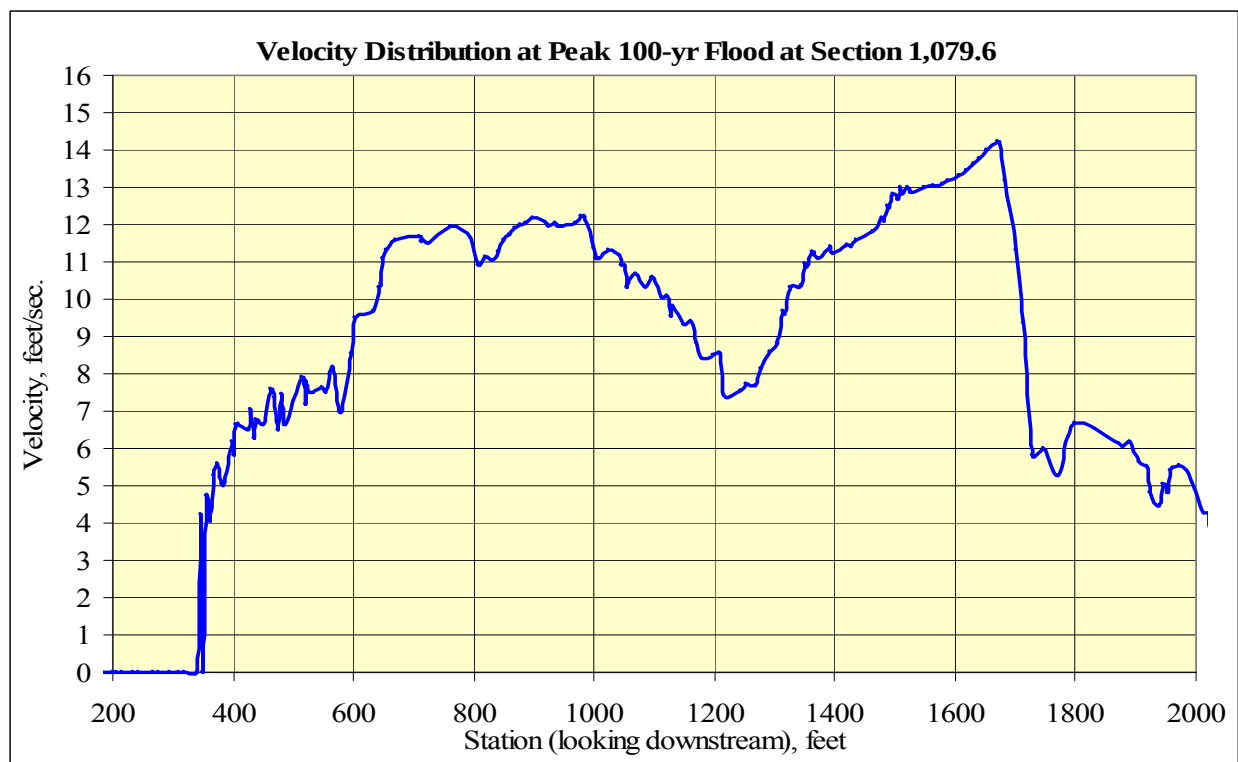
Sediment deposition in channel induced by check dam on downstream side



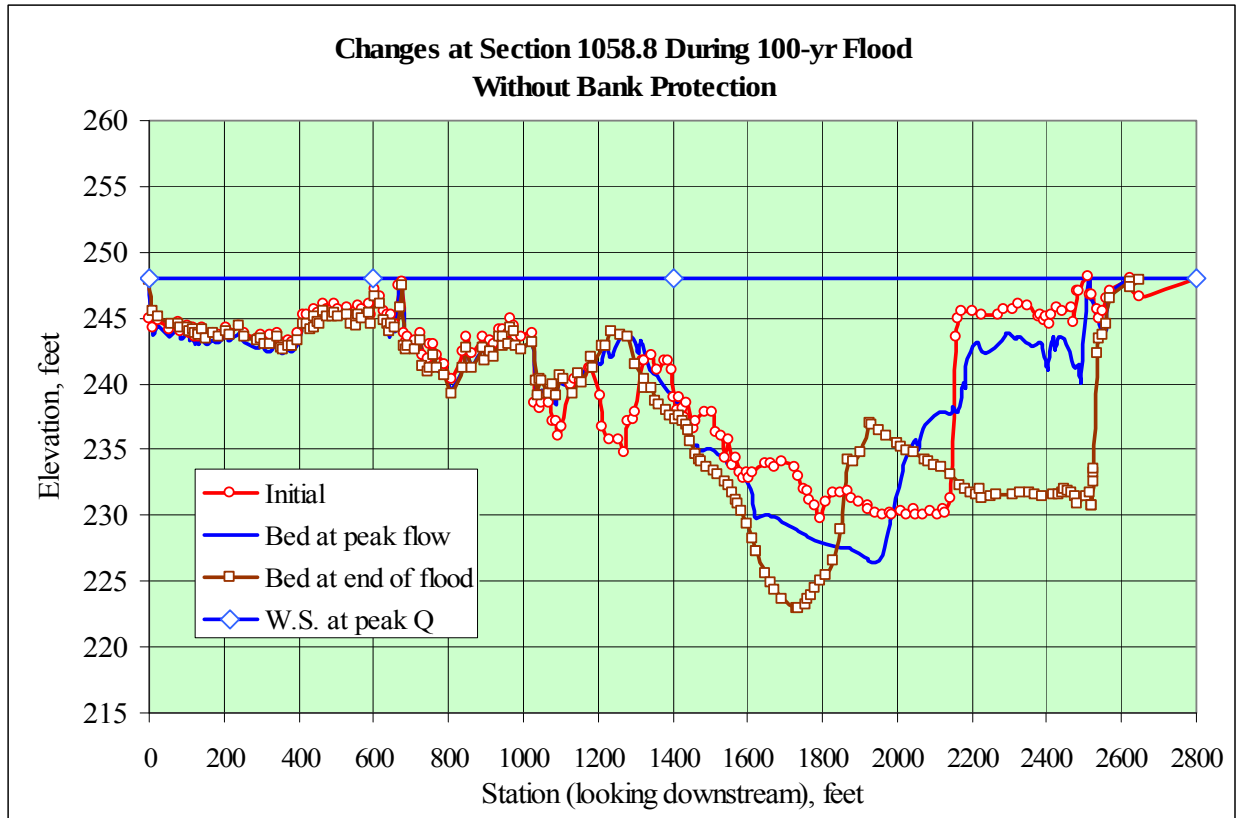
Cross sectional changes during lateral migration



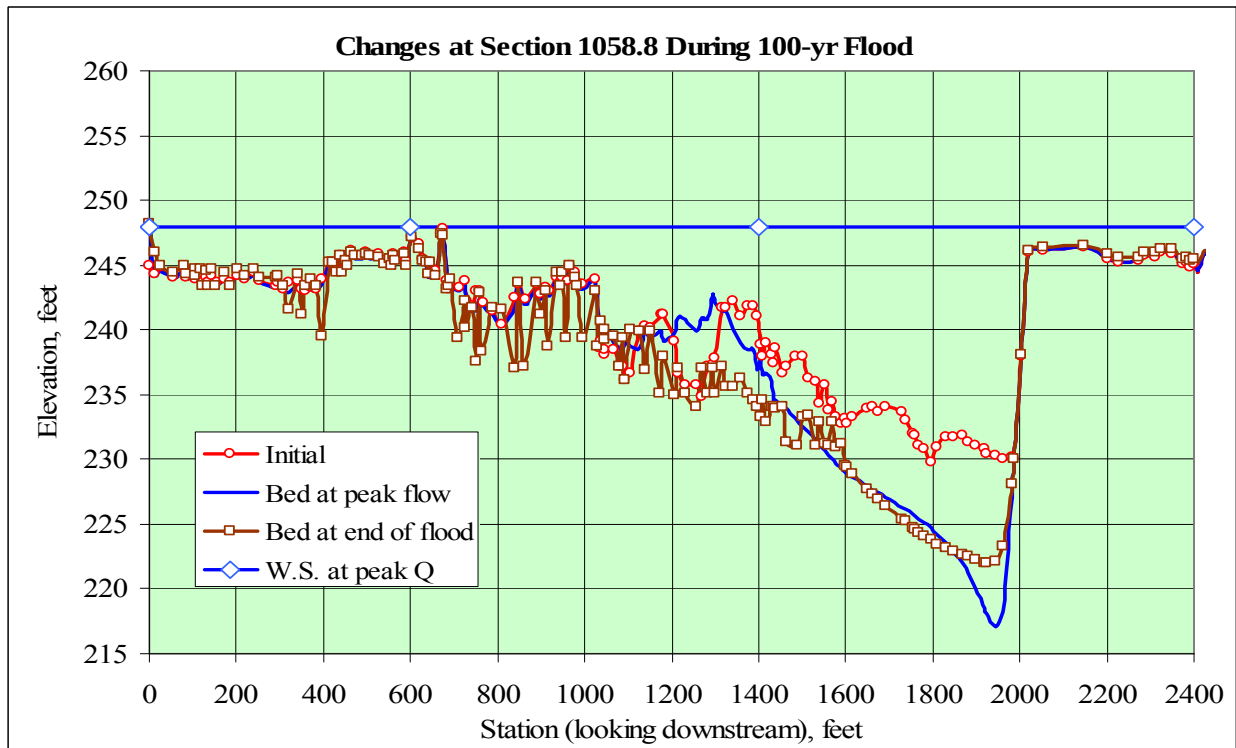
Bank protection along concave bank in curved channel



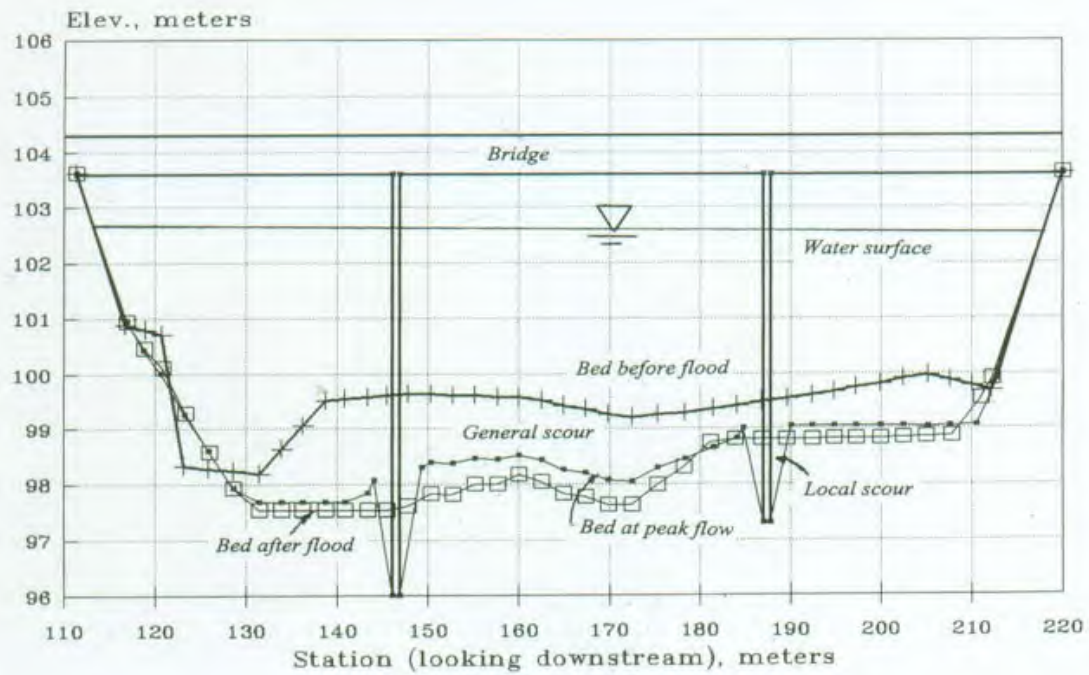
Velocity distribution at peak flow at the same cross section



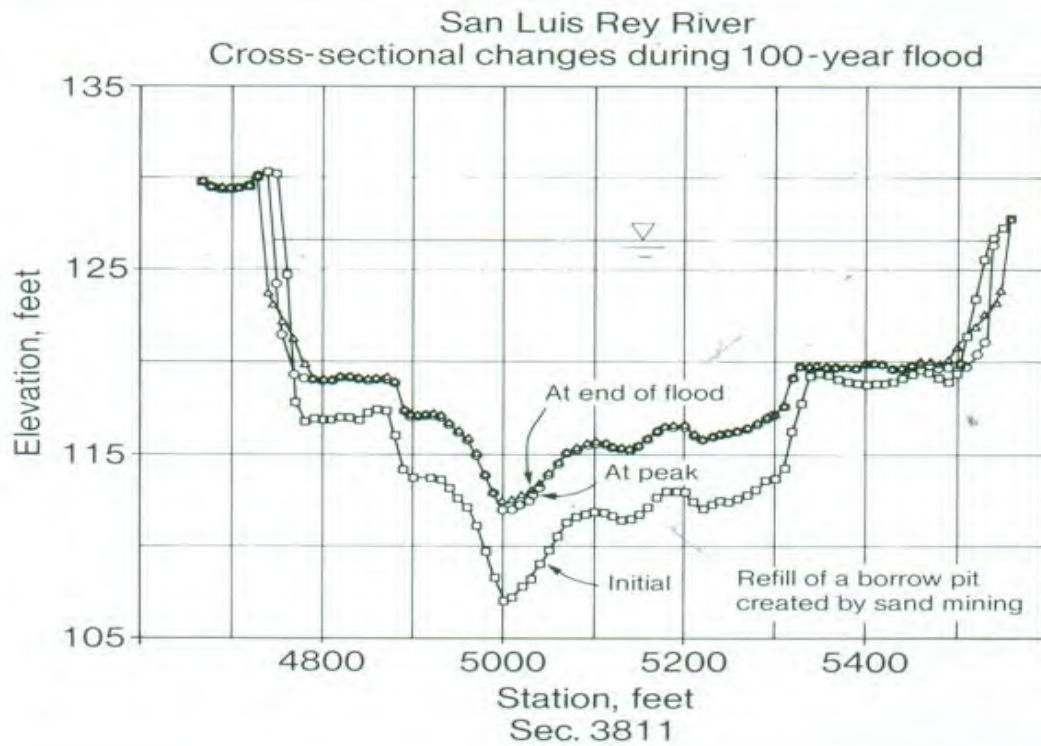
Cross-sectional changes with lateral migration



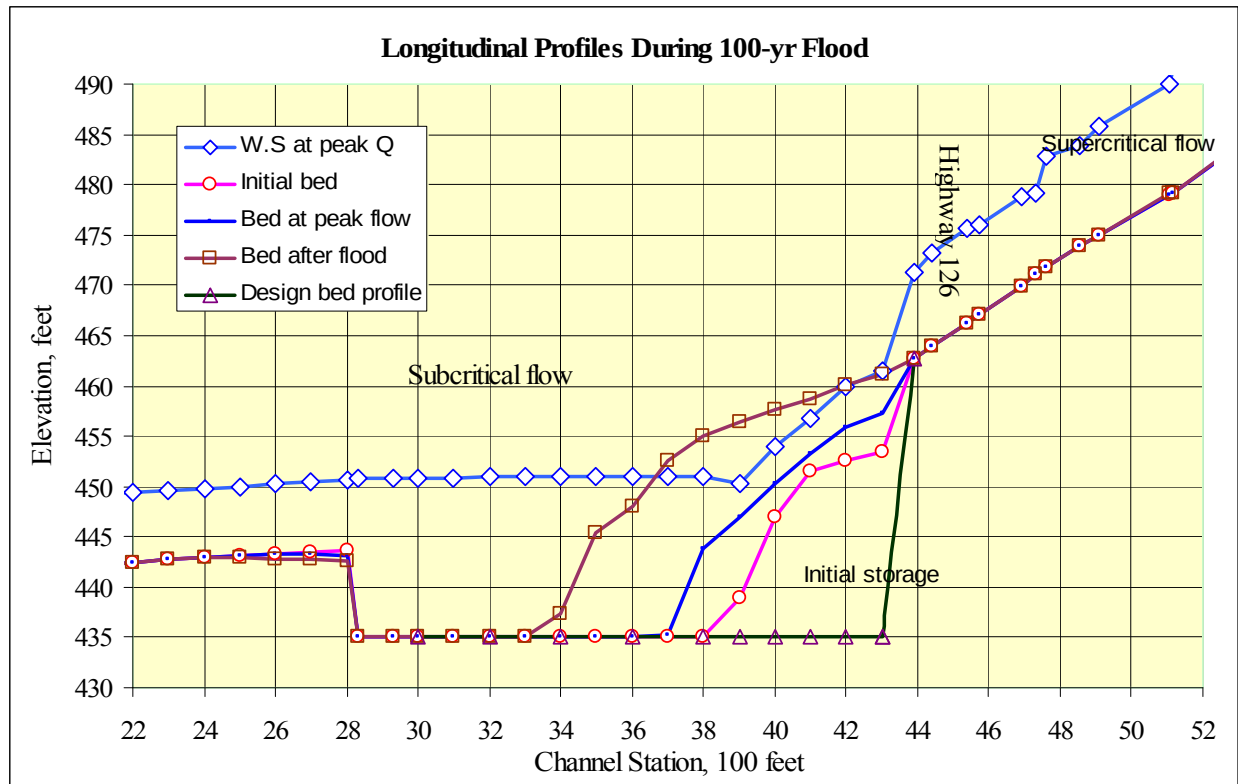
Bank protection along concave bank in curved channel



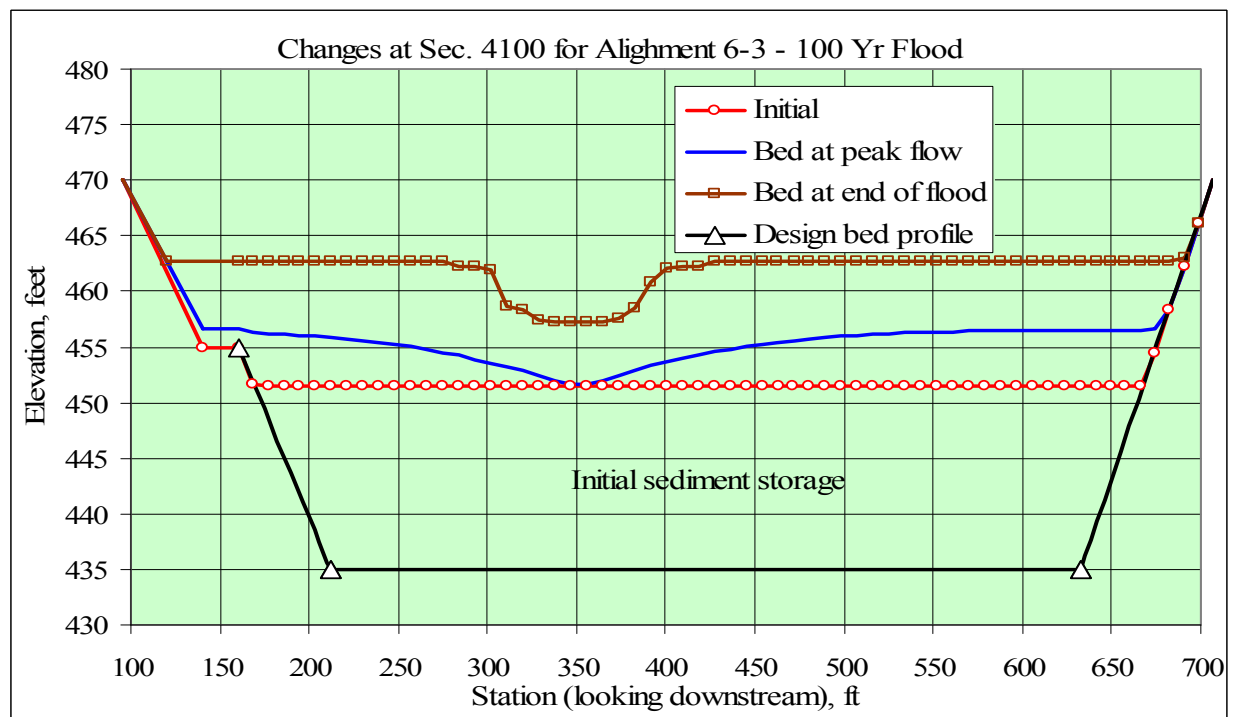
Scour prediction for bridge design



Refill of a sand pit by sediment deposition



Simulation of sediment deposition in a sediment basin



Cross sectional changes during deposition in sediment basin

Test and Calibration Studies of FLUVIAL-12
Mathematical Model for Erodible Channels

Prepared by
Howard H. Chang, Ph.D., P.E.
San Diego, California
November, 1993

TEST AND CALIBRATION STUDIES OF THE FLUVIAL-12 MODEL

TABLE OF CONTENTS

I. Program Summary for FLUVIAL-12

II. Test and Calibration Study Using Data from the San Diego River in Southern California

Chang, H. H., 1982, "Mathematical Model for Erodible Channels", *Journal of the Hydraulics Division*, ASCE, 108(HY5), 678-689. Closure in 109(HY4), 655-656.

III. Test and Calibration Study Using Data from the Inlet Channel of San Elijo Lagoon in Southern California

Chang, H. H., and Hill, J. C., 1977, "Minimum Stream Power for Rivers and Deltas," *Journal of the Hydraulics Division*, ASCE, 103(HY12), 1375-89.

IV. Test and Calibration Study Using Data from the San Dieguito River in Southern California

Chang, H. H., 1984, "Modeling of River Channel Changes", *Journal of Hydraulic Engineering*, ASCE, 110(2), 157-172. Closure in 113(2), 1987, 265-267.

V. Test and Calibration Study Using Data from the San Lorenzo River in Northern California

Chang, H. H., 1985, "Water and Sediment Routing through Curved Channels", *Journal of Hydraulic Engineering*, ASCE, 111(4), 644-658.

VI. Test and Calibration Study Using Data from San Juan Creek in Southern California

Chang, H. H., 1987, "Modeling Fluvial Processes in Streams with Gravel Mining," in *Sediment Transport in Gravel-Bed Rivers*, Thorne, et al. editors, John Wiley & Sons, pp. 977-988. Also presented at the Intern. Workshop on Problems of Sediment Transport in Gravel-Bed River, Colorado State University, August 12-17, 1985.

VII. Test and Calibration Using the Missouri River Data in Iowa

Chang, H. H., 1988, "Test and Calibration Study of the FLUVIAL Model Using the Missouri River Data", Prepared for the Waterways Experiment Station, U.S. Army Corps of Engineers, Under Contract "Computer-Based Design of River Bank Protection", No. DACW39-87-0039.

VIII. Test and Calibration Study Using Data from the Santa Clara River in Southern California

Chang, H. H. and Stow, D., 1989, "Mathematical Modeling of Fluvial Sediment Delivery", *Journal of Waterway, Port, Coastal, and Ocean Engineering*, ASCE, 115(3), 311-326.

IX. Test and Calibration Study Using Data from the Fall River in Colorado

Chang, H. H., 1991, "Simulation of Bed Topography in a Meandering River", *Proceedings of the Fifth Interagency Sedimentation Conference*, Las Vegas, NV, March 21-28.

X. Test and Calibration Study Using Data from the San Luis Rey River in Southern California

Chang, H. H., 1991, "Computer Simulation of River Channel Changes Induced by Sand Mining", *Proceedings of International Conference on Computer Applications in Water Resources*, July 3-6, Taipei, Taiwan, Vol. 1, 226-234.

XI. Test and Calibration Study Using Data from Stony Creek in Northern California

Chang, H. H., Harris, C., Lindsay, W., Nakao, S. S., and Kia, R., 1993, "Selecting Sediment Transport Equation for Scour Simulation at Bridge Crossing", *Proceedings of the 1993 National Conference on Hydraulic Engineering*, San Francisco, CA, July 25-30, pp. 1744-1949.

XII. Test and Calibration Study Using Data from the Feather River in Northern California

Chang, H. H., 1993, "Numerical Modeling for Sediment-Pass-Through Operations of Reservoirs on North Fork Feather River", prepared for Pacific Gas & Electric Company, San Francisco.

SELECTION OF MATHEMATICAL MODELS FOR RIVER AND RESERVOIR SEDIMENTATION

River channel behavior often needs to be studied for its natural state and response to human regulation. Studies of river hydraulics, sediment transport, and river channel changes may be through physical modeling, or mathematical modeling, or both. Physical modeling has been relied upon traditionally for river projects, but mathematical modeling is becoming more popular as its capabilities expand rapidly.

Mathematical models are developed based on convoluted physical relationships. The five most important relations are: continuity equation of flow, momentum equation of flow, continuity equation of sediment, sediment transport equation, and relations for channel deformation. These equations are applied at successive time steps to simulate the time-dependent processes. In selecting a model for application, the user should consider the necessary model features described below.

(1) The model should have sound mathematical and physical bases. The allocation of scour and fill at a time step should be based on physical principles that can be verified using field data. Empirical relationships are considered inadequate for modeling river dynamics.

(2) A mathematical model applicable to natural streams should be an *erodible boundary model* rather than an *erodible bed model*. The channel boundary changes are by no means uniformly distributed on the bed. The changes in channel width and bed profile are closely inter-related. For these reasons, the model must consider all boundaries of a river channel as free surfaces. These changes must be coupled at each time step.

(3) The curvature effect on bed topography is an important feature for river morphology. Natural streams are seldom straight over a length longer than a few channel widths. The channel curvature, with its inherent secondary currents, has important effects on channel morphology; therefore, a mathematical model should possess this capability.

(4) A model should allow the user to specify non-erodible parts of a channel, such as bank protection, grade control structures, check dams, etc.

(5) The applicability of a model must be substantiated by adequate number of test and calibration studies using field data.

COMPARISON OF FLUVIAL-12 AND HEC-6 MODELS

The FLUVIAL-12 model is an *erodible-boundary model*; it simulated inter-related changes in channel-bed profile, channel width and bed topography induced by the channel curvature. The erodible boundary model is different from an *erodible-bed model*, such as HEC-6 in the following ways.

- (1) The HEC-6 model does not simulate changes in channel width. Since changes in channel-bed profile is closely related to changes in width, these changes may not be separated.
- (2) The change in bed profile in HEC-6 is assumed to be uniform in the erodible zone. All points adjust up and down by the equal amount during aggradation and degradation. Actual bed changes are by no means uniform and therefore they may not be simulated by an erodible bed model.
- (3) An erodible bed model does not consider the channel curvature. In reality, the bed topography is highly non-uniform in a curved channel, especially during a high flow.
- (4) The erodible zone needs to be specified at all cross sections in the HEC-6 model. This means the model does not provide the extent of erosion in the channel, but the user has to inform the model about the erodible part of the channel bed. The boundary of erosion is computed and provided by the FLUVIAL-12 model, this boundary changes with the discharge and time.
- (5) The sediment inflow into the channel reach needs to be specified in the HEC-6 input. This requires the sediment rating curve which is usually not available for stream channels. In the FLUVIAL-12 model, the sediment inflow may be specified and it may also be computed based on the hydraulics of flow at the upstream section at every time step.
- (6) The FLUVIAL-12 model has been calibrated using 12 sets of river data. An erodible-bed model may not be calibrated with field data of natural streams.

Data Requirements for Fluvial Study

Prepared by Howard H. Chang

- (1) Topographic maps of the Sacramento River for a channel reach at least two miles in length, with one mile minimum on each side of the intake structure. These maps should show locations of cross sections used for the HEC-2 study, if any.
- (2) Available digitized cross-sectional data used for HEC-2 studies for the stream reach from the downstream end to the upstream end of study. The locations of cross sections should be shown on the accompanying topographic maps. For stream reaches without such data, the consultant will prepare cross-sectional data based on the topographic maps.
- (3) Peak discharges of 10-, 50- and 100-yr floods and their variations along the study stream reach. The hydrographs for 100-yr floods are also required.
- (4) Existing mining sites and proposed mining plans, if any.
- (5) Plans for the proposed structure.
- (5) Plans for existing bridges and hydraulic structures, such as drop structures, bank protection, levees, etc. on the stream, if any.
- (6) At least two sediment samples along the study reach of each stream. Size distributions of such samples are normally determined based on the sieve analysis.

USE AGREEMENT

An Agreement between Chang Consultants, Located at Rancho Santa Fe, California 92067-4492, U.S.A., hereinafter referred to as the "Developer" and _____ in California hereafter referred to as the "User."

WHEREAS the parties agree that subject to the following terms and conditions, the Developer shall deliver to the User in a machine-readable form FLUVIAL-12, a computer model hereinafter referred to as the "Product."

I. Definitions

A. The term "copy" shall mean any transfer in whole or in part of the product onto transportable machine-readable media.

B. The term "use" shall mean any use whatsoever of the Product whether in whole or in part in its original mode or in any mode.

II. Use of Product

A. User agrees that the product shall be used only at the User's place of business or its contracted Computer Service Bureau.

B. User agrees not to copy, release, disclose or otherwise make the Product available, in its original form, as received from the Developer.

C. User agrees not to include the Product in an online commercially available terminal service established to offer service to people who are not a part of the User's organization. However, the User may use the product as a part of an online service offered wholly for the use of the User's employees.

D. User agrees to notify the Developer of any physical defects in the Product within sixty (60) days following delivery of the Product by the Developer.

Developer:

User:

Signature and Date

Signature and Date

Name

Title

Return to: Howard H. Chang, P.O. Box 9492, 6001 Avenida Alteras, Rancho Santa Fe, CA 92067-4492, U.S.A.

The FLUVIAL-12 model contains special and unique features, making it the most suitable model for the Salt River project as described below:

(1) The model simulates river hydraulics, sediment delivery, and river channel changes, which include channel bed scour and fill, width changes and lateral migration. The Salt River, as an ephemeral river undergoes changes during floods, not only in the bed but also along the banks. Changes in channel bed and banks are interrelated, and thus they must be considered at the same time in a simulation study. The FLUVIAL-12 model is unique in that these changes are coupled at every time step. Other models are limited to changes of the bed (i.e., scour and fill) but not the banks.

(2) The model includes the effects of secondary currents inherent in river channels. For this reason, the hydraulics, sediment transport and channel changes related to the channel curvature may be computed using the model. Bank erosion evaluation is an important task for the Salt River project, and it is specifically called out in the scope of work. Reaches of bank erosion are evident along the river and they need to be identified in the project. Continued erosion of concave banks will result in lateral migration of the channel. Lateral migration is an important concern for channel stability. The FLUVIAL-12 model is unique, as it is the only model that contains the features for curved channels.

(3) Rivers in the arid western U. S. are highly dynamic as they may undergo rather rapid and significant changes in comparison to the eastern rivers. The FLUVIAL-12 model has been developed in the west, adopted to the dynamic nature of the western rivers. Most importantly, the model has been tested and calibrated based on more than five sets of river data. The simulation results by the model have been confirmed by field data.

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RESPONSE TO QUESTIONS REGARDING FLUVIAL-12

Prepared by Howard H. Chang, Ph.D., P.E.

June 20, 2005

This document was prepared in response to the questions regarding the FLUVIAL-12 model at the April 26, 2005 meeting at the Los Angeles Corps of Engineers. Attendees at the meeting include those from the Los Angeles County Department of Public Works, the Corps of Engineers, and the Ventura County Watershed Protection District.

I. MODELS FOR RIVER SEDIMENTATION

Models for river sedimentation are used to simulate sediment transport and river channel changes under natural conditions and in response to human intervention. They can be classified into two following types:

Erodible Bed Models: The HEC-6 and HEC-6T models are *erodible-bed models*. They simulate channel bed aggradation and degradation (or scour and fill of the channel bed). The model itself does not simulate bank erosion unless prescribed by the user.

Erodible Boundary Models: The FLUVIAL-12 model is an *erodible-boundary model*; it simulated inter-related changes in channel-bed profile, channel width, lateral migration, and bed topography induced by the channel curvature.

Comparison: The *erodible-boundary model* is different from an *erodible-bed model* in the following ways.

- (1) An erodible-bed model does not simulate changes in channel width. Since changes in channel-bed profile is closely related to changes in width, these changes may not be separated.
- (2) The change in bed profile in an erodible-bed model is assumed to be uniform in the erodible zone. All points adjust up and down by an equal amount during aggradation and degradation. Actual bed changes are by no means uniform and therefore they may not be simulated by an erodible-bed model.
- (3) An erodible-bed model does not consider channel curvature. In reality, river channels are generally sinuous. The bed topography is non-uniform in a curved channel, especially during a high flow.

- (4) The erodible zone needs to be specified at all cross sections in an erodible-bed model. This means the model does not provide the extent of erosion in the channel, but the user has to inform the model about the erodible part of the channel bed. The boundary of erosion is computed and provided by the FLUVIAL-12 model, this boundary changes with the discharge and time.
- (5) The FLUVIAL-12 has been calibrated using many sets of river data. An erodible-bed model may not be calibrated with field data of natural streams. ***Verification of modeling results by field measurement is absolutely necessary to validate the applicability of a model***

II. FLUVIAL-12 MODEL AVAILABILITY

The FLUVIAL-12 model is not in the public domain.
This model is available from CHANG Consultants.
This model is available to the Corps and Los Angeles County free of charge.

III. TECHNICAL SUPPORT FOR FLUVIAL-12

The technical support staffs for FLUVIAL-12 are as follows:

Howard H. Chang, B.S., M.S., Ph.D. (Colorado State University, 1967), P.E.
Model developer since 1970.

Wayne W. Chang, B. S., (Berkeley), M.S. (MIT, 1988), P.E., 17 years of model
Experience, Board member of the Association for State Floodplain Managers.

FLUVIAL -12 has many authorized users in the U.S. and all over the world.

IV. INTERACTION AND TRAINING FOR FLUVIAL-12 USERS

Since CHANG Consultants is a local firm, it is easy to have interaction with the L.A. County and Corps staffs for model application.

Seminars and training sessions can also be offered upon request.

V. DOCUMENTATION FOR FLUVIAL-12

- (1) The input/output instructions and samples are described in the Users' Manual for FLUVIAL-12
- (2) The theoretical foundation, analytical basis and sample applications for FLUVIAL-12 are given in the book by H.H. Chang, *Fluvial Processes in River Engineering*, John Wiley & Sons, February 1988, 432 pp. Known adoptions as a graduate text: Johns Hopkins University, Purdue University, McGill University in Canada, University of Iowa, University of Colorado, Clarkson University, University of Canterbury in New Zealand, South Dakota

State University, Chengdu University, Washington State University, Clemson University, University of Nebraska, University of Kentucky, University of Maryland, University of Alaska, Virginia Tech, Oregon State University, University of Idaho, Tennessee Technological University, Ferdowsi University and Tarbiat Modares University in Iran, National University of Lisbon in Portugal, California State University at Fullerton, Technical University of Nova Scotia, Universiti Sains Malaysia, and Taiwan Chung Hsing University. The Chinese translation is published by the Science Press, Beijing, 1990.

- (3) Test and Calibration Studies of FLUVIAL-12. This document contains 12 calibration studies of FLUVIAL-12 with actual substantiation by field measurement.
- (4) The background and applications for FLVUIAL-12 are also described in published papers appeared in:
Journal of Hydraulic Engineering
Water Resources Research
Hydrosoft
Journal of Floodplain Management
ASCE Conference proceedings

VI. UNIQUE REGIONAL EXPERIENCES FOR FLUVIAL-12

Stream channels in the arid southwest are different from those in the humid east. Many western streams are ephemeral in nature and they are more susceptible to changes. Stream channel changes in ephemeral rivers may occur in channel bed and along channel banks. They may also migrate laterally along channel bends.

FLUVIAL-12 has been applied extensively to major streams in California, including Sacramento River, Feather River, San Lorenzo River, Stony Creek, etc. in northern California.

FLUVIAL-12 has been applied to major streams in all southern California Counties, including Ventura, San Diego, Orange, Los Angeles, Kern, Riverside, San Bernardino, Imperial, and Santa Barbara Counties.

FLUVIAL -12 has already been applied to the Santa Clara River for at least six studies so far, including Curtis Sand in Canyon Country, river bank restoration at Santa Paula Airport and County Yard, beach sand delivery, Sespe Creek, Bouquet Canyon Bridge, etc.

PACE will apply FLUVIAL-12 to the Newhall Ranch Project along the Santa Clara River.

FLUVIAL-12 has been applied to all major streams in Arizona and Nevada.

VII. OTHER MODEL FEATURES

FLUVIAL-12 has seven sediment transport formulas available for use.
FLUVIAL-12 can model divergent flows, split flows, and bridge hydraulics.
FLUVIAL-12 model runs on window.

 * FLUVIAL-12 SIMULATION OF RIVER HYDRAULICS, *
 * SEDIMENT TRANSPORT AND RIVER CHANNEL CHANGES *
 * FOR USE BY HOWARD H. CHANG *

THIS PROGRAM IS DEVELOPED AND FURNISHED BY HOWARD H. CHANG AND IS ACCEPTED AND USED BY THE RECIPIENT UPON THE EXPRESS UNDERSTANDING THAT THE DEVELOPER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, CONCERNING THE ACCURACY, COMPLETENESS, RELIABILITY, USABILITY, OR SUITABILITY FOR ANY PARTICULAR PURPOSE OF THE INFORMATION AND DATA CONTAINED IN THIS PROGRAM OR FURNISHED IN CONNECTION THEREWITH, AND THE DEVELOPER SHALL BE UNDER NO LIABILITY WHATSOEVER TO ANY PERSON BY REASON OF ANY USE MADE THEREOF.

T1 Compass Energy Storage Project

T2 Oso Creek

T3 Flood Series Event

G1	1.00	501.00	60.00	3.00	0.50	0.00	0.05	242.50	500.00	200.00
G2	40.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G2	3.00	0.10	333.00	3.00	555.00	10.00	666.00	12.00	1900.00	17.50
G2	1900.00	17.60	1666.00	19.90	666.00	21.80	333.00	23.50	3.00	25.00
G2	7.00	25.10	633.00	28.00	1055.00	35.00	1266.00	37.00	3860.00	42.50
G2	3860.00	42.60	3669.00	44.90	1266.00	46.80	633.00	48.50	7.00	50.00
G2	6.00	50.10	608.00	53.00	1013.00	60.00	1216.00	62.00	3690.00	67.50
G2	3690.00	67.60	3041.00	69.90	1216.00	71.80	608.00	73.50	6.00	75.00
G2	6.00	75.10	600.00	78.00	1000.00	85.00	1200.00	87.00	3700.00	92.50
G2	3700.00	92.60	3000.00	94.90	1200.00	96.80	600.00	98.50	6.00	100.00
G2	5.00	100.10	450.00	103.00	750.00	110.00	900.00	112.00	2700.00	117.50
G2	2700.00	117.60	2250.00	119.90	900.00	121.80	450.00	123.50	5.00	125.00
G2	7.00	125.10	650.00	128.00	1083.00	135.00	1300.00	137.00	3900.00	142.50
G2	3900.00	142.60	3250.00	144.90	1300.00	146.80	650.00	148.50	7.00	150.00
G2	3.00	150.10	350.00	153.00	583.00	160.00	700.00	162.00	2190.00	167.50
G2	2190.00	167.60	1750.00	169.90	700.00	171.80	350.00	173.50	3.00	175.00
G2	6.00	175.10	616.00	178.00	1027.00	185.00	1233.00	187.00	3800.00	192.50
G2	3800.00	192.60	3083.00	194.90	1233.00	196.80	616.00	198.50	6.00	200.00
G2	5.00	200.10	483.00	203.00	805.00	210.00	966.00	212.00	2900.00	217.50
G2	2900.00	217.60	2416.00	219.90	966.00	221.80	483.00	223.50	5.00	225.00
G2	8.00	225.10	733.00	228.00	1960.00	235.00	2480.00	237.00	6500.00	242.50
G2	6500.00	242.60	6200.00	244.90	2300.00	246.80	733.00	248.50	8.00	250.00
G2	5.00	250.10	533.00	253.00	888.00	260.00	1066.00	262.00	3200.00	267.50
G2	3200.00	267.60	2666.00	269.90	1066.00	271.80	533.00	273.50	5.00	275.00
G2	4.00	275.10	383.00	278.00	638.00	285.00	766.00	287.00	2300.00	292.50
G2	2300.00	292.60	1916.00	294.90	766.00	296.80	383.00	298.50	4.00	300.00
G2	6.00	300.10	583.00	303.00	972.00	310.00	1166.00	312.00	3670.00	317.50
G2	3670.00	317.60	2916.00	319.90	1166.00	321.80	583.00	323.50	6.00	325.00
G2	4.00	325.10	366.00	328.00	611.00	335.00	733.00	337.00	2290.00	342.50
G2	2290.00	342.60	1833.00	344.90	733.00	346.80	366.00	348.50	4.00	350.00
G2	5.00	350.10	450.00	353.00	750.00	360.00	900.00	362.00	2700.00	367.50
G2	2700.00	367.60	2250.00	369.90	900.00	371.80	450.00	373.50	5.00	375.00
G2	7.00	375.10	666.00	378.00	1111.00	385.00	1333.00	387.00	6100.00	392.50
G2	6100.00	392.60	3333.00	394.90	1333.00	396.80	666.00	398.50	7.00	400.00
G2	6.00	400.10	558.00	403.00	930.00	410.00	1116.00	412.00	3350.00	417.50
G2	3350.00	417.60	2791.00	419.90	1116.00	421.80	558.00	423.50	6.00	425.00
G2	5.00	425.10	450.00	428.00	750.00	435.00	900.00	437.00	2700.00	442.50
G2	2700.00	442.60	2250.00	444.90	900.00	446.80	450.00	448.50	5.00	450.00
G2	6.00	450.10	600.00	453.00	1000.00	460.00	1200.00	462.00	3700.00	467.50
G2	3700.00	467.60	3000.00	469.90	1200.00	471.80	600.00	473.50	6.00	475.00
G2	6.00	475.10	616.00	478.00	1027.00	485.00	1233.00	487.00	3820.00	492.50
G2	3820.00	492.60	3083.00	494.90	1233.00	496.80	616.00	498.50	6.00	502.00
G3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00
G4	10000.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
G5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00
GS	0.21	0.17	0.73	0.27	1.03	0.24	1.55	0.22	4.36	0.10
X1	0.01	75.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										8.00
GR	198.00	0.00	198.00	4.04	198.00	8.07	198.00	12.11	197.75	17.66
GR	197.50	23.21	197.25	28.77	197.00	34.32	196.00	35.93	195.00	36.92
GR	194.00	37.90	193.00	38.82	192.00	39.48	191.00	40.14	190.00	40.79
GR	189.00	41.45	188.00	42.11	187.00	42.77	186.00	43.43	185.00	44.09
GR	184.00	44.75	183.00	45.41	182.00	46.07	181.00	46.72	180.00	47.37
GR	179.00	48.04	178.00	48.70	177.00	49.36	176.00	50.02	175.00	50.68
GR	174.00	51.34	173.00	52.00	172.00	52.66	171.00	53.32	170.00	53.99
GR	169.00	54.66	168.00	55.32	167.00	55.99	166.00	56.66	165.00	57.32

GR	164.00	58.00	163.00	58.68	162.00	59.35	161.00	60.03	160.00	60.71
GR	159.00	61.40	158.00	62.08	157.00	62.78	156.00	63.55	155.00	64.47
GR	154.00	65.41	153.00	66.48	152.00	68.10	151.00	71.61	150.50	74.78
GR	150.00	77.95	149.00	82.61	148.70	86.20	148.40	89.79	148.70	95.57
GR	149.00	101.36	150.00	103.48	151.00	105.17	152.00	106.63	153.00	108.08
GR	154.00	109.73	155.00	111.61	156.00	113.68	157.00	115.86	158.00	117.91
GR	159.00	119.72	160.00	121.43	161.00	123.13	162.00	124.88	163.00	126.83
GR	164.00	129.16	165.00	132.01	166.00	135.17	167.00	137.70	168.00	139.79
GR	169.00	141.79	170.00	143.75	171.00	145.82				
X1	287.00	107.00	0.00	0.00	0.00	0.00	287.00	0.00	0.00	0.00
X3										11.00
GR	200.00	0.00	199.00	1.71	198.00	2.84	197.00	3.86	196.00	4.66
GR	195.00	5.44	194.00	6.22	193.00	6.94	192.00	7.59	191.00	8.24
GR	190.00	8.89	189.00	9.54	188.00	10.40	187.00	11.33	186.00	12.27
GR	185.00	13.29	184.00	14.40	183.00	15.52	182.00	16.79	181.00	18.08
GR	180.00	19.37	179.00	20.63	178.00	21.88	177.00	23.12	176.00	24.36
GR	175.00	25.60	174.00	26.84	173.00	28.08	172.00	29.34	171.00	30.63
GR	170.00	32.37	169.00	34.29	168.00	36.80	167.00	39.88	166.00	42.51
GR	165.00	45.09	164.00	47.86	163.00	51.71	162.50	57.69	162.00	63.67
GR	161.00	69.50	160.00	73.22	159.00	75.30	158.00	76.83	157.00	78.15
GR	156.00	79.41	155.00	80.58	154.00	81.75	153.00	83.03	152.00	84.49
GR	151.00	86.29	150.00	89.35	149.75	94.57	149.50	99.79	149.75	104.98
GR	150.00	110.16	151.00	112.64	152.00	114.26	153.00	115.68	154.00	117.00
GR	155.00	118.45	156.00	120.09	157.00	121.86	158.00	123.71	159.00	125.15
GR	160.00	126.57	161.00	127.69	162.00	128.75	163.00	129.83	164.00	131.00
GR	165.00	132.18	166.00	133.81	167.00	136.35	167.50	140.77	168.00	145.19
GR	168.50	150.08	169.00	154.97	170.00	160.93	170.50	164.01	171.00	167.09
GR	172.00	172.19	173.00	175.40	174.00	177.86	175.00	180.12	176.00	182.48
GR	177.00	185.35	178.00	189.41	178.50	192.45	179.00	195.48	179.50	200.17
GR	180.00	204.85	180.33	209.20	180.67	213.56	181.00	217.91	182.00	223.80
GR	183.00	228.44	184.00	234.06	185.00	238.75	186.00	243.46	187.00	248.38
GR	188.00	254.18	188.50	258.71	189.00	263.24	190.00	267.03	191.00	269.48
GR	192.00	271.43	193.00	273.21	194.00	274.90	195.00	276.58	196.00	278.40
GR	197.00	280.15	198.00	281.80	199.00	283.37	200.00	284.95	201.00	286.50
GR	202.00	288.07	203.00	290.10	204.00	292.77				
X1	455.00	108.00	0.00	0.00	0.00	0.00	168.00	0.00	0.00	0.00
XF	0.00	0.00	-120.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										5.00
GR	201.00	0.00	200.00	1.62	199.00	2.80	198.00	3.79	197.00	4.68
GR	196.00	5.51	195.00	6.34	194.00	7.16	193.00	8.02	192.00	8.90
GR	191.00	9.83	190.00	10.80	189.00	11.81	188.00	12.86	187.00	13.93
GR	186.00	15.01	185.00	16.10	184.00	17.19	183.00	18.28	182.00	19.37
GR	181.00	20.47	180.00	21.58	179.00	22.69	178.00	23.82	177.00	24.95
GR	176.00	26.09	175.00	27.24	174.00	28.36	173.00	29.46	172.00	30.50
GR	171.00	31.49	170.00	32.41	169.00	33.28	168.00	34.14	167.00	34.96
GR	166.00	35.77	165.00	36.56	164.00	37.35	163.00	38.14	162.00	38.95
GR	161.00	39.76	160.00	40.61	159.00	41.47	158.00	42.36	157.00	43.28
GR	156.00	44.21	155.00	45.16	154.00	46.18	153.00	47.28	152.00	48.48
GR	151.00	49.89	150.00	51.87	149.95	57.85	149.90	63.83	149.95	67.57
GR	150.00	71.31	151.00	76.20	152.00	78.53	153.00	80.24	154.00	81.70
GR	155.00	83.07	156.00	84.46	157.00	85.92	158.00	87.55	159.00	89.29
GR	160.00	91.06	161.00	92.82	162.00	94.70	163.00	96.95	164.00	100.44
GR	164.50	103.71	165.00	106.97	165.50	110.29	166.00	113.62	167.00	118.15
GR	168.00	121.41	169.00	124.24	170.00	127.45	171.00	131.93	172.00	135.24
GR	173.00	137.70	174.00	140.16	175.00	143.25	176.00	147.07	177.00	150.80
GR	178.00	154.66	179.00	158.86	180.00	164.71	180.50	168.27	181.00	171.83
GR	182.00	175.52	183.00	177.41	184.00	178.80	185.00	179.91	186.00	180.93
GR	187.00	181.86	188.00	182.76	189.00	183.63	190.00	184.48	191.00	185.31
GR	192.00	186.13	193.00	186.95	194.00	187.75	195.00	188.56	196.00	189.37
GR	197.00	190.18	198.00	191.00	199.00	191.86	200.00	192.77	201.00	193.72
GR	202.00	194.88	203.00	196.30	204.00	199.49				
X1	582.00	112.00	0.00	0.00	0.00	0.00	127.00	0.00	0.00	0.00
X3										4.00
GR	201.00	0.00	200.00	2.37	199.00	3.76	198.00	4.87	197.00	5.84
GR	196.00	6.75	195.00	7.61	194.00	8.45	193.00	9.28	192.00	10.11
GR	191.00	10.92	190.00	11.73	189.00	12.54	188.00	13.34	187.00	14.14
GR	186.00	14.92	185.00	15.70	184.00	16.49	183.00	17.29	182.00	18.10
GR	181.00	18.96	180.00	19.86	179.00	20.80	178.00	21.81	177.00	22.90
GR	176.00	24.08	175.00	25.39	174.00	26.81	173.00	28.33	172.00	29.87
GR	171.00	31.47	170.00	33.27	169.00	35.52	168.00	38.61	167.00	42.11
GR	166.00	45.13	165.00	48.73	164.50	52.58	164.00	56.43	163.50	60.99

GR	163.00	65.56	162.00	68.31	161.00	69.89	160.00	71.14	159.00	72.17
GR	158.00	73.11	157.00	74.00	156.00	74.86	155.00	75.73	154.00	76.66
GR	153.00	77.64	152.00	78.83	151.00	80.37	150.00	83.51	149.90	87.35
GR	149.80	91.20	149.90	95.15	150.00	99.11	151.00	102.89	152.00	105.04
GR	153.00	106.70	154.00	108.15	155.00	109.48	156.00	110.78	157.00	112.04
GR	158.00	113.28	159.00	114.54	160.00	116.01	161.00	118.08	162.00	121.28
GR	163.00	125.05	164.00	129.04	165.00	133.08	166.00	136.76	167.00	139.93
GR	168.00	143.25	169.00	146.67	170.00	149.50	171.00	151.85	172.00	153.71
GR	173.00	155.42	174.00	157.19	175.00	159.03	176.00	160.93	177.00	163.64
GR	178.00	167.61	179.00	172.50	180.00	176.72	181.00	180.75	182.00	185.61
GR	183.00	191.21	184.00	195.72	185.00	199.74	186.00	202.46	187.00	204.18
GR	188.00	205.46	189.00	206.56	190.00	207.59	191.00	208.56	192.00	209.50
GR	193.00	210.43	194.00	211.37	195.00	212.31	196.00	213.27	197.00	214.24
GR	198.00	215.22	199.00	216.21	200.00	217.22	201.00	218.24	202.00	219.28
GR	203.00	220.33	204.00	221.42	205.00	222.59	206.00	224.06	207.00	225.80
GR	208.00	228.71								
X1	692.00	113.00	0.00	0.00	0.00	0.00	110.00	0.00	0.00	0.00
X3										3.00
GR	201.00	0.00	200.00	2.64	199.00	4.34	198.00	5.73	197.00	7.01
GR	196.00	8.24	195.00	9.37	194.00	10.47	193.00	11.59	192.00	12.74
GR	191.00	13.92	190.00	15.14	189.00	16.40	188.00	17.69	187.00	19.02
GR	186.00	20.38	185.00	21.76	184.00	23.17	183.00	24.60	182.00	26.06
GR	181.00	27.70	180.00	29.50	179.00	31.22	178.00	32.70	177.00	34.04
GR	176.00	35.26	175.00	36.38	174.00	37.46	173.00	38.51	172.00	39.58
GR	171.00	40.65	170.00	41.72	169.00	42.79	168.00	43.86	167.00	44.94
GR	166.00	46.02	165.00	47.10	164.00	48.17	163.00	49.25	162.00	50.34
GR	161.00	51.43	160.00	52.51	159.00	53.61	158.00	54.71	157.00	55.82
GR	156.00	56.95	155.00	58.10	154.00	59.30	153.00	60.57	152.00	62.02
GR	151.00	63.81	150.00	66.83	149.90	69.97	149.80	73.11	149.90	76.16
GR	150.00	79.21	151.00	82.34	152.00	84.22	153.00	85.77	154.00	87.15
GR	155.00	88.49	156.00	89.83	157.00	91.13	158.00	92.41	159.00	93.70
GR	160.00	95.09	161.00	96.60	162.00	98.27	163.00	100.17	164.00	102.31
GR	165.00	104.67	166.00	107.81	167.00	112.10	168.00	116.25	169.00	120.28
GR	170.00	124.42	171.00	128.12	172.00	132.60	173.00	136.99	174.00	141.87
GR	174.50	144.93	175.00	147.99	176.00	152.70	177.00	156.55	178.00	160.35
GR	179.00	165.86	180.00	171.27	181.00	175.02	182.00	177.86	183.00	181.04
GR	184.00	184.93	185.00	189.40	186.00	194.36	187.00	197.99	188.00	200.00
GR	189.00	201.41	190.00	202.57	191.00	203.63	192.00	204.63	193.00	205.57
GR	194.00	206.45	195.00	207.31	196.00	208.09	197.00	208.82	198.00	209.54
GR	199.00	210.23	200.00	210.92	201.00	211.61	202.00	212.29	203.00	212.99
GR	204.00	213.71	205.00	214.47	206.00	215.31	207.00	216.28	208.00	217.42
GR	209.00	219.19								
X1	790.00	111.00	0.00	0.00	0.00	0.00	98.00	0.00	0.00	0.00
XF	0.00	0.00	385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										7.00
GR	203.00	0.00	202.00	1.85	201.00	3.29	200.00	4.44	199.00	5.51
GR	198.00	6.52	197.00	7.49	196.00	8.44	195.00	9.40	194.00	10.41
GR	193.00	11.51	192.00	12.62	191.00	13.78	190.00	15.15	189.00	16.65
GR	188.00	18.42	187.00	20.52	186.00	23.31	185.00	26.79	184.00	31.10
GR	183.00	36.47	182.50	40.19	182.00	43.91	181.00	48.13	180.00	50.93
GR	179.00	54.23	178.50	58.38	178.00	62.52	177.50	68.00	177.00	73.49
GR	176.67	77.57	176.33	81.64	176.00	85.72	175.00	90.01	174.00	92.83
GR	173.00	94.93	172.00	96.85	171.00	98.92	170.00	101.63	169.00	105.11
GR	168.00	108.21	167.00	111.13	166.00	114.51	165.00	118.05	164.00	121.27
GR	163.00	123.97	162.00	125.93	161.00	127.47	160.00	128.82	159.00	130.08
GR	158.00	131.30	157.00	132.53	156.00	133.78	155.00	135.07	154.00	136.46
GR	153.00	138.06	152.00	140.39	151.00	145.46	150.50	149.28	150.00	153.10
GR	150.50	157.17	151.00	161.23	152.00	163.54	153.00	165.59	154.00	168.04
GR	155.00	171.23	156.00	174.05	157.00	176.01	158.00	177.68	159.00	179.33
GR	160.00	180.95	161.00	182.52	162.00	184.06	163.00	185.57	164.00	187.12
GR	165.00	188.78	166.00	190.97	167.00	195.36	168.00	201.01	169.00	204.80
GR	170.00	207.84	171.00	210.26	172.00	212.44	173.00	214.65	174.00	217.27
GR	175.00	220.25	176.00	222.91	177.00	225.09	178.00	226.93	179.00	228.54
GR	180.00	229.89	181.00	231.04	182.00	232.04	183.00	232.96	184.00	233.83
GR	185.00	234.63	186.00	235.39	187.00	236.11	188.00	236.84	189.00	237.62
GR	190.00	238.43	191.00	239.28	192.00	240.18	193.00	241.13	194.00	242.10
GR	195.00	243.12	196.00	244.12	197.00	245.14	198.00	246.16	199.00	247.20
GR	200.00	248.29	201.00	249.45	202.00	250.71	203.00	252.08	204.00	253.65
GR	205.00	255.47	206.00	257.76	207.00	261.59				
X1	921.00	115.00	0.00	0.00	0.00	0.00	131.00	0.00	0.00	0.00
XF	0.00	0.00	385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

X3										8.00
GR	204.00	0.00	203.00	3.18	202.00	5.50	201.00	7.48	200.00	9.11
GR	199.00	10.65	198.00	12.14	197.00	13.69	196.00	15.41	195.00	17.40
GR	194.00	19.78	193.00	22.43	192.00	25.13	191.00	28.01	190.00	30.79
GR	189.00	33.23	188.00	35.45	187.00	37.57	186.00	39.67	185.00	41.85
GR	184.00	44.15	183.00	46.92	182.00	51.17	181.50	54.49	181.00	57.82
GR	180.50	62.54	180.00	67.27	179.50	70.74	179.00	74.22	178.00	79.69
GR	177.00	84.06	176.00	88.13	175.00	91.90	174.00	94.33	173.00	96.14
GR	172.00	97.81	171.00	99.23	170.00	100.31	169.00	101.36	168.00	102.34
GR	167.00	103.25	166.00	104.16	165.00	105.01	164.00	105.76	163.00	106.49
GR	162.00	107.23	161.00	107.96	160.00	108.71	159.00	109.47	158.00	110.24
GR	157.00	111.02	156.00	111.85	155.00	112.71	154.00	113.60	153.00	114.66
GR	152.00	116.15	151.00	118.93	150.50	120.88	151.00	123.35	151.50	127.62
GR	152.00	131.90	152.30	137.08	152.60	142.26	152.30	145.64	152.00	149.03
GR	151.80	151.69	152.00	154.32	153.00	157.49	154.00	159.78	155.00	162.11
GR	156.00	164.08	157.00	165.93	158.00	167.67	159.00	169.20	160.00	170.58
GR	161.00	171.85	162.00	173.11	163.00	174.41	164.00	175.82	165.00	177.46
GR	166.00	179.18	167.00	181.07	168.00	183.25	169.00	185.40	170.00	187.54
GR	171.00	189.52	172.00	191.42	173.00	193.23	174.00	195.02	175.00	196.79
GR	176.00	198.62	177.00	200.54	178.00	202.68	179.00	205.65	179.50	209.74
GR	180.00	213.83	180.50	218.52	181.00	223.21	182.00	225.40	183.00	226.92
GR	184.00	228.29	185.00	229.62	186.00	230.90	187.00	232.20	188.00	233.54
GR	189.00	234.87	190.00	236.15	191.00	237.36	192.00	238.61	193.00	239.91
GR	194.00	241.37	195.00	242.95	196.00	244.70	197.00	246.58	198.00	248.44
GR	199.00	250.32	200.00	252.40	201.00	254.81	202.00	257.98	203.00	261.80
GR	204.00	264.79	205.00	267.61	206.00	271.25				
X1	1048.00	108.00	0.00	0.00	0.00	0.00	127.00	0.00	0.00	0.00
XF	0.00	0.00	-225.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										8.00
GR	204.00	0.00	203.50	3.36	203.00	6.71	202.00	10.09	201.00	12.69
GR	200.00	15.04	199.00	17.39	198.00	20.04	197.00	22.63	196.00	25.31
GR	195.00	28.14	194.00	31.33	193.00	34.79	192.00	38.52	191.00	42.79
GR	190.00	46.82	189.00	49.58	188.00	51.35	187.00	52.64	186.00	53.75
GR	185.00	54.53	184.00	55.23	183.00	55.93	182.00	56.63	181.00	57.20
GR	180.00	57.74	179.00	58.28	178.00	58.82	177.00	59.35	176.00	59.89
GR	175.00	60.42	174.00	60.96	173.00	61.49	172.00	62.02	171.00	62.55
GR	170.00	63.08	169.00	63.63	168.00	64.16	167.00	64.70	166.00	65.23
GR	165.00	65.77	164.00	66.32	163.00	66.85	162.00	67.39	161.00	67.94
GR	160.00	68.49	159.00	69.10	158.00	69.81	157.00	70.55	156.00	71.33
GR	155.00	72.22	154.00	73.45	153.00	74.97	152.00	78.66	151.00	83.79
GR	150.95	87.07	150.90	90.35	150.95	93.67	151.00	96.98	151.50	101.43
GR	152.00	105.88	153.00	108.57	154.00	110.63	155.00	112.54	156.00	114.54
GR	157.00	117.44	157.50	122.95	158.00	128.46	158.50	132.66	159.00	136.86
GR	160.00	140.45	161.00	142.71	162.00	144.70	163.00	146.79	164.00	149.96
GR	164.50	153.34	165.00	156.72	165.50	160.23	166.00	163.73	167.00	167.35
GR	168.00	169.98	169.00	172.37	170.00	174.90	171.00	177.96	172.00	181.18
GR	173.00	184.52	174.00	187.77	175.00	191.17	176.00	194.48	177.00	198.05
GR	178.00	202.29	179.00	206.53	180.00	210.14	181.00	213.24	182.00	216.12
GR	183.00	218.77	184.00	221.40	185.00	224.09	186.00	226.55	187.00	228.93
GR	188.00	231.15	189.00	233.13	190.00	235.14	191.00	237.12	192.00	238.93
GR	193.00	240.59	194.00	241.97	195.00	243.25	196.00	244.51	197.00	245.78
GR	198.00	247.05	199.00	248.36	200.00	249.70	201.00	251.55	202.00	253.75
GR	203.00	257.24								
X1	1193.00	108.00	0.00	0.00	0.00	0.00	145.00	0.00	0.00	0.00
XF	0.00	0.00	-225.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										8.00
GR	206.00	0.00	205.00	2.98	204.00	5.20	203.00	7.12	202.00	8.90
GR	201.00	10.62	200.00	12.26	199.00	13.87	198.00	15.49	197.00	17.19
GR	196.00	19.22	195.00	21.30	194.00	23.31	193.00	25.14	192.00	27.04
GR	191.00	29.12	190.00	32.37	189.00	37.03	188.00	40.93	187.00	46.65
GR	186.50	52.20	186.00	57.75	185.00	63.55	184.00	66.37	183.00	68.60
GR	182.00	70.83	181.00	73.33	180.00	77.35	179.86	81.31	180.00	84.93
GR	180.26	88.20	180.51	91.47	180.00	96.54	179.00	100.62	178.00	104.35
GR	177.00	108.06	176.00	111.75	175.00	114.82	174.00	117.32	173.00	119.76
GR	172.00	121.99	171.00	123.72	170.00	125.13	169.00	126.23	168.00	127.20
GR	167.00	128.07	166.00	128.86	165.00	129.60	164.00	130.32	163.00	131.01
GR	162.00	131.70	161.00	132.39	160.00	133.10	159.00	133.83	158.00	134.61
GR	157.00	135.58	156.00	136.64	155.00	137.83	154.00	140.08	153.85	145.01
GR	153.70	149.94	153.80	154.01	153.90	158.08	154.00	162.15	155.00	165.63
GR	156.00	168.18	157.00	170.67	158.00	175.36	158.46	179.90	158.91	184.44
GR	158.00	190.38	157.00	194.52	157.00	199.97	157.00	205.42	158.00	207.79

GR	159.00	208.87	160.00	209.88	161.00	210.63	162.00	211.25	163.00	211.87
GR	164.00	212.49	165.00	213.09	166.00	213.60	167.00	214.07	168.00	214.54
GR	169.00	215.01	170.00	215.48	171.00	215.96	172.00	216.47	173.00	216.97
GR	174.00	217.50	175.00	218.03	176.00	218.56	177.00	219.11	178.00	219.66
GR	179.00	220.24	180.00	220.85	181.00	221.47	182.00	222.12	183.00	222.79
GR	184.00	223.52	185.00	224.33	186.00	225.23	187.00	226.26	188.00	227.46
GR	189.00	228.93	190.00	230.81	191.00	233.01	192.00	235.29	193.00	237.62
GR	194.00	240.23	195.00	243.18	196.00	246.80	197.00	252.36	197.50	256.48
GR	198.00	260.59								
X1	1345.00	90.00	0.00	0.00	0.00	0.00	152.00	0.00	0.00	0.00
XF	0.00	0.00	-225.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										7.00
GR	202.00	0.00	201.00	5.16	200.00	9.64	199.00	14.33	198.00	17.93
GR	197.00	20.16	196.00	21.78	195.00	23.10	194.00	24.28	193.00	25.37
GR	192.00	26.41	191.00	27.42	190.00	28.44	189.00	29.46	188.00	30.47
GR	187.00	31.48	186.00	32.42	185.00	33.27	184.00	34.05	183.00	34.76
GR	182.00	35.40	181.00	36.01	180.00	36.60	179.00	37.15	178.00	37.68
GR	177.00	38.21	176.00	38.73	175.00	39.26	174.00	39.79	173.00	40.32
GR	172.00	40.87	171.00	41.43	170.00	42.02	169.00	42.60	168.00	43.20
GR	167.00	43.83	166.00	44.48	165.00	45.15	164.00	45.90	163.00	46.70
GR	162.00	47.60	161.00	48.76	160.00	50.37	159.00	55.16	158.50	59.81
GR	158.00	64.46	157.70	70.21	157.40	75.97	157.60	80.07	157.80	84.16
GR	158.00	88.26	158.25	93.76	158.50	99.25	158.75	104.75	159.00	110.25
GR	160.00	112.22	161.00	113.50	162.00	114.57	163.00	115.52	164.00	116.36
GR	165.00	117.14	166.00	117.89	167.00	118.62	168.00	119.35	169.00	120.09
GR	170.00	120.86	171.00	121.65	172.00	122.49	173.00	123.39	174.00	124.35
GR	175.00	125.37	176.00	126.44	177.00	127.60	178.00	128.88	179.00	130.38
GR	180.00	132.00	181.00	133.84	182.00	136.33	183.00	139.11	184.00	142.03
GR	185.00	144.56	186.00	146.92	187.00	149.20	188.00	151.34	189.00	153.42
GR	190.00	155.32	191.00	157.07	192.00	158.80	193.00	160.59	194.00	162.52
GR	195.00	164.37	196.00	166.08	197.00	167.66	198.00	169.25	199.00	171.05
GR	200.00	173.26	201.00	178.05						
X1	1510.00	113.00	0.00	0.00	0.00	0.00	165.00	0.00	0.00	0.00
XF	0.00	0.00	130.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										6.00
GR	206.00	0.00	205.00	5.03	204.00	7.10	203.00	8.66	202.00	9.98
GR	201.00	11.19	200.00	12.37	199.00	13.57	198.00	14.82	197.00	16.18
GR	196.00	17.63	195.00	19.13	194.00	20.67	193.00	22.27	192.00	23.97
GR	191.00	25.87	190.00	28.35	189.00	31.73	188.00	35.11	187.00	37.77
GR	186.00	40.06	185.00	42.38	184.00	44.58	183.00	46.53	182.00	48.20
GR	181.00	49.71	180.00	51.17	179.00	52.64	178.00	54.12	177.00	55.64
GR	176.00	57.25	175.00	58.90	174.00	60.58	173.00	62.28	172.00	64.00
GR	171.00	65.65	170.00	67.33	169.00	69.24	168.00	71.61	167.00	74.82
GR	166.00	77.86	165.00	80.01	164.00	81.75	163.00	83.44	162.00	85.25
GR	161.00	87.87	160.67	92.87	160.33	97.88	160.00	102.88	159.80	107.58
GR	159.90	110.62	160.00	113.65	160.10	115.43	160.00	116.98	159.90	119.68
GR	160.00	122.68	160.00	126.56	160.00	130.44	159.50	133.52	159.00	136.60
GR	158.50	142.02	158.00	147.44	158.00	148.76	159.00	152.29	160.00	153.76
GR	161.00	154.86	162.00	155.88	163.00	156.71	164.00	157.42	165.00	158.08
GR	166.00	158.73	167.00	159.35	168.00	159.97	169.00	160.56	170.00	161.13
GR	171.00	161.70	172.00	162.26	173.00	162.85	174.00	163.43	175.00	164.02
GR	176.00	164.63	177.00	165.24	178.00	165.85	179.00	166.46	180.00	167.07
GR	181.00	167.68	182.00	168.29	183.00	168.91	184.00	169.52	185.00	170.14
GR	186.00	170.75	187.00	171.36	188.00	171.96	189.00	172.54	190.00	173.11
GR	191.00	173.66	192.00	174.21	193.00	174.75	194.00	175.29	195.00	175.83
GR	196.00	176.39	197.00	176.95	198.00	177.55	199.00	178.17	200.00	178.82
GR	201.00	179.50	202.00	180.21	203.00	180.97	204.00	181.78	205.00	182.65
GR	206.00	183.64	207.00	184.72	208.00	186.06	209.00	187.58	210.00	189.24
GR	211.00	191.05	212.00	193.06	213.00	195.81	214.00	200.55		
X1	1665.00	99.00	0.00	0.00	0.00	0.00	155.00	0.00	0.00	0.00
X3										6.00
GR	206.00	0.00	205.50	5.14	205.00	10.29	204.50	14.27	204.00	18.26
GR	203.00	21.95	202.00	24.14	201.00	25.87	200.00	27.32	199.00	28.67
GR	198.00	29.92	197.00	31.10	196.00	32.23	195.00	33.35	194.00	34.45
GR	193.00	35.53	192.00	36.62	191.00	37.71	190.00	38.89	189.00	40.21
GR	188.00	41.87	187.00	43.99	186.00	45.81	185.00	47.41	184.00	48.84
GR	183.00	50.20	182.00	51.46	181.00	52.73	180.00	54.19	179.00	55.68
GR	178.00	56.85	177.00	58.00	176.00	59.05	175.00	59.85	174.00	60.64
GR	173.00	61.43	172.00	62.16	171.00	62.85	170.00	63.53	169.00	64.21
GR	168.00	64.92	167.00	65.74	166.00	66.60	165.00	67.50	164.00	68.68
GR	163.00	70.54	162.50	74.48	162.00	78.42	161.50	81.99	161.00	85.56

GR	160.00	89.11	159.00	94.09	159.00	96.87	159.50	101.29	160.00	105.71
GR	160.50	108.88	161.00	112.06	162.00	113.95	163.00	115.03	164.00	116.05
GR	165.00	117.01	166.00	117.86	167.00	118.73	168.00	119.59	169.00	120.48
GR	170.00	121.38	171.00	122.29	172.00	123.24	173.00	124.34	174.00	125.44
GR	175.00	126.47	176.00	127.42	177.00	128.38	178.00	129.31	179.00	130.23
GR	180.00	131.15	181.00	132.05	182.00	132.93	183.00	133.82	184.00	134.71
GR	185.00	135.59	186.00	136.47	187.00	137.34	188.00	138.20	189.00	139.06
GR	190.00	139.91	191.00	140.76	192.00	141.61	193.00	142.44	194.00	143.29
GR	195.00	144.15	196.00	145.02	197.00	145.89	198.00	146.77	199.00	147.69
GR	200.00	148.65	201.00	149.61	202.00	150.58	203.00	151.59	204.00	152.67
GR	205.00	153.85	206.00	155.27	207.00	156.94	208.00	159.35	209.00	163.97
X1	1796.00	95.00	0.00	0.00	0.00	0.00	131.00	0.00	0.00	0.00
XF	0.00	0.00	235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										6.00
GR	205.00	0.00	204.50	3.77	204.00	7.54	203.00	9.95	202.00	11.64
GR	201.00	13.05	200.00	14.31	199.00	15.53	198.00	16.69	197.00	17.84
GR	196.00	19.03	195.00	20.23	194.00	21.45	193.00	22.71	192.00	23.98
GR	191.00	25.28	190.00	26.55	189.00	27.81	188.00	29.06	187.00	30.30
GR	186.00	31.57	185.00	32.86	184.00	34.16	183.00	35.62	182.00	37.12
GR	181.00	38.81	180.00	40.55	179.00	42.30	178.00	43.91	177.00	45.42
GR	176.00	46.83	175.00	48.31	174.00	49.91	173.00	51.88	172.00	54.54
GR	171.00	57.81	170.00	60.90	169.00	64.06	168.00	68.71	167.00	72.04
GR	166.00	73.83	165.00	75.16	164.00	76.33	163.00	77.52	162.00	78.86
GR	161.00	80.30	160.00	82.82	159.80	85.89	159.60	88.96	159.80	93.67
GR	160.00	98.38	161.00	103.56	161.50	107.47	162.00	111.38	163.00	114.30
GR	164.00	115.84	165.00	116.99	166.00	117.92	167.00	118.72	168.00	119.44
GR	169.00	120.13	170.00	120.81	171.00	121.46	172.00	122.11	173.00	122.77
GR	174.00	123.44	175.00	124.13	176.00	124.88	177.00	125.64	178.00	126.42
GR	179.00	127.26	180.00	128.44	181.00	129.67	182.00	131.55	183.00	134.27
GR	184.00	137.67	185.00	141.68	186.00	146.85	187.00	149.18	188.00	150.71
GR	189.00	152.00	190.00	153.17	191.00	154.34	192.00	155.64	193.00	157.16
GR	194.00	159.07	195.00	161.55	196.00	164.14	197.00	166.93	197.33	171.10
GR	197.67	175.28	198.00	179.45	199.00	184.21	200.00	185.91	201.00	187.28
GR	202.00	188.51	203.00	189.71	204.00	190.95	205.00	192.33	206.00	194.09
GR	207.00	196.98								
X1	1944.00	97.00	0.00	0.00	0.00	0.00	148.00	0.00	0.00	0.00
XF	0.00	0.00	235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										6.00
GR	205.00	0.00	204.50	3.98	204.00	7.97	203.00	10.38	202.00	11.89
GR	201.00	13.12	200.00	14.30	199.00	15.34	198.00	16.38	197.00	17.44
GR	196.00	18.55	195.00	19.65	194.00	20.94	193.00	22.44	192.00	24.10
GR	191.00	26.05	190.00	28.03	189.00	29.98	188.00	31.69	187.00	33.34
GR	186.00	34.83	185.00	36.36	184.00	38.09	183.00	40.09	182.00	42.96
GR	181.00	48.94	180.00	54.24	179.00	58.80	178.00	61.74	177.00	64.41
GR	176.00	67.23	175.00	70.18	174.00	72.34	173.00	73.97	172.00	75.32
GR	171.00	76.61	170.00	77.95	169.00	79.44	168.00	81.77	167.50	86.14
GR	167.00	90.52	166.00	94.94	165.00	98.15	164.00	101.42	163.00	105.78
GR	163.00	110.72	163.00	115.66	163.00	120.60	163.10	123.22	163.00	125.97
GR	162.00	130.32	161.00	133.74	160.50	137.93	160.00	142.12	160.00	143.29
GR	161.00	148.54	162.00	151.41	163.00	153.53	164.00	155.13	165.00	156.39
GR	166.00	157.40	167.00	158.26	168.00	158.90	169.00	159.45	170.00	159.98
GR	171.00	160.53	172.00	161.09	173.00	161.65	174.00	162.22	175.00	162.82
GR	176.00	163.45	177.00	164.08	178.00	164.73	179.00	165.38	180.00	166.06
GR	181.00	166.76	182.00	167.47	183.00	168.17	184.00	168.87	185.00	169.58
GR	186.00	170.30	187.00	171.06	188.00	171.82	189.00	172.59	190.00	173.35
GR	191.00	174.13	192.00	175.10	193.00	176.22	194.00	177.41	195.00	179.26
GR	196.00	182.48	197.00	186.77	198.00	190.22	199.00	192.63	200.00	194.85
GR	201.00	197.16	202.00	200.01	203.00	204.66	203.50	209.08	204.00	213.49
GR	205.00	218.29	206.00	221.31	207.00	225.23				
X1	2047.00	99.00	0.00	0.00	0.00	0.00	103.00	0.00	0.00	0.00
XF	0.00	0.00	235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										12.00
GR	205.00	0.00	204.00	2.03	203.00	3.50	202.00	4.76	201.00	5.88
GR	200.00	6.95	199.00	8.00	198.00	9.07	197.00	10.16	196.00	11.28
GR	195.00	12.46	194.00	13.74	193.00	15.16	192.00	16.79	191.00	18.71
GR	190.00	21.15	189.00	23.91	188.00	27.09	187.00	30.51	186.00	33.47
GR	185.00	35.97	184.00	38.04	183.00	39.96	182.00	41.75	181.00	43.75
GR	180.00	45.96	179.00	48.90	178.00	53.30	177.00	59.25	176.50	62.49
GR	176.00	65.73	175.00	71.55	174.50	75.68	174.00	79.82	173.50	83.88
GR	173.00	87.93	172.50	91.15	172.00	94.37	171.00	97.52	170.00	99.68
GR	169.00	101.42	168.00	103.01	167.00	104.57	166.00	106.26	165.00	108.28

GR	164.00	111.44	163.50	116.18	163.00	120.92	162.80	124.04	162.53	128.23
GR	162.27	132.41	162.00	136.60	161.00	142.51	160.90	146.52	161.00	151.13
GR	162.00	156.68	163.00	160.03	163.50	163.52	164.00	167.01	165.00	169.58
GR	166.00	171.09	167.00	172.23	168.00	173.26	169.00	174.18	170.00	175.06
GR	171.00	175.92	172.00	176.75	173.00	177.60	174.00	178.48	175.00	179.39
GR	176.00	180.41	177.00	181.53	178.00	183.00	179.00	185.17	180.00	189.13
GR	181.00	193.09	182.00	196.60	183.00	201.83	183.50	205.79	184.00	209.74
GR	185.00	213.16	186.00	215.51	187.00	217.25	188.00	218.99	189.00	220.50
GR	190.00	222.07	191.00	223.54	192.00	225.02	193.00	226.67	194.00	228.40
GR	195.00	230.35	196.00	232.39	197.00	235.11	198.00	238.10	199.00	240.93
GR	200.00	243.33	201.00	245.11	202.00	246.86	203.00	248.55	204.00	250.24
GR	205.00	252.18	206.00	254.72	207.00	259.65	207.13	261.60	207.00	263.22
GR	206.90	267.15	207.00	270.16	207.25	274.67	207.50	279.18	207.75	283.69
GR	208.00	288.20								
X1	2120.00	105.00	0.00	0.00	0.00	0.00	73.00	0.00	0.00	0.00
XF	0.00	0.00	235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										17.00
GR	205.00	0.00	204.00	1.67	203.00	2.98	202.00	4.18	201.00	5.38
GR	200.00	6.58	199.00	7.88	198.00	9.30	197.00	10.87	196.00	12.61
GR	195.00	14.45	194.00	16.82	193.00	19.53	192.00	23.51	191.00	29.44
GR	190.00	33.70	189.00	36.47	188.00	39.38	187.00	42.57	186.00	45.36
GR	185.00	48.07	184.00	50.64	183.00	53.18	182.00	55.58	181.00	57.96
GR	180.00	60.00	179.00	61.98	178.00	63.91	177.00	65.54	176.00	66.77
GR	175.00	67.87	174.00	68.86	173.00	69.79	172.00	70.65	171.00	71.47
GR	170.00	72.27	169.00	73.09	168.00	73.96	167.00	74.95	166.00	76.16
GR	165.00	77.92	164.00	80.83	163.70	85.22	163.40	89.61	163.70	94.11
GR	164.00	98.61	165.00	101.72	166.00	105.38	166.15	108.69	166.30	112.00
GR	166.15	115.71	166.00	119.41	165.00	124.53	164.00	130.00	163.50	133.14
GR	163.00	136.29	162.50	139.93	162.00	143.58	161.93	148.92	161.87	154.25
GR	161.80	159.59	161.90	163.13	162.00	166.67	163.00	169.01	164.00	170.46
GR	165.00	171.62	166.00	172.69	167.00	173.72	168.00	174.75	169.00	175.82
GR	170.00	176.96	171.00	178.17	172.00	179.46	173.00	180.79	174.00	182.10
GR	175.00	183.37	176.00	184.61	177.00	185.83	178.00	187.06	179.00	188.39
GR	180.00	190.00	181.00	192.41	182.00	195.86	183.00	199.14	184.00	202.77
GR	184.30	208.71	184.15	212.04	184.00	215.36	183.79	218.79	184.00	223.66
GR	185.00	227.51	186.00	230.93	187.00	234.51	188.00	237.07	189.00	239.09
GR	190.00	240.90	191.00	242.67	192.00	244.47	193.00	246.40	194.00	248.33
GR	195.00	250.39	196.00	252.56	197.00	255.01	198.00	258.12	199.00	261.95
GR	200.00	265.29	201.00	267.76	202.00	269.88	203.00	271.88	204.00	273.98
GR	205.00	276.15	206.00	278.57	207.00	281.40	207.25	287.18	207.50	292.95
GR	207.75	298.73	208.00	304.51	208.20	310.31	208.40	316.11	208.60	321.92
GR	208.80	327.72	209.00	333.52						
X1	2199.00	99.00	0.00	0.00	0.00	0.00	79.00	0.00	0.00	0.00
XF	0.00	0.00	235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										26.00
GR	206.00	0.00	205.67	4.29	205.33	8.59	205.00	12.88	204.00	15.13
GR	203.00	16.05	202.00	16.79	201.00	17.46	200.00	18.12	199.00	18.78
GR	198.00	19.30	197.00	19.69	196.00	20.09	195.00	20.47	194.00	20.84
GR	193.00	21.21	192.00	21.59	191.00	21.97	190.00	22.35	189.00	22.68
GR	188.00	22.99	187.00	23.29	186.00	23.59	185.00	23.89	184.00	24.20
GR	183.00	24.50	182.00	24.80	181.00	25.10	180.00	25.40	179.00	25.70
GR	178.00	26.05	177.00	26.40	176.00	26.76	175.00	27.11	174.00	27.48
GR	173.00	27.84	172.00	28.22	171.00	28.60	170.00	29.02	169.00	29.53
GR	168.00	30.13	167.00	30.81	166.00	31.58	165.00	32.55	164.00	34.49
GR	163.50	37.61	163.00	40.72	162.90	44.39	163.00	47.67	163.50	51.01
GR	164.00	54.35	164.30	59.88	164.60	65.40	164.40	70.81	164.20	76.23
GR	164.00	81.64	163.65	85.01	163.30	88.37	163.65	92.24	164.00	96.10
GR	165.00	100.53	166.00	103.05	167.00	105.40	168.00	108.24	169.00	112.45
GR	170.00	118.43	170.50	123.54	171.00	128.64	171.50	132.79	172.00	136.94
GR	173.00	139.98	174.00	142.26	175.00	144.30	176.00	146.18	177.00	147.90
GR	178.00	149.51	179.00	151.03	180.00	152.54	181.00	154.13	182.00	155.97
GR	183.00	158.20	184.00	160.84	185.00	163.55	186.00	166.17	187.00	169.03
GR	188.00	172.03	189.00	175.18	190.00	178.24	191.00	181.16	192.00	184.13
GR	193.00	187.84	193.50	193.34	194.00	198.84	195.00	202.87	196.00	205.76
GR	197.00	208.69	198.00	211.82	199.00	215.74	199.22	219.55	199.00	224.07
GR	198.77	228.10	199.00	231.14	200.00	233.34	201.00	234.77	202.00	236.06
GR	203.00	237.31	204.00	238.70	205.00	240.37	206.00	243.14	206.11	248.81
GR	206.22	254.49	206.33	260.16	206.44	265.83	206.56	271.51	206.67	277.18
GR	206.78	282.85	206.89	288.53	207.00	294.20	207.14	299.57	207.29	304.93
GR	207.43	310.30	207.57	315.66	207.71	321.03	207.86	326.39	208.00	331.76
X1	2302.00	103.00	0.00	0.00	0.00	0.00	103.00	0.00	0.00	0.00

XF	0.00	0.00	-190.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										29.00
GR	207.00	0.00	206.00	2.25	205.00	3.63	204.00	4.70	203.00	5.66
GR	202.00	6.51	201.00	7.33	200.00	8.13	199.00	8.95	198.00	9.77
GR	197.00	10.67	196.00	11.64	195.00	12.70	194.00	13.85	193.00	15.08
GR	192.00	16.31	191.00	17.51	190.00	18.65	189.00	19.73	188.00	20.84
GR	187.00	22.06	186.00	23.43	185.00	25.22	184.00	27.45	183.00	29.61
GR	182.00	31.18	181.00	32.40	180.00	33.40	179.00	34.30	178.00	35.08
GR	177.00	35.85	176.00	36.59	175.00	37.32	174.00	38.05	173.00	38.78
GR	172.00	39.53	171.00	40.31	170.00	41.13	169.00	42.02	168.00	43.00
GR	167.00	44.09	166.00	45.37	165.00	47.00	164.00	49.79	163.80	54.36
GR	164.00	57.99	165.00	62.27	165.50	65.33	166.00	68.39	166.11	72.63
GR	166.23	76.87	166.11	80.46	166.00	84.05	165.50	88.40	165.00	92.76
GR	164.00	98.23	163.90	102.80	163.80	107.37	163.90	111.55	164.00	115.73
GR	165.00	121.00	166.00	123.97	167.00	128.08	167.50	132.06	168.00	136.04
GR	169.00	138.75	170.00	140.69	171.00	142.68	172.00	145.84	172.33	150.81
GR	172.67	155.78	173.00	160.75	173.50	164.05	174.00	167.35	175.00	171.34
GR	176.00	175.28	177.00	179.92	178.00	184.87	178.38	188.10	178.76	191.32
GR	178.69	196.08	178.63	200.83	178.56	205.59	179.00	210.33	180.00	213.76
GR	181.00	215.93	182.00	218.24	183.00	220.89	184.00	224.49	185.00	228.89
GR	186.00	232.77	187.00	235.95	188.00	238.93	189.00	242.24	190.00	246.00
GR	191.00	248.97	192.00	251.60	193.00	254.60	193.50	260.40	194.00	266.19
GR	195.00	269.97	196.00	272.67	197.00	274.79	198.00	276.59	199.00	278.11
GR	200.00	279.52	201.00	280.85	202.00	282.11	203.00	283.35	204.00	285.01
GR	205.00	286.76	206.00	289.90	206.10	294.47	206.20	299.05	206.13	303.44
GR	206.07	307.83	206.00	312.22	205.90	317.95	205.80	323.67	205.70	329.40
GR	205.60	335.13	205.50	340.86	205.40	346.58	205.30	352.31	205.48	357.60
GR	205.65	362.90	205.83	368.19	206.00	373.48	206.25	378.52	206.50	383.56
GR	206.75	388.60	207.00	393.64						
X1	2430.00	108.00	0.00	0.00	0.00	0.00	128.00	0.00	0.00	0.00
XF	0.00	0.00	-190.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										25.00
GR	207.00	0.00	206.00	2.22	205.00	3.82	204.00	5.15	203.00	6.35
GR	202.00	7.55	201.00	8.79	200.00	10.10	199.00	11.47	198.00	12.84
GR	197.00	14.23	196.00	15.69	195.00	17.27	194.00	18.93	193.00	20.64
GR	192.00	22.54	191.00	24.55	190.00	26.57	189.00	28.59	188.00	30.80
GR	187.00	32.85	186.00	34.31	185.00	35.44	184.00	36.37	183.00	37.23
GR	182.00	38.00	181.00	38.76	180.00	39.51	179.00	40.27	178.00	41.05
GR	177.00	41.90	176.00	42.84	175.00	43.86	174.00	45.02	173.00	46.32
GR	172.00	47.87	171.00	49.70	170.00	52.11	169.00	54.83	168.00	57.15
GR	167.00	59.17	166.00	61.17	165.00	64.07	164.80	69.60	164.60	75.13
GR	164.73	79.17	164.87	83.20	165.00	87.24	166.00	89.85	167.00	91.90
GR	168.00	93.96	169.00	96.66	169.50	99.74	170.00	102.82	170.10	105.87
GR	170.00	109.45	169.80	115.11	169.60	120.76	169.40	126.42	169.20	132.07
GR	169.00	137.73	168.90	140.32	169.00	143.12	169.50	147.07	170.00	151.03
GR	171.00	154.63	172.00	156.95	173.00	159.14	174.00	161.35	175.00	163.81
GR	176.00	166.81	177.00	171.92	177.33	175.99	177.67	180.07	178.00	184.14
GR	178.50	187.81	179.00	191.48	180.00	196.29	181.00	199.91	182.00	203.75
GR	183.00	207.75	184.00	210.86	185.00	213.32	186.00	215.40	187.00	217.81
GR	188.00	221.19	188.41	224.59	188.00	228.98	187.00	232.22	186.00	234.71
GR	185.00	237.79	184.73	241.18	185.00	243.69	186.00	247.58	187.00	250.30
GR	188.00	252.65	189.00	254.90	190.00	257.13	191.00	259.36	192.00	261.57
GR	193.00	263.80	194.00	266.03	195.00	268.12	196.00	269.90	197.00	271.37
GR	198.00	272.67	199.00	273.84	200.00	274.95	201.00	275.97	202.00	277.06
GR	203.00	278.26	204.00	279.64	205.00	281.29	206.00	283.49	206.16	288.65
GR	206.31	293.81	206.47	298.96	206.63	304.12	206.78	309.28	206.94	314.44
GR	206.96	319.74	206.98	325.05	207.00	330.35	207.10	335.72	207.00	341.20
GR	206.96	346.12	206.93	351.05	206.89	355.97	206.91	361.69	206.93	367.42
GR	206.96	373.14	206.98	378.87	207.00	384.59				
X1	2586.00	101.00	0.00	0.00	0.00	0.00	156.00	0.00	0.00	0.00
XF	0.00	0.00	-190.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										27.00
GR	208.00	0.00	207.50	4.16	207.00	8.33	206.00	10.80	205.00	12.52
GR	204.00	13.83	203.00	15.00	202.00	16.12	201.00	17.09	200.00	18.02
GR	199.00	18.94	198.00	19.86	197.00	20.79	196.00	21.72	195.00	22.63
GR	194.00	23.54	193.00	24.46	192.00	25.37	191.00	26.26	190.00	27.16
GR	189.00	28.05	188.00	28.94	187.00	29.82	186.00	30.78	185.00	31.74
GR	184.00	32.72	183.00	33.91	182.00	35.21	181.00	36.63	180.00	38.49
GR	179.00	40.45	178.00	42.58	177.00	44.70	176.00	46.80	175.00	48.89
GR	174.00	50.95	173.00	52.94	172.00	54.96	171.00	56.88	170.00	58.75
GR	169.00	60.90	168.00	63.64	167.74	66.76	167.49	69.89	167.74	72.93

GR	168.00	75.98	169.00	81.84	169.20	86.39	169.13	91.75	169.07	97.11
GR	169.00	102.47	168.75	107.90	168.50	113.34	168.25	118.77	168.00	124.21
GR	167.50	130.01	167.00	135.81	166.60	140.48	167.00	145.25	167.50	148.39
GR	168.00	151.54	169.00	154.17	170.00	156.23	171.00	158.09	172.00	159.99
GR	173.00	162.26	174.00	165.25	175.00	169.71	176.00	174.10	177.00	177.57
GR	178.00	180.67	179.00	183.44	180.00	185.85	181.00	187.88	182.00	189.69
GR	183.00	191.35	184.00	192.88	185.00	194.48	186.00	196.24	187.00	198.02
GR	188.00	199.74	189.00	201.56	190.00	203.34	191.00	205.13	192.00	206.96
GR	193.00	209.01	194.00	211.11	195.00	213.40	196.00	215.63	197.00	217.97
GR	198.00	220.43	199.00	222.68	200.00	224.56	201.00	226.18	202.00	227.67
GR	203.00	229.15	204.00	230.79	205.00	232.98	206.00	238.87	206.33	243.25
GR	206.67	247.63	207.00	252.01	207.10	255.08	207.20	258.16	207.00	263.85
GR	206.00	266.09	205.00	268.00	204.00	270.28	203.70	271.88	204.00	274.34
GR	205.00	276.81	206.00	279.02	207.00	282.52	207.00	288.39	207.00	294.26
GR	207.00	300.13	207.00	306.00	207.00	311.87	207.00	317.74	207.00	323.61
GR	207.00	329.49	207.00	335.36	207.00	341.23	207.00	347.10	207.00	352.97
GR	207.00	358.84	207.00	364.71	207.00	370.58				
X1	2633.00	87.00	0.00	0.00	0.00	0.00	47.00	0.00	0.00	0.00
XF	72.71	0.00	-190.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										24.00
GR	206.00	0.00	205.00	4.51	204.00	7.78	203.00	10.51	202.00	12.94
GR	201.00	15.26	200.00	17.52	199.00	19.62	198.00	21.59	197.00	23.37
GR	196.00	25.01	195.00	26.66	194.00	28.55	193.00	31.00	192.00	36.58
GR	191.00	41.64	190.00	44.95	189.00	47.40	188.00	48.99	187.00	50.44
GR	186.00	51.73	185.00	52.97	184.00	54.20	183.00	55.37	182.00	56.51
GR	181.00	57.84	180.00	59.34	179.00	60.85	178.00	62.37	177.00	63.89
GR	176.00	65.42	175.00	66.95	174.00	68.51	173.00	70.39	172.00	72.71
GR	171.00	76.52	170.50	81.93	170.00	87.33	169.00	91.07	168.00	94.14
GR	167.50	98.56	167.00	102.98	166.90	108.01	167.00	113.62	167.33	119.07
GR	167.67	124.51	168.00	129.96	169.00	134.80	170.00	139.44	171.00	143.14
GR	172.00	145.31	173.00	147.09	174.00	148.55	175.00	149.71	176.00	150.87
GR	177.00	152.37	178.00	153.89	179.00	155.39	180.00	157.00	181.00	158.81
GR	182.00	160.57	183.00	162.24	184.00	163.83	185.00	165.37	186.00	166.91
GR	187.00	168.53	188.00	170.20	189.00	171.78	190.00	173.35	191.00	175.02
GR	192.00	176.69	193.00	178.23	194.00	179.72	195.00	181.21	196.00	182.68
GR	197.00	184.07	198.00	185.36	199.00	186.57	200.00	187.74	201.00	188.92
GR	202.00	190.16	203.00	191.51	204.00	192.97	205.00	194.73	206.00	197.12
GR	206.12	203.08	206.24	209.04	206.36	215.01	206.48	220.97	206.60	226.93
GR	206.30	230.68	206.00	234.43	205.59	238.69	206.00	241.49	207.00	245.56
GR	207.01	251.25	207.02	256.94	207.03	262.63	207.03	268.32	207.04	274.01
GR	207.05	279.70	207.06	285.39	207.07	291.08	207.08	296.77	207.09	302.46
GR	207.10	308.15	207.10	313.84	207.11	319.53	207.12	325.22	207.13	330.91
GR	207.14	336.60								
X1	2730.00	79.00	0.00	0.00	0.00	0.00	97.00	0.00	0.00	0.00
XF	63.26	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										31.00
GR	196.00	0.00	195.00	4.67	194.50	8.10	194.00	11.53	193.50	17.08
GR	193.00	22.62	192.50	27.00	192.00	31.38	191.00	35.19	190.00	37.56
GR	189.00	39.50	188.00	41.41	187.00	43.38	186.00	45.44	185.00	47.33
GR	184.00	49.09	183.00	50.75	182.00	52.30	181.00	53.75	180.00	55.14
GR	179.00	56.51	178.00	57.94	177.00	59.46	176.00	61.12	175.00	63.26
GR	174.00	66.29	173.00	70.60	172.00	74.54	171.00	78.11	170.00	82.18
GR	169.80	86.23	170.00	90.07	170.10	93.91	170.20	97.75	170.10	100.94
GR	170.00	104.13	169.50	107.35	169.00	110.58	169.00	115.62	169.00	120.67
GR	169.00	125.71	169.00	130.76	168.75	136.70	168.50	142.65	168.75	147.99
GR	169.00	153.33	170.00	156.67	171.00	159.28	172.00	161.39	173.00	163.04
GR	174.00	164.53	175.00	165.85	176.00	167.05	177.00	168.13	178.00	169.17
GR	179.00	170.15	180.00	171.15	181.00	172.11	182.00	172.99	183.00	173.83
GR	184.00	174.52	185.00	175.18	186.00	175.78	187.00	176.32	188.00	176.80
GR	189.00	177.25	190.00	177.68	191.00	178.10	192.00	178.50	193.00	178.89
GR	194.00	179.28	195.00	179.66	196.00	180.03	197.00	180.41	198.00	180.79
GR	199.00	181.18	200.00	181.58	201.00	181.99	202.00	182.43	203.00	182.90
GR	204.00	183.41	205.00	184.07	206.00	184.86	207.00	186.05	207.00	191.58
GR	207.00	197.10	207.00	202.63	207.00	208.15	207.00	213.68	207.00	219.21
GR	207.00	224.73	207.00	230.26	207.00	235.78	207.00	241.31	207.00	246.83
GR	207.00	252.36	206.00	257.23	205.60	260.81	205.20	264.39	206.00	269.90
GR	207.00	273.58	207.07	279.07	207.15	284.57	207.22	290.06	207.29	295.56
GR	207.37	301.05	207.44	306.55	207.51	312.04	207.59	317.54	207.66	323.03
X1	2798.00	80.00	0.00	0.00	0.00	0.00	68.00	0.00	0.00	0.00
XF	53.32	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										36.00

GR	197.00	0.00	196.50	4.80	196.00	9.60	195.50	14.61	195.00	19.62
GR	194.00	23.47	193.00	25.72	192.00	27.42	191.00	28.97	190.00	30.35
GR	189.00	31.73	188.00	33.15	187.00	34.57	186.00	36.02	185.00	37.47
GR	184.00	38.92	183.00	40.37	182.00	41.82	181.00	43.28	180.00	44.73
GR	179.00	46.18	178.00	47.64	177.00	49.09	176.00	50.94	175.00	53.32
GR	174.50	56.99	174.00	60.66	173.67	64.86	173.33	69.05	173.00	73.25
GR	172.50	76.89	172.00	80.53	171.00	83.47	170.00	86.54	169.50	89.96
GR	169.00	93.39	168.80	98.51	168.60	103.64	168.73	108.12	168.87	112.61
GR	169.00	117.09	169.15	120.98	169.30	124.87	169.15	129.09	169.00	133.30
GR	168.70	136.73	168.40	140.16	168.70	143.65	169.00	147.15	170.00	149.96
GR	171.00	152.06	172.00	154.01	173.00	155.89	174.00	157.48	175.00	158.65
GR	176.00	159.67	177.00	160.51	178.00	161.10	179.00	161.56	180.00	162.00
GR	181.00	162.46	182.00	162.90	183.00	163.32	184.00	163.71	185.00	164.02
GR	186.00	164.32	187.00	164.61	188.00	164.91	189.00	165.20	190.00	165.50
GR	191.00	165.79	192.00	166.09	193.00	166.38	194.00	166.69	195.00	167.00
GR	196.00	167.33	197.00	167.65	198.00	167.98	199.00	168.30	200.00	168.64
GR	201.00	168.97	202.00	169.33	203.00	169.72	204.00	170.22	205.00	170.82
GR	206.00	171.44	207.00	172.09	208.00	172.98	208.07	177.19	208.13	181.40
GR	208.20	185.61	208.13	189.63	208.07	193.66	208.00	197.68	207.92	203.62
GR	207.83	209.55	207.75	215.49	207.67	221.43	207.58	227.37	207.50	233.30
GR	207.42	239.24	207.33	245.18	207.25	251.12	207.17	257.05	207.08	262.99
GR	207.00	268.93	206.89	273.38	206.77	277.83	206.89	281.82	207.00	285.80
GR	207.12	291.11	207.25	296.42	207.38	301.73	207.50	307.03	207.62	312.34
GR	207.75	317.65								
X1	2879.00	79.00	0.00	0.00	0.00	0.00	81.00	0.00	0.00	0.00
XF	35.08	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										21.00
GR	196.00	0.00	195.00	4.41	194.00	6.78	193.00	8.79	192.00	10.30
GR	191.00	11.80	190.00	13.21	189.00	14.60	188.00	15.88	187.00	17.10
GR	186.00	18.34	185.00	19.58	184.00	20.84	183.00	22.11	182.00	23.39
GR	181.00	24.68	180.00	25.98	179.00	27.30	178.00	28.74	177.00	30.23
GR	176.00	32.24	175.00	35.08	174.00	40.61	173.00	44.76	172.00	50.11
GR	171.50	54.08	171.00	58.06	170.00	63.33	169.75	67.15	169.50	70.97
GR	169.75	75.78	170.00	80.58	170.05	84.61	170.00	88.84	169.50	93.24
GR	169.00	97.64	168.65	102.72	168.30	107.80	168.65	112.27	169.00	116.74
GR	170.00	119.08	171.00	120.76	172.00	122.20	173.00	123.64	174.00	125.12
GR	175.00	126.71	176.00	128.81	177.00	131.91	178.00	136.07	179.00	139.42
GR	180.00	141.99	181.00	144.30	182.00	146.66	183.00	149.13	184.00	151.16
GR	185.00	152.82	186.00	154.33	187.00	155.81	188.00	157.31	189.00	158.20
GR	190.00	158.77	191.00	159.31	192.00	159.86	193.00	160.40	194.00	160.91
GR	195.00	161.36	196.00	161.80	197.00	162.25	198.00	162.70	199.00	163.15
GR	200.00	163.60	201.00	164.06	202.00	164.54	203.00	165.03	204.00	165.52
GR	205.00	166.01	206.00	166.52	207.00	167.24	208.00	168.70	208.09	172.85
GR	208.17	177.00	208.26	181.15	208.27	186.61	208.28	192.07	208.29	197.53
GR	208.38	203.34	208.47	209.15	208.56	214.97	208.64	220.78	208.73	226.59
GR	208.82	232.40	208.91	238.22	209.00	244.03	209.05	248.43	209.10	252.83
GR	209.05	257.31	209.00	261.79	208.67	266.33	208.33	270.87	208.00	275.41
X1	2953.00	81.00	0.00	0.00	0.00	0.00	74.00	0.00	0.00	0.00
XF	31.58	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										24.00
GR	196.00	0.00	195.00	2.03	194.00	3.68	193.00	4.94	192.00	6.14
GR	191.00	7.36	190.00	8.58	189.00	9.83	188.00	11.15	187.00	12.49
GR	186.00	13.89	185.00	15.37	184.00	16.86	183.00	18.44	182.00	20.00
GR	181.00	21.57	180.00	23.13	179.00	24.71	178.00	26.24	177.00	27.77
GR	176.00	29.51	175.00	31.58	174.00	34.44	173.00	38.25	172.00	42.17
GR	171.50	46.76	171.00	51.35	170.50	54.74	170.00	58.14	169.95	62.17
GR	169.90	66.20	169.95	70.55	170.00	74.90	170.30	79.81	170.60	84.71
GR	170.30	89.19	170.00	93.68	169.50	97.62	169.00	101.57	168.90	104.70
GR	169.00	107.78	170.00	113.25	171.00	115.81	172.00	118.14	173.00	120.49
GR	174.00	122.74	175.00	124.98	176.00	127.23	177.00	129.58	178.00	132.13
GR	179.00	134.33	180.00	135.99	181.00	137.34	182.00	138.46	183.00	139.50
GR	184.00	140.42	185.00	141.21	186.00	141.93	187.00	142.58	188.00	143.15
GR	189.00	143.67	190.00	144.16	191.00	144.64	192.00	145.10	193.00	145.55
GR	194.00	145.97	195.00	146.40	196.00	146.81	197.00	147.23	198.00	147.64
GR	199.00	148.06	200.00	148.49	201.00	148.93	202.00	149.38	203.00	149.87
GR	204.00	150.42	205.00	150.98	206.00	151.58	207.00	152.20	208.00	153.20
GR	209.00	154.72	209.05	158.46	209.10	162.20	209.09	167.64	209.07	173.08
GR	209.06	178.52	209.04	183.95	209.03	189.39	209.01	194.83	209.00	200.27
GR	208.94	203.12	209.00	208.59	209.10	214.45	209.20	220.30	209.30	226.16
GR	209.20	230.74	209.10	235.32	209.00	239.90	208.86	245.27	208.71	250.65
GR	208.57	256.02	208.43	261.40	208.29	266.77	208.14	272.15	208.00	277.52

X1	3053.00	74.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
XF	34.04	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										25.00
GR	197.00	0.00	196.00	2.06	195.00	3.56	194.00	4.87	193.00	6.08
GR	192.00	7.28	191.00	8.49	190.00	9.69	189.00	10.88	188.00	12.07
GR	187.00	13.26	186.00	14.45	185.00	15.63	184.00	16.81	183.00	17.99
GR	182.00	19.19	181.00	20.45	180.00	21.88	179.00	23.42	178.00	25.08
GR	177.00	26.71	176.00	28.29	175.00	29.74	174.00	31.06	173.00	32.41
GR	172.00	34.04	171.00	36.27	170.80	41.33	170.90	44.45	171.00	47.57
GR	172.00	53.28	172.50	57.57	173.00	61.87	173.00	66.66	172.50	71.39
GR	172.00	76.11	171.60	79.51	171.20	82.91	171.60	86.76	172.00	90.61
GR	172.33	94.67	172.67	98.74	173.00	102.80	174.00	105.06	175.00	106.97
GR	176.00	108.80	177.00	111.18	177.25	115.76	177.50	120.35	177.75	124.93
GR	178.00	129.52	179.00	135.11	180.00	138.63	181.00	141.99	182.00	145.35
GR	183.00	148.84	184.00	152.26	185.00	155.25	186.00	157.88	187.00	160.33
GR	188.00	162.70	189.00	165.03	190.00	167.42	191.00	170.32	192.00	172.97
GR	193.00	174.43	194.00	175.33	195.00	176.13	196.00	176.83	197.00	177.44
GR	198.00	177.99	199.00	178.51	200.00	179.03	201.00	179.53	202.00	180.03
GR	203.00	180.57	204.00	181.13	205.00	181.75	206.00	182.41	207.00	183.17
GR	208.00	184.20	209.00	186.09	209.00	191.89	209.00	197.70	209.00	203.50
GR	209.00	209.31	209.00	215.11	209.00	220.91	209.00	226.72	209.00	232.52
GR	208.89	238.19	208.78	243.86	208.67	249.53	208.56	255.20	208.44	260.86
GR	208.33	266.53	208.22	272.20	208.11	277.87	208.00	283.54		
X1	3143.00	72.00	0.00	0.00	0.00	0.00	90.00	0.00	0.00	0.00
XF	31.67	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										24.00
GR	198.00	0.00	197.00	2.22	196.00	4.04	195.00	5.36	194.00	6.71
GR	193.00	7.88	192.00	9.04	191.00	10.19	190.00	11.29	189.00	12.39
GR	188.00	13.50	187.00	14.74	186.00	15.98	185.00	17.26	184.00	18.57
GR	183.00	19.87	182.00	21.24	181.00	22.61	180.00	23.96	179.00	25.30
GR	178.00	26.75	177.00	28.24	176.00	29.91	175.00	31.67	174.00	34.33
GR	173.30	38.79	173.65	43.03	174.00	47.27	174.46	51.69	174.91	56.11
GR	174.46	61.74	174.00	67.38	173.67	72.21	173.33	77.04	173.00	81.87
GR	172.00	87.66	171.90	91.69	172.00	94.48	173.00	97.37	174.00	99.19
GR	175.00	100.86	176.00	102.40	177.00	103.88	178.00	106.08	179.00	109.20
GR	180.00	112.25	181.00	115.23	182.00	118.82	182.20	124.82	182.40	130.81
GR	182.60	136.81	182.80	142.80	183.00	148.80	184.00	153.62	185.00	158.06
GR	186.00	161.42	187.00	164.15	188.00	166.87	189.00	169.65	190.00	172.20
GR	191.00	174.48	192.00	176.67	193.00	179.24	194.00	183.42	195.00	187.78
GR	196.00	189.35	197.00	190.51	198.00	191.40	199.00	192.18	200.00	192.90
GR	201.00	193.59	202.00	194.26	203.00	194.92	204.00	195.64	205.00	196.39
GR	206.00	197.16	207.00	198.14	208.00	199.34	209.00	201.07	209.00	206.29
GR	209.00	211.50	209.00	216.72	209.00	221.94	209.00	227.16	209.00	232.37
GR	209.00	237.59	208.95	243.35	208.89	249.12	208.84	254.88	208.78	260.65
GR	208.73	266.41	208.68	272.17	208.62	277.94	208.57	283.70	208.51	289.47
GR	208.46	295.23								
X1	3236.00	78.00	0.00	0.00	0.00	0.00	93.00	0.00	0.00	0.00
XF	34.65	0.00	-950.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										27.00
GR	201.00	0.00	200.00	5.98	199.00	8.57	198.00	10.54	197.00	12.30
GR	196.00	13.87	195.00	15.27	194.00	16.60	193.00	17.86	192.00	19.10
GR	191.00	20.31	190.00	21.49	189.00	22.67	188.00	23.85	187.00	25.03
GR	186.00	26.21	185.00	27.38	184.00	28.56	183.00	29.80	182.00	31.16
GR	181.00	32.67	180.00	34.65	179.00	38.85	178.90	41.10	179.00	42.65
GR	179.10	47.06	179.00	51.88	178.50	55.49	178.00	59.10	177.50	64.11
GR	177.00	69.12	176.50	72.67	176.00	76.22	175.00	81.51	174.73	85.03
GR	174.46	88.55	174.53	91.78	174.60	95.01	174.00	97.99	173.00	101.90
GR	172.50	106.97	173.00	110.63	174.00	112.68	175.00	114.15	176.00	115.53
GR	177.00	117.00	178.00	118.84	179.00	122.36	179.50	125.75	180.00	129.15
GR	181.00	133.43	182.00	136.59	183.00	140.58	183.18	145.27	183.37	149.97
GR	183.55	154.66	183.37	160.39	183.18	166.11	183.00	171.84	182.95	175.54
GR	182.90	179.23	183.00	184.88	184.00	187.67	185.00	189.60	186.00	191.63
GR	187.00	193.93	188.00	196.38	189.00	198.50	190.00	200.23	191.00	201.45
GR	192.00	202.45	193.00	203.27	194.00	203.90	195.00	204.47	196.00	205.02
GR	197.00	205.54	198.00	206.06	199.00	206.55	200.00	207.04	201.00	207.53
GR	202.00	208.01	203.00	208.51	204.00	209.01	205.00	209.56	206.00	210.16
GR	207.00	210.85	208.00	211.63	209.00	212.68	209.00	218.54	209.00	224.39
GR	209.00	230.25	209.00	236.10	209.00	241.96	209.00	247.82	209.00	253.67
GR	209.00	259.53	209.00	265.38	209.00	271.24	209.00	277.09	209.00	282.95
GR	209.00	288.81	209.00	294.66	209.00	300.52	209.00	306.37	209.00	312.23
GS	0.15	0.10	0.42	0.20	0.85	0.26	1.55	0.14	6.16	0.31

X1	3331.00	78.00	0.00	0.00	0.00	0.00	95.00	0.00	0.00	0.00
XF	0.00	0.00	-950.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
X3										19.00
GR	205.00	0.00	204.00	2.77	203.00	4.83	202.00	6.59	201.00	8.17
GR	200.00	9.61	199.00	11.03	198.00	12.44	197.00	13.86	196.00	15.26
GR	195.00	16.62	194.00	17.93	193.00	19.20	192.00	20.43	191.00	21.63
GR	190.00	22.83	189.00	24.04	188.00	25.25	187.00	26.49	186.00	27.76
GR	185.00	29.07	184.00	30.40	183.00	31.84	182.00	33.59	181.00	36.12
GR	180.00	41.43	179.50	45.18	179.00	48.94	178.50	54.36	178.00	59.78
GR	177.00	62.95	176.00	65.15	175.00	67.12	174.00	69.47	173.00	73.04
GR	172.97	78.03	172.93	83.02	172.90	88.01	172.92	93.32	172.95	98.64
GR	172.97	103.96	173.00	109.27	174.00	112.07	175.00	113.96	176.00	115.52
GR	177.00	116.99	178.00	118.53	179.00	120.07	180.00	121.74	181.00	123.68
GR	182.00	126.13	183.00	129.08	184.00	132.27	185.00	135.46	186.00	138.10
GR	187.00	140.53	188.00	143.18	189.00	147.35	189.50	151.27	190.00	155.20
GR	191.00	158.50	192.00	160.15	193.00	161.77	194.00	163.05	195.00	164.21
GR	196.00	165.23	197.00	166.12	198.00	166.95	199.00	167.74	200.00	168.48
GR	201.00	169.21	202.00	169.93	203.00	170.65	204.00	171.39	205.00	172.14
GR	206.00	172.91	207.00	173.71	208.00	174.69	209.00	176.00	210.00	177.63
GR	210.23	183.51	210.46	189.39	210.39	194.78	210.33	200.16	210.26	205.55
GR	210.20	210.93	210.13	216.32	210.07	221.70	210.00	227.09	209.97	231.91
GR	209.93	236.73	209.90	241.55	209.95	245.65	210.00	249.74	210.10	255.30
GR	210.05	259.79	210.00	264.28						
X1	3392.00	74.00	0.00	0.00	0.00	0.00	61.00	0.00	0.00	0.00
X3										25.00
GR	206.00	0.00	205.00	3.47	204.00	5.60	203.00	7.27	202.00	8.78
GR	201.00	10.15	200.00	11.46	199.00	12.69	198.00	13.83	197.00	14.93
GR	196.00	15.97	195.00	16.97	194.00	17.96	193.00	18.92	192.00	19.89
GR	191.00	20.84	190.00	21.78	189.00	22.73	188.00	23.68	187.00	24.63
GR	186.00	25.59	185.00	26.58	184.00	27.58	183.00	28.71	182.00	29.95
GR	181.00	31.37	180.00	33.12	179.00	35.14	178.00	37.30	177.00	39.59
GR	176.00	42.87	175.90	46.42	175.80	49.96	175.90	53.42	176.00	56.88
GR	176.50	61.94	177.00	67.00	177.33	72.45	177.67	77.89	178.00	83.34
GR	178.10	86.51	178.20	89.69	178.00	94.95	178.00	98.39	178.00	101.84
GR	179.00	104.27	180.00	105.42	181.00	106.20	182.00	106.88	183.00	107.48
GR	184.00	107.95	185.00	108.39	186.00	108.82	187.00	109.23	188.00	109.62
GR	189.00	110.01	190.00	110.35	191.00	110.71	192.00	111.06	193.00	111.41
GR	194.00	111.77	195.00	112.13	196.00	112.50	197.00	112.89	198.00	113.29
GR	199.00	113.70	200.00	114.12	201.00	114.58	202.00	115.10	203.00	115.71
GR	204.00	116.39	205.00	117.15	206.00	118.21	207.00	119.46	208.00	121.08
GR	209.00	123.33	210.00	126.33	210.20	131.66	210.40	136.99	210.60	142.33
GR	210.80	147.66	211.00	152.99	211.09	158.84	211.18	164.70	211.27	170.55
GR	211.18	175.23	211.09	179.92	211.00	184.60	210.97	190.41	210.94	196.23
GR	210.90	202.04	210.87	207.86	210.84	213.67	210.81	219.49	210.78	225.30
GR	210.75	231.12	210.71	236.93	210.68	242.75	210.65	248.56		
X1	3502.00	85.00	0.00	0.00	0.00	0.00	110.00	0.00	0.00	0.00
XF	58.26	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										21.00
GR	219.00	0.00	218.00	2.06	217.00	3.73	216.00	5.20	215.00	6.60
GR	214.00	7.98	213.00	9.36	212.00	10.77	211.00	12.17	210.00	13.55
GR	209.00	14.94	208.00	16.32	207.00	17.72	206.00	19.22	205.00	20.79
GR	204.00	22.70	203.00	24.79	202.00	27.01	201.00	29.12	200.00	30.86
GR	199.00	32.37	198.00	33.80	197.00	35.15	196.00	36.46	195.00	37.78
GR	194.00	39.08	193.00	40.34	192.00	41.59	191.00	42.83	190.00	44.05
GR	189.00	45.26	188.00	46.44	187.00	47.58	186.00	48.70	185.00	49.80
GR	184.00	50.87	183.00	51.93	182.00	52.98	181.00	54.04	180.00	55.20
GR	179.00	56.52	178.00	58.26	177.00	61.95	177.00	65.18	177.50	69.49
GR	178.00	73.80	178.00	79.09	178.00	84.38	178.00	89.67	177.65	93.75
GR	177.30	97.83	177.65	102.96	178.00	108.10	179.00	112.68	180.00	115.77
GR	181.00	118.23	182.00	120.29	183.00	122.01	184.00	123.52	185.00	124.63
GR	186.00	125.72	187.00	126.59	188.00	127.28	189.00	127.97	190.00	128.65
GR	191.00	129.32	192.00	129.89	193.00	130.46	194.00	131.02	195.00	131.59
GR	196.00	132.15	197.00	132.76	198.00	133.38	199.00	134.00	200.00	134.62
GR	201.00	135.26	202.00	135.99	203.00	136.80	204.00	137.62	205.00	138.48
GR	206.00	139.54	207.00	140.63	208.00	141.88	209.00	143.60	210.00	146.89
GR	210.45	151.49	210.90	156.08	210.92	160.90	210.94	165.72	210.96	170.53
GR	210.98	175.35	211.00	180.17	211.10	185.36	211.19	190.54	211.29	195.73
GR	211.39	200.92	211.48	206.10	211.58	211.29	211.50	216.52	211.41	221.75
GR	211.33	226.98	211.25	232.21	211.17	237.44	211.08	242.67	211.00	247.90
GR	210.98	251.73								
X1	3589.00	77.00	0.00	0.00	0.00	0.00	87.00	0.00	0.00	0.00

XF	51.42	0.00	35.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										20.00
GR	218.00	0.00	217.00	2.41	216.00	4.21	215.00	5.70	214.00	7.23
GR	213.00	8.81	212.00	10.44	211.00	12.08	210.00	13.65	209.00	15.16
GR	208.00	16.49	207.00	17.77	206.00	19.01	205.00	20.23	204.00	21.44
GR	203.00	22.73	202.00	24.07	201.00	25.46	200.00	26.90	199.00	28.38
GR	198.00	29.93	197.00	31.47	196.00	33.04	195.00	34.60	194.00	36.15
GR	193.00	37.69	192.00	39.23	191.00	40.75	190.00	42.27	189.00	43.78
GR	188.00	45.31	187.00	46.93	186.00	48.76	185.00	51.42	184.50	57.10
GR	184.00	62.78	183.50	68.49	183.00	74.20	182.00	79.06	181.00	82.24
GR	180.00	85.33	179.50	88.80	179.00	92.27	178.50	97.11	178.00	101.95
GR	177.93	106.02	177.87	110.09	177.80	114.16	177.84	119.36	177.88	124.55
GR	177.92	129.75	177.96	134.94	178.00	140.14	179.00	145.22	180.00	149.47
GR	181.00	152.25	182.00	154.30	183.00	156.08	184.00	157.45	185.00	158.74
GR	186.00	159.96	187.00	161.14	188.00	162.18	189.00	162.99	190.00	163.77
GR	191.00	164.50	192.00	165.11	193.00	165.66	194.00	166.19	195.00	166.71
GR	196.00	167.23	197.00	167.72	198.00	168.19	199.00	168.65	200.00	169.10
GR	201.00	169.55	202.00	170.01	203.00	170.47	204.00	170.99	205.00	171.54
GR	206.00	172.16	207.00	172.82	208.00	173.53	209.00	174.51	210.00	176.05
GR	211.00	179.09	211.09	184.79	211.18	190.48	211.27	196.18	211.36	201.88
GR	211.45	207.57	211.55	213.27	211.64	218.96	211.73	224.66	211.82	230.36
GR	211.91	236.05	212.00	241.75						
X1	3681.00	70.00	0.00	0.00	0.00	0.00	92.00	0.00	0.00	0.00
XF	53.40	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
X3										19.00
GR	217.00	0.00	216.00	3.40	215.00	5.57	214.00	7.19	213.00	8.83
GR	212.00	10.48	211.00	12.12	210.00	13.75	209.00	15.39	208.00	17.01
GR	207.00	18.62	206.00	20.23	205.00	21.75	204.00	23.24	203.00	24.65
GR	202.00	26.03	201.00	27.36	200.00	28.65	199.00	29.94	198.00	31.22
GR	197.00	32.50	196.00	33.78	195.00	35.05	194.00	36.32	193.00	37.58
GR	192.00	38.84	191.00	40.09	190.00	41.34	189.00	42.74	188.00	44.21
GR	187.00	45.67	186.00	47.13	185.00	48.58	184.00	50.08	183.00	51.64
GR	182.00	53.40	181.00	56.27	180.85	59.96	180.70	63.64	180.85	69.22
GR	181.00	74.81	182.00	78.14	183.00	80.64	184.00	82.99	185.00	85.47
GR	186.00	88.13	187.00	90.66	188.00	93.44	189.00	95.97	190.00	98.49
GR	191.00	100.62	192.00	102.45	193.00	104.08	194.00	105.69	195.00	107.17
GR	196.00	108.64	197.00	109.90	198.00	111.16	199.00	112.41	200.00	113.65
GR	201.00	114.87	202.00	116.05	203.00	117.24	204.00	118.57	205.00	120.03
GR	206.00	121.63	207.00	123.45	208.00	125.73	209.00	129.48	209.20	135.33
GR	209.40	141.17	209.60	147.02	209.80	152.86	210.00	158.71	210.25	164.39
GR	210.50	170.07	210.75	175.76	211.00	181.44	211.09	187.42	211.18	193.40
GR	211.27	199.38	211.36	205.36	211.45	211.34	211.55	217.33	211.64	223.31
GR	211.73	229.29	211.82	235.27	211.91	241.25	212.00	247.23		
X1	3837.00	63.00	0.00	0.00	0.00	0.00	156.00	0.00	0.00	0.00
X3										6.00
GR	216.00	0.00	215.00	2.08	214.00	3.49	213.00	4.88	212.00	6.23
GR	211.00	7.57	210.00	8.92	209.00	10.26	208.00	11.57	207.00	12.89
GR	206.00	14.19	205.00	15.48	204.00	16.75	203.00	17.97	202.00	19.20
GR	201.00	20.44	200.00	21.70	199.00	23.00	198.00	24.38	197.00	25.80
GR	196.00	27.34	195.00	28.89	194.00	30.48	193.00	32.10	192.00	33.83
GR	191.00	35.73	190.00	37.82	189.00	40.51	188.00	44.16	187.00	47.41
GR	186.00	50.03	185.00	52.45	184.00	56.37	183.60	61.19	184.00	66.34
GR	184.50	72.31	185.00	78.28	186.00	81.27	187.00	83.67	188.00	85.92
GR	189.00	88.15	190.00	90.23	191.00	92.15	192.00	93.97	193.00	95.71
GR	194.00	97.43	195.00	99.16	196.00	100.86	197.00	102.50	198.00	104.15
GR	199.00	105.74	200.00	107.07	201.00	108.31	202.00	109.48	203.00	110.62
GR	204.00	111.74	205.00	112.87	206.00	114.08	207.00	115.45	208.00	117.55
GR	209.00	122.50	209.50	128.49	210.00	134.47	210.50	139.04	211.00	143.60
GR	211.25	149.46	211.50	155.31	211.75	161.16	212.00	167.02		
X1	3990.00	56.00	0.00	0.00	0.00	0.00	153.00	0.00	0.00	0.00
XF	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
X3										8.00
GR	214.00	0.00	213.00	3.24	212.00	5.66	211.00	8.40	210.00	11.40
GR	209.00	15.70	208.67	20.74	208.33	25.77	208.00	30.81	207.00	34.62
GR	206.00	36.91	205.00	38.39	204.00	39.82	203.00	41.00	202.00	42.17
GR	201.00	43.40	200.00	44.67	199.00	46.04	198.00	47.77	197.00	49.62
GR	196.00	51.66	195.00	53.45	194.00	55.18	193.00	56.77	192.00	58.42
GR	191.00	60.17	190.00	62.15	189.00	64.34	188.00	67.16	187.00	70.93
GR	186.65	76.09	186.30	81.25	186.53	85.46	186.77	89.66	187.00	93.87
GR	188.00	96.24	189.00	98.06	190.00	99.65	191.00	101.16	192.00	102.68
GR	193.00	104.36	194.00	106.06	195.00	107.63	196.00	109.16	197.00	110.70

GR	198.00	112.26	199.00	114.06	200.00	116.16	201.00	118.73	202.00	121.49
GR	203.00	123.55	204.00	125.51	205.00	127.47	206.00	129.50	207.00	132.45
GR	207.50	136.46	208.00	140.47	208.50	145.88	209.00	151.29	210.00	154.52
GR	211.00	157.47	212.00	162.02	212.15	165.17	212.30	168.31		
X1	4140.00	57.00	0.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00
XF	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
X3										8.00
GR	215.00	0.00	214.00	2.36	213.00	4.29	212.00	6.25	211.00	9.05
GR	210.67	13.40	210.33	17.74	210.00	22.09	209.00	25.79	208.00	27.93
GR	207.00	29.31	206.00	30.64	205.00	31.90	204.00	33.11	203.00	34.32
GR	202.00	35.60	201.00	36.90	200.00	38.41	199.00	39.99	198.00	41.78
GR	197.00	43.72	196.00	45.94	195.00	48.20	194.00	50.32	193.00	52.22
GR	192.00	53.91	191.00	55.54	190.00	57.20	189.00	58.96	188.00	61.15
GR	187.00	65.00	186.99	69.02	186.97	73.05	186.96	77.07	186.98	82.92
GR	187.00	88.77	188.00	93.18	189.00	95.43	190.00	97.33	191.00	99.05
GR	192.00	100.71	193.00	102.49	194.00	104.40	195.00	106.34	196.00	108.27
GR	197.00	110.11	198.00	111.73	199.00	113.37	200.00	115.06	201.00	116.55
GR	202.00	117.92	203.00	119.30	204.00	120.76	205.00	122.29	206.00	123.89
GR	207.00	125.85	208.00	128.55	209.00	133.39	209.33	138.13	209.67	142.86
GR	210.00	147.60	211.00	151.60	212.00	155.28	212.11	159.72	212.23	164.16
X1	4256.00	54.00	0.00	0.00	0.00	0.00	116.00	0.00	0.00	0.00
XF	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
X3										15.00
GR	216.00	0.00	215.00	3.53	214.00	6.24	213.00	9.01	212.00	12.57
GR	211.00	16.89	210.67	21.90	210.33	26.90	210.00	31.91	209.67	36.96
GR	209.33	42.01	209.00	47.06	208.00	48.15	207.00	48.61	206.00	49.06
GR	205.00	49.50	204.00	49.94	203.00	50.38	202.00	50.82	201.00	51.26
GR	200.00	51.70	199.00	52.14	198.00	52.58	197.00	53.02	196.00	53.46
GR	195.00	53.91	194.00	54.38	193.00	54.88	192.00	55.38	191.00	55.89
GR	190.00	56.40	189.00	57.07	188.53	59.97	188.65	64.56	188.76	69.14
GR	188.88	73.72	189.00	78.31	190.00	79.78	191.00	80.77	192.00	81.47
GR	193.00	81.99	194.00	82.47	195.00	82.94	196.00	83.41	197.00	83.85
GR	198.00	84.30	199.00	84.73	200.00	85.16	201.00	85.59	202.00	86.02
GR	203.00	86.46	204.00	86.92	205.00	87.41	206.00	87.98	207.00	88.67
GR	208.00	89.43	209.00	90.62	209.20	96.06	209.40	101.51	209.60	106.95
GR	209.80	112.40	210.00	117.84	210.25	122.46	210.50	127.08	210.75	131.70
GR	211.00	136.32	212.00	141.41	212.50	146.36	213.00	151.31		
X1	4347.00	55.00	0.00	0.00	0.00	0.00	91.00	0.00	0.00	0.00
XF	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
X3										7.00
GR	217.00	0.00	216.00	3.09	215.00	5.02	214.00	6.67	213.00	8.42
GR	212.00	10.94	211.50	16.22	211.00	21.49	210.50	27.03	210.00	32.56
GR	209.00	33.74	208.00	34.62	207.00	35.24	206.00	35.71	205.00	36.15
GR	204.00	36.57	203.00	36.98	202.00	37.40	201.00	37.82	200.00	38.23
GR	199.00	38.65	198.00	39.07	197.00	39.49	196.00	39.91	195.00	40.33
GR	194.00	40.75	193.00	41.21	192.00	41.75	191.00	42.38	190.00	43.19
GR	189.00	44.78	188.99	46.20	188.99	51.01	189.00	55.82	189.00	60.63
GR	189.00	65.44	190.00	66.73	191.00	67.57	192.00	68.29	193.00	68.88
GR	194.00	69.34	195.00	69.77	196.00	70.20	197.00	70.64	198.00	71.07
GR	199.00	71.50	200.00	71.92	201.00	72.34	202.00	72.76	203.00	73.19
GR	204.00	73.61	205.00	74.04	206.00	74.49	207.00	75.04	208.00	75.81
GR	209.00	76.75	210.00	78.55	210.33	83.76	210.67	88.97	211.00	94.18
GR	212.00	99.28	213.00	103.26						
GS	0.21	0.22	0.85	0.29	1.55	0.22	3.10	0.16	9.55	0.10
EJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TI	INITIAL BED MATERIAL COMPOSITION									
SECTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION	SIZE MM	FRACTION
0.01	0.21	0.170	0.73	0.270	1.03	0.240	1.55	0.220	4.36	0.100
287.00	0.20	0.164	0.70	0.264	1.01	0.242	1.55	0.213	4.50	0.118
455.00	0.20	0.160	0.68	0.260	1.00	0.242	1.55	0.209	4.58	0.129
582.00	0.20	0.157	0.66	0.257	1.00	0.243	1.55	0.205	4.64	0.137
692.00	0.20	0.155	0.65	0.255	0.99	0.244	1.55	0.203	4.69	0.144
790.00	0.19	0.153	0.64	0.252	0.98	0.244	1.55	0.200	4.74	0.151
921.00	0.19	0.150	0.62	0.250	0.98	0.245	1.55	0.197	4.81	0.159
1048.00	0.19	0.147	0.61	0.247	0.97	0.246	1.55	0.194	4.88	0.167
1193.00	0.19	0.144	0.60	0.243	0.96	0.246	1.55	0.190	4.95	0.176
1345.00	0.18	0.140	0.58	0.240	0.95	0.247	1.55	0.186	5.03	0.186
1510.00	0.18	0.137	0.56	0.236	0.94	0.248	1.55	0.182	5.12	0.197
1665.00	0.18	0.133	0.55	0.233	0.93	0.249	1.55	0.178	5.21	0.206
1796.00	0.17	0.131	0.54	0.230	0.93	0.250	1.55	0.175	5.28	0.215
1944.00	0.17	0.127	0.52	0.227	0.92	0.250	1.55	0.171	5.37	0.224
2047.00	0.17	0.125	0.51	0.224	0.91	0.251	1.55	0.169	5.43	0.231
2120.00	0.17	0.123	0.51	0.223	0.91	0.251	1.55	0.167	5.47	0.236
2199.00	0.17	0.122	0.50	0.221	0.90	0.252	1.55	0.165	5.51	0.241
2302.00	0.17	0.119	0.49	0.219	0.90	0.252	1.55	0.162	5.58	0.247
2430.00	0.16	0.117	0.48	0.216	0.89	0.253	1.55	0.159	5.65	0.255
2586.00	0.16	0.113	0.47	0.212	0.88	0.254	1.55	0.155	5.75	0.265
2633.00	0.16	0.112	0.47	0.211	0.88	0.254	1.55	0.154	5.78	0.268
2730.00	0.16	0.110	0.46	0.209	0.88	0.255	1.55	0.151	5.84	0.275
2798.00	0.16	0.109	0.45	0.208	0.87	0.255	1.55	0.150	5.88	0.279
2879.00	0.16	0.107	0.45	0.206	0.87	0.256	1.55	0.148	5.93	0.284
2953.00	0.15	0.105	0.44	0.204	0.86	0.256	1.55	0.146	5.98	0.289
3053.00	0.15	0.103	0.43	0.202	0.86	0.256	1.55	0.143	6.04	0.295
3143.00	0.15	0.101	0.43	0.200	0.85	0.257	1.55	0.141	6.10	0.301
3236.00	0.15	0.099	0.42	0.198	0.85	0.257	1.55	0.139	6.16	0.307
3331.00	0.15	0.110	0.45	0.206	0.89	0.254	1.64	0.141	6.40	0.289
3392.00	0.16	0.116	0.46	0.211	0.92	0.252	1.71	0.142	6.55	0.278
3502.00	0.16	0.129	0.50	0.221	0.98	0.249	1.83	0.144	6.84	0.258
3589.00	0.17	0.138	0.53	0.228	1.03	0.246	1.93	0.146	7.08	0.242
3681.00	0.17	0.148	0.56	0.236	1.08	0.243	2.05	0.148	7.34	0.224

3837.00	0.18	0.166	0.61	0.249	1.18	0.238	2.26	0.151	7.81	0.196
3990.00	0.19	0.183	0.68	0.262	1.28	0.234	2.48	0.154	8.29	0.167
4140.00	0.20	0.199	0.75	0.275	1.39	0.229	2.72	0.157	8.80	0.139
4256.00	0.20	0.212	0.80	0.285	1.48	0.225	2.93	0.160	9.21	0.118
4347.00	0.21	0.222	0.85	0.293	1.55	0.222	3.10	0.162	9.55	0.101

THE ENGELUND-HANSEN SEDIMENT FORMULA IS USED

TIME = 242.52 HRS DT = 60 SECS TIME STEP = 14566

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD TONS
0.010	166.47	80.0	18.07	6500	6.89	0.001949	1.41	2.38	0.35	0.154E+06
287.000	167.15	98.3	17.71	6500	6.43	0.001976	1.32	2.20	0.35	0.151E+06
455.000	167.44	85.1	18.12	6500	6.63	0.001897	1.38	2.25	0.34	0.151E+06
582.000	167.78	103.1	17.66	6500	6.24	0.001889	1.28	2.09	0.35	0.150E+06
692.000	167.93	86.0	17.05	6500	6.48	0.001726	1.26	2.10	0.33	0.149E+06
790.000	168.23	110.9	15.91	6500	6.02	0.001744	1.13	1.92	0.34	0.148E+06
921.000	168.41	95.9	15.39	6500	6.31	0.001765	1.21	2.10	0.34	0.149E+06
1048.000	168.88	133.4	21.33	6500	5.74	0.002060	1.09	2.10	0.35	0.149E+06
1193.000	169.33	168.1	15.13	6500	5.77	0.002779	1.47	2.72	0.39	0.147E+06
1345.000	169.50	86.5	14.26	6500	7.03	0.002271	1.77	2.84	0.38	0.139E+06
1510.000	169.91	94.4	13.14	6500	6.91	0.002316	1.76	2.83	0.39	0.135E+06
1665.000	170.19	74.5	14.73	6500	7.29	0.002188	1.98	2.92	0.37	0.134E+06
1796.000	170.85	110.3	15.41	6500	6.13	0.002020	1.57	2.24	0.35	0.128E+06
1944.000	171.25	121.7	16.01	6500	6.01	0.002015	1.49	2.20	0.35	0.123E+06
2047.000	171.62	154.8	15.17	6500	5.64	0.002411	1.64	2.29	0.36	0.118E+06
2120.000	171.82	172.0	14.75	6500	5.71	0.002697	1.87	2.50	0.39	0.114E+06
2199.000	171.88	116.1	12.28	6500	6.59	0.002510	2.19	2.72	0.40	0.110E+06
2302.000	172.25	111.6	22.55	6500	6.62	0.002637	2.32	2.82	0.39	0.108E+06
2430.000	172.76	113.8	23.14	6500	6.55	0.002748	2.38	2.87	0.39	0.107E+06
2586.000	173.30	116.3	16.53	6500	6.59	0.002852	2.50	2.94	0.40	0.104E+06
2633.000	173.35	90.1	16.45	6500	7.10	0.002655	2.62	3.03	0.39	0.102E+06
2730.000	173.64	104.0	10.07	6500	6.98	0.002703	2.62	2.99	0.41	0.982E+05
2798.000	173.82	103.6	10.64	6500	7.07	0.002834	2.77	3.10	0.42	0.954E+05
2879.000	173.99	96.3	10.51	6500	7.35	0.002877	2.94	3.22	0.43	0.936E+05
2953.000	174.20	95.6	10.38	6500	7.43	0.002994	3.08	3.32	0.43	0.915E+05
3053.000	174.45	83.3	12.16	6500	7.66	0.002977	3.20	3.38	0.42	0.890E+05
3143.000	174.68	76.1	12.21	6500	7.81	0.002896	3.24	3.38	0.42	0.860E+05
3236.000	174.94	76.4	12.72	6500	7.87	0.002837	3.27	3.35	0.42	0.822E+05
3331.000	175.18	71.8	13.50	6500	7.98	0.002822	3.42	3.30	0.42	0.777E+05
3392.000	175.36	71.1	13.99	6500	7.98	0.002781	3.51	3.21	0.42	0.743E+05
3502.000	175.67	61.8	14.86	6500	7.96	0.002720	3.68	3.06	0.39	0.686E+05
3589.000	175.93	66.9	15.41	6500	7.83	0.002529	3.71	2.76	0.39	0.631E+05
3681.000	176.17	59.9	16.06	6500	7.82	0.002475	3.96	2.66	0.37	0.582E+05
3837.000	176.74	68.5	16.88	6500	6.98	0.001818	3.77	1.83	0.33	0.379E+05
3990.000	196.74	60.2	10.44	6500	15.11	0.016914	1.09	0.99	1.00	0.154E+05
4140.000	201.14	80.0	14.18	6500	8.41	0.003524	1.11	0.99	0.48	0.154E+05
4256.000	201.24	34.5	12.71	6500	18.15	0.021578	1.14	0.99	0.99	0.154E+05
4347.000	205.98	38.8	16.99	6500	12.24	0.007455	1.15	0.99	0.58	0.154E+05

ID

37 SECTION 4256.00 TIME = 242.52 HRS WS = 201.24 WIDTH = 34.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
216.00	0.00	0.00	0.0	215.00	0.00	0.00	3.5	214.00	0.00	0.00	6.2
213.00	0.00	0.00	9.0	212.00	0.00	0.00	12.6	211.00	0.00	0.00	16.9
210.67	0.00	0.00	21.9	210.33	0.00	0.00	26.9	210.00	0.00	0.00	31.9
209.67	0.00	0.00	37.0	209.33	0.00	0.00	42.0	209.00	0.00	0.00	47.1
208.00	0.00	0.00	48.2	207.00	0.00	0.00	48.6	206.00	0.00	0.00	49.1
205.00	0.00	0.00	49.5	204.00	0.00	0.00	49.9	203.00	0.00	0.00	50.4
202.00	0.00	0.00	50.8	201.00	0.00	0.00	51.3	200.00	0.00	0.00	51.7
199.00	0.00	0.00	52.1	198.00	0.00	0.00	52.6	197.00	0.00	0.00	53.0
196.00	0.00	0.00	53.5	195.00	0.00	0.00	53.9	194.00	0.00	0.00	54.4
193.00	0.00	0.00	54.9	192.00	0.00	0.00	55.4	191.00	0.00	0.00	55.9
190.00	0.00	0.00	56.4	189.00	0.00	0.00	57.1	188.53	0.00	0.00	60.0
188.65	0.00	0.00	64.6	188.76	0.00	0.00	69.1	188.88	0.00	0.00	73.7
189.00	0.00	0.00	78.3	190.00	0.00	0.00	79.8	191.00	0.00	0.00	80.8
192.00	0.00	0.00	81.5	193.00	0.00	0.00	82.0	194.00	0.00	0.00	82.5
195.00	0.00	0.00	82.9	196.00	0.00	0.00	83.4	197.00	0.00	0.00	83.8
198.00	0.00	0.00	84.3	199.00	0.00	0.00	84.7	200.00	0.00	0.00	85.2
201.00	0.00	0.00	85.6	202.00	0.00	0.00	86.0	203.00	0.00	0.00	86.5
204.00	0.00	0.00	86.9	205.00	0.00	0.00	87.4	206.00	0.00	0.00	88.0
207.00	0.00	0.00	88.7	208.00	0.00	0.00	89.4	209.00	0.00	0.00	90.6
209.20	0.00	0.00	96.1	209.40	0.00	0.00	101.5	209.60	0.00	0.00	107.0
209.80	0.00	0.00	112.4	210.00	0.00	0.00	117.8	210.25	0.00	0.00	122.5
210.50	0.00	0.00	127.1	210.75	0.00	0.00	131.7	211.00	0.00	0.00	136.3

212.00	0.00	0.00	141.4	212.50	0.00	0.00	146.4	213.00	0.00	0.00	151.3
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ID

36	SECTION	4140.00	TIME = 242.52 HRS	WS = 201.14	WIDTH = 80.0
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
215.00	0.00	0.00	0.0	214.00	0.00	0.00	2.4	213.00	0.00	0.00	4.3
212.00	0.00	0.00	6.2	211.00	0.00	0.00	9.1	210.67	0.00	0.00	13.4
210.33	0.00	0.00	17.7	210.00	0.00	0.00	22.1	209.00	0.00	0.00	25.8
208.00	0.00	0.00	27.9	207.00	0.00	0.00	29.3	206.00	0.00	0.00	30.6
205.00	0.00	0.00	31.9	204.00	0.00	0.00	33.1	203.00	0.00	0.00	34.3
202.00	0.00	0.00	35.6	201.00	0.00	0.00	36.9	200.00	0.00	0.00	38.4
199.00	0.00	0.00	40.0	198.00	0.00	0.00	41.8	197.00	0.00	0.00	43.7
196.00	0.00	0.00	45.9	195.00	0.00	0.00	48.2	194.00	0.00	0.00	50.3
193.00	0.00	0.00	52.2	192.00	0.00	0.00	53.9	191.00	0.00	0.00	55.5
190.00	0.00	0.00	57.2	189.00	0.00	0.00	59.0	188.00	0.00	0.00	61.2
187.00	0.00	0.00	65.0	186.99	0.00	0.00	69.0	186.97	0.00	0.00	73.0
186.96	0.00	0.00	77.1	186.98	0.00	0.00	82.9	187.00	0.00	0.00	88.8
188.00	0.00	0.00	93.2	189.00	0.00	0.00	95.4	190.00	0.00	0.00	97.3
191.00	0.00	0.00	99.1	192.00	0.00	0.00	100.7	193.00	0.00	0.00	102.5
194.00	0.00	0.00	104.4	195.00	0.00	0.00	106.3	196.00	0.00	0.00	108.3
197.00	0.00	0.00	110.1	198.00	0.00	0.00	111.7	199.00	0.00	0.00	113.4
200.00	0.00	0.00	115.1	201.00	0.00	0.00	116.6	202.00	0.00	0.00	117.9
203.00	0.00	0.00	119.3	204.00	0.00	0.00	120.8	205.00	0.00	0.00	122.3
206.00	0.00	0.00	123.9	207.00	0.00	0.00	125.8	208.00	0.00	0.00	128.6
209.00	0.00	0.00	133.4	209.33	0.00	0.00	138.1	209.67	0.00	0.00	142.9
210.00	0.00	0.00	147.6	211.00	0.00	0.00	151.6	212.00	0.00	0.00	155.3
212.11	0.00	0.00	159.7	212.23	0.00	0.00	164.2				

ID

35	SECTION	3990.00	TIME = 242.52 HRS	WS = 196.74	WIDTH = 60.2
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
214.00	0.00	0.00	0.0	213.00	0.00	0.00	3.2	212.00	0.00	0.00	5.7
211.00	0.00	0.00	8.4	210.00	0.00	0.00	11.4	209.00	0.00	0.00	15.7
208.67	0.00	0.00	20.7	208.33	0.00	0.00	25.8	208.00	0.00	0.00	30.8
207.00	0.00	0.00	34.6	206.00	0.00	0.00	36.9	205.00	0.00	0.00	38.4
204.00	0.00	0.00	39.8	203.00	0.00	0.00	41.0	202.00	0.00	0.00	42.2
201.00	0.00	0.00	43.4	200.00	0.00	0.00	44.7	199.00	0.00	0.00	46.0
198.00	0.00	0.00	47.8	197.00	0.00	0.00	49.6	196.00	0.00	0.00	51.7
195.00	0.00	0.00	53.5	194.00	0.00	0.00	55.2	193.00	0.00	0.00	56.8
192.00	0.00	0.00	58.4	191.00	0.00	0.00	60.2	190.00	0.00	0.00	62.2
189.00	0.00	0.00	64.3	188.00	0.00	0.00	67.2	187.00	0.00	0.00	70.9
186.65	0.00	0.00	76.1	186.30	0.00	0.00	81.2	186.53	0.00	0.00	85.5
186.77	0.00	0.00	89.7	187.00	0.00	0.00	93.9	188.00	0.00	0.00	96.2
189.00	0.00	0.00	98.1	190.00	0.00	0.00	99.7	191.00	0.00	0.00	101.2
192.00	0.00	0.00	102.7	193.00	0.00	0.00	104.4	194.00	0.00	0.00	106.1
195.00	0.00	0.00	107.6	196.00	0.00	0.00	109.2	197.00	0.00	0.00	110.7
198.00	0.00	0.00	112.3	199.00	0.00	0.00	114.1	200.00	0.00	0.00	116.2
201.00	0.00	0.00	118.7	202.00	0.00	0.00	121.5	203.00	0.00	0.00	123.6
204.00	0.00	0.00	125.5	205.00	0.00	0.00	127.5	206.00	0.00	0.00	129.5
207.00	0.00	0.00	132.4	207.50	0.00	0.00	136.5	208.00	0.00	0.00	140.5
208.50	0.00	0.00	145.9	209.00	0.00	0.00	151.3	210.00	0.00	0.00	154.5
211.00	0.00	0.00	157.5	212.00	0.00	0.00	162.0	212.15	0.00	0.00	165.2
212.30	0.00	0.00	168.3								

ID

34	SECTION	3837.00	TIME = 242.52 HRS	WS = 176.74	WIDTH = 68.5
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
216.00	0.00	0.00	0.0	215.00	0.00	0.00	2.1	214.00	0.00	0.00	3.5
213.00	0.00	0.00	4.9	212.00	0.00	0.00	6.2	211.00	0.00	0.00	7.6
210.00	0.00	0.00	8.9	209.00	0.00	0.00	10.3	208.00	0.00	0.00	11.6
207.00	0.00	0.00	12.9	206.00	0.00	0.00	14.2	205.00	0.00	0.00	15.5
204.00	0.00	0.00	16.8	203.00	0.00	0.00	18.0	202.00	0.00	0.00	19.2
201.00	0.00	0.00	20.4	199.54	0.00	-0.46	21.7	197.99	0.00	-1.01	23.0
196.35	0.00	-1.65	24.4	194.66	0.00	-2.34	25.8	192.82	0.00	-3.18	27.3
190.97	0.00	-4.03	28.9	189.08	0.00	-4.92	30.5	187.15	0.00	-5.85	32.1

185.09	0.00	-6.91	33.8	182.83	0.00	-8.17	35.7	180.33	0.00	-9.67	37.8
180.09	0.00	-8.91	38.0	179.64	0.00	-8.36	38.4	172.45	0.00	-14.55	44.6
171.13	0.00	-14.87	46.0	170.41	0.00	-14.59	46.7	162.65	0.00	-21.35	54.4
159.86	0.00	-23.74	61.2	159.86	0.00	-24.14	67.9	159.86	0.00	-24.64	77.6
159.86	0.00	-25.14	83.3	159.86	0.00	-26.14	83.5	159.86	0.00	-27.14	88.3
159.86	0.00	-28.14	90.6	159.86	0.00	-29.14	93.5	159.86	0.00	-30.14	96.7
160.03	-0.06	-30.97	98.5	161.41	-0.06	-30.59	99.7	163.23	-0.07	-29.77	101.1
164.44	-0.07	-29.56	101.9	165.33	-0.08	-29.67	102.1	165.80	-0.08	-30.20	102.3
168.05	-0.09	-28.95	104.1	170.49	-0.09	-27.51	106.1	172.14	-0.09	-26.86	107.3
174.57	-0.09	-25.43	109.1	176.38	-0.04	-24.62	109.3	177.06	-0.03	-24.94	109.5
178.65	-0.02	-24.35	110.6	180.21	-0.02	-23.79	111.7	181.76	-0.01	-23.24	112.9
183.37	-0.01	-22.63	114.1	185.11	-0.01	-21.89	115.4	187.66	-0.01	-20.34	117.6
193.57	-0.01	-15.43	122.5	200.71	-0.01	-8.79	128.5	207.83	-0.01	-2.17	134.5
210.50	0.00	0.00	139.0	211.00	0.00	0.00	143.6	211.25	0.00	0.00	149.5
211.50	0.00	0.00	155.3	211.75	0.00	0.00	161.2	212.00	0.00	0.00	167.0

ID

33 SECTION 3681.00 TIME = 242.52 HRS WS = 176.17 WIDTH = 59.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
217.00	0.00	0.00	0.0	216.00	0.00	0.00	3.4	215.00	0.00	0.00	5.6
214.00	0.00	0.00	7.2	213.00	0.00	0.00	8.8	212.00	0.00	0.00	10.5
211.00	0.00	0.00	12.1	210.00	0.00	0.00	13.8	209.00	0.00	0.00	15.4
208.00	0.00	0.00	17.0	207.00	0.00	0.00	18.6	206.00	0.00	0.00	20.2
205.00	0.00	0.00	21.8	204.00	0.00	0.00	23.2	203.00	0.00	0.00	24.6
202.00	0.00	0.00	26.0	201.00	0.00	0.00	27.4	200.00	0.00	0.00	28.6
199.00	0.00	0.00	29.9	198.00	0.00	0.00	31.2	197.00	0.00	0.00	32.5
196.00	0.00	0.00	33.8	195.00	0.00	0.00	35.0	194.00	0.00	0.00	36.3
193.00	0.00	0.00	37.6	192.00	0.00	0.00	38.8	191.00	0.00	0.00	40.1
190.00	0.00	0.00	41.3	189.00	0.00	0.00	42.7	188.00	0.00	0.00	44.2
187.00	0.00	0.00	45.7	186.00	0.00	0.00	47.1	185.00	0.00	0.00	48.6
184.00	0.00	0.00	50.1	183.00	0.00	0.00	51.6	181.61	0.00	-0.39	53.4
160.10	0.00	-20.90	59.8	160.10	0.00	-20.75	60.0	160.10	0.00	-20.60	63.6
160.10	0.00	-20.75	69.2	160.10	0.00	-20.90	76.1	160.10	0.00	-21.90	81.6
160.10	0.00	-22.90	84.9	160.10	0.00	-23.90	85.3	160.10	0.00	-24.90	85.7
160.10	0.00	-25.90	86.0	160.10	0.00	-26.90	87.8	160.10	0.00	-27.90	90.7
160.10	0.00	-28.90	95.1	160.10	0.00	-29.90	96.4	160.10	0.00	-30.90	98.1
160.10	0.00	-31.90	98.3	160.10	0.00	-32.90	101.4	160.10	0.00	-33.90	101.6
160.10	0.00	-34.90	102.4	166.77	-0.02	-29.23	108.6	168.42	-0.02	-28.58	109.9
170.22	-0.02	-27.78	111.2	171.61	-0.01	-27.39	111.4	172.04	0.00	-27.96	111.6
175.70	-0.06	-25.30	114.6	177.58	-0.01	-24.42	116.1	179.11	-0.01	-23.89	117.2
180.79	-0.01	-23.21	118.6	182.61	-0.01	-22.38	120.0	184.59	-0.01	-21.41	121.6
186.81	-0.01	-20.19	123.4	189.56	-0.01	-18.45	125.7	194.03	-0.01	-14.97	129.5
201.00	-0.01	-8.20	135.3	207.96	-0.01	-1.44	141.2	209.60	0.00	0.00	147.0
209.80	0.00	0.00	152.9	210.00	0.00	0.00	158.7	210.25	0.00	0.00	164.4
210.50	0.00	0.00	170.1	210.75	0.00	0.00	175.8	211.00	0.00	0.00	181.4
211.09	0.00	0.00	187.4	211.18	0.00	0.00	193.4	211.27	0.00	0.00	199.4
211.36	0.00	0.00	205.4	211.45	0.00	0.00	211.3	211.55	0.00	0.00	217.3
211.64	0.00	0.00	223.3	211.73	0.00	0.00	229.3	211.82	0.00	0.00	235.3
211.91	0.00	0.00	241.2	212.00	0.00	0.00	247.2				

ID

32 SECTION 3589.00 TIME = 242.52 HRS WS = 175.93 WIDTH = 66.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
218.00	0.00	0.00	0.0	217.00	0.00	0.00	2.4	216.00	0.00	0.00	4.2
215.00	0.00	0.00	5.7	214.00	0.00	0.00	7.2	213.00	0.00	0.00	8.8
212.00	0.00	0.00	10.4	211.00	0.00	0.00	12.1	210.00	0.00	0.00	13.6
209.00	0.00	0.00	15.2	208.00	0.00	0.00	16.5	207.00	0.00	0.00	17.8
206.00	0.00	0.00	19.0	205.00	0.00	0.00	20.2	204.00	0.00	0.00	21.4
203.00	0.00	0.00	22.7	202.00	0.00	0.00	24.1	201.00	0.00	0.00	25.5
200.00	0.00	0.00	26.9	199.00	0.00	0.00	28.4	198.00	0.00	0.00	29.9
197.00	0.00	0.00	31.5	196.00	0.00	0.00	33.0	195.00	0.00	0.00	34.6
194.00	0.00	0.00	36.2	193.00	0.00	0.00	37.7	192.00	0.00	0.00	39.2
191.00	0.00	0.00	40.8	190.00	0.00	0.00	42.3	189.00	0.00	0.00	43.8
188.00	0.00	0.00	45.3	187.00	0.00	0.00	46.9	186.00	0.00	0.00	48.8
185.00	0.00	0.00	51.4	184.50	0.00	0.00	57.1	184.00	0.00	0.00	62.8
183.50	0.00	0.00	68.5	183.00	0.00	0.00	74.2	177.71	0.00	-4.29	79.1
173.71	0.00	-7.29	82.4	170.78	0.00	-9.22	84.9	164.37	0.00	-15.13	90.3

160.99	0.00	-18.01	93.1	160.53	0.00	-17.97	97.1	160.53	0.00	-17.47	101.9
160.53	0.00	-17.41	106.0	160.52	0.00	-17.34	110.1	160.52	0.00	-17.28	114.2
160.52	0.00	-17.32	119.4	160.52	0.00	-17.36	124.6	160.53	0.00	-17.39	129.8
160.55	0.00	-17.41	134.5	165.44	0.00	-12.56	138.6	172.62	0.00	-6.38	144.6
178.93	0.00	-1.07	149.9	180.27	0.00	-0.72	152.6	181.54	0.00	-0.46	154.3
183.49	0.00	0.49	156.1	185.12	0.00	1.12	157.4	186.66	0.00	1.66	158.7
188.11	0.00	2.11	160.0	189.52	0.00	2.52	161.1	190.76	0.00	2.76	162.2
191.74	0.00	2.74	163.0	192.67	0.00	2.67	163.8	193.55	0.00	2.55	164.5
194.29	0.00	2.29	165.1	194.96	0.00	1.96	165.7	195.61	0.00	1.61	166.2
196.24	0.00	1.24	166.7	196.88	0.00	0.88	167.2	197.48	0.00	0.48	167.7
198.06	0.00	0.06	168.2	198.62	0.00	-0.38	168.6	199.17	0.00	-0.83	169.1
199.72	0.00	-1.28	169.6	200.29	0.00	-1.71	170.0	200.85	0.00	-2.15	170.5
201.48	0.00	-2.52	171.0	202.14	0.00	-2.86	171.5	202.89	0.00	-3.11	172.2
203.68	0.00	-3.32	172.8	204.53	0.00	-3.47	173.5	205.70	0.00	-3.30	174.5
207.53	0.00	-2.47	176.1	211.00	0.00	0.00	179.1	211.09	0.00	0.00	184.8
211.18	0.00	0.00	190.5	211.27	0.00	0.00	196.2	211.36	0.00	0.00	201.9
211.45	0.00	0.00	207.6	211.55	0.00	0.00	213.3	211.64	0.00	0.00	219.0
211.73	0.00	0.00	224.7	211.82	0.00	0.00	230.4	211.91	0.00	0.00	236.1
212.00	0.00	0.00	241.8								

ID

31 SECTION 3502.00 TIME = 242.52 HRS WS = 175.67 WIDTH = 61.8

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
219.00	0.00	0.00	0.0	218.00	0.00	0.00	2.1	217.00	0.00	0.00	3.7
216.00	0.00	0.00	5.2	215.00	0.00	0.00	6.6	214.00	0.00	0.00	8.0
213.00	0.00	0.00	9.4	212.00	0.00	0.00	10.8	211.00	0.00	0.00	12.2
210.00	0.00	0.00	13.6	209.00	0.00	0.00	14.9	208.00	0.00	0.00	16.3
207.00	0.00	0.00	17.7	206.00	0.00	0.00	19.2	205.00	0.00	0.00	20.8
204.00	0.00	0.00	22.7	203.00	0.00	0.00	24.8	202.00	0.00	0.00	27.0
201.00	0.00	0.00	29.1	200.00	0.00	0.00	30.9	199.00	0.00	0.00	32.4
198.00	0.00	0.00	33.8	197.00	0.00	0.00	35.2	196.00	0.00	0.00	36.5
195.00	0.00	0.00	37.8	194.00	0.00	0.00	39.1	193.00	0.00	0.00	40.3
192.00	0.00	0.00	41.6	191.00	0.00	0.00	42.8	190.00	0.00	0.00	44.0
189.00	0.00	0.00	45.3	188.00	0.00	0.00	46.4	187.00	0.00	0.00	47.6
186.00	0.00	0.00	48.7	185.00	0.00	0.00	49.8	184.00	0.00	0.00	50.9
183.00	0.00	0.00	51.9	182.00	0.00	0.00	53.0	181.00	0.00	0.00	54.0
180.00	0.00	0.00	55.2	179.00	0.00	0.00	56.5	160.80	0.00	-17.20	58.3
160.80	0.00	-16.20	62.0	160.80	0.00	-16.20	65.2	160.80	0.00	-16.70	69.5
160.80	0.00	-17.20	73.8	160.80	0.00	-17.20	79.1	160.80	0.00	-17.20	84.4
160.80	0.00	-17.20	89.7	160.80	0.00	-16.85	93.8	160.80	0.00	-16.50	97.8
160.81	-0.01	-16.84	106.4	164.78	-0.03	-13.22	109.7	168.39	-0.03	-10.61	112.7
172.14	-0.03	-7.86	115.8	175.20	-0.03	-5.80	118.2	177.78	-0.02	-4.22	120.3
179.96	-0.02	-3.04	122.0	181.89	-0.02	-2.11	123.5	183.35	-0.02	-1.65	124.6
184.79	-0.02	-1.21	125.7	185.97	-0.02	-1.03	126.6	186.95	-0.02	-1.05	127.3
187.91	-0.02	-1.09	128.0	188.85	-0.01	-1.15	128.6	189.78	-0.01	-1.22	129.3
190.59	-0.01	-1.41	129.9	191.39	-0.01	-1.61	130.5	192.17	-0.01	-1.83	131.0
192.95	-0.01	-2.05	131.6	193.71	-0.01	-2.29	132.1	194.51	-0.01	-2.49	132.8
195.33	-0.01	-2.67	133.4	196.13	-0.01	-2.87	134.0	196.93	-0.01	-3.07	134.6
197.75	0.00	-3.25	135.3	198.66	0.00	-3.34	136.0	199.66	0.00	-3.34	136.8
200.67	0.00	-3.33	137.6	201.72	0.00	-3.28	138.5	202.99	0.00	-3.01	139.5
204.30	0.00	-2.70	140.6	205.80	0.00	-2.20	141.9	207.85	0.00	-1.15	143.6
210.00	0.00	0.00	146.9	210.45	0.00	0.00	151.5	210.90	0.00	0.00	156.1
210.92	0.00	0.00	160.9	210.94	0.00	0.00	165.7	210.96	0.00	0.00	170.5
210.98	0.00	0.00	175.4	211.00	0.00	0.00	180.2	211.10	0.00	0.00	185.4
211.19	0.00	0.00	190.5	211.29	0.00	0.00	195.7	211.39	0.00	0.00	200.9
211.48	0.00	0.00	206.1	211.58	0.00	0.00	211.3	211.50	0.00	0.00	216.5
211.41	0.00	0.00	221.7	211.33	0.00	0.00	227.0	211.25	0.00	0.00	232.2
211.17	0.00	0.00	237.4	211.08	0.00	0.00	242.7	211.00	0.00	0.00	247.9
210.98	0.00	0.00	251.7								

ID

30 SECTION 3392.00 TIME = 242.52 HRS WS = 175.36 WIDTH = 71.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	3.5	204.00	0.00	0.00	5.6
203.00	0.00	0.00	7.3	202.00	0.00	0.00	8.8	201.00	0.00	0.00	10.1
200.00	0.00	0.00	11.5	199.00	0.00	0.00	12.7	198.00	0.00	0.00	13.8
197.00	0.00	0.00	14.9	195.79	0.00	-0.21	16.0	194.59	0.00	-0.41	17.0

193.41	0.00	-0.59	18.0	192.27	0.00	-0.73	18.9	191.11	0.00	-0.89	19.9
189.98	0.00	-1.02	20.8	188.86	0.00	-1.14	21.8	187.73	0.00	-1.27	22.7
186.59	0.00	-1.41	23.7	185.46	0.00	-1.54	24.6	184.32	0.00	-1.68	25.6
183.14	0.00	-1.86	26.6	181.95	0.00	-2.05	27.6	180.60	0.00	-2.40	28.7
179.12	0.00	-2.88	30.0	177.06	0.00	-3.94	31.7	176.11	0.00	-3.89	32.5
175.82	0.00	-3.18	32.7	174.04	0.00	-3.96	34.4	170.13	0.00	-6.87	38.3
164.66	0.00	-11.34	43.8	162.05	0.00	-13.84	46.4	161.37	0.00	-14.43	50.0
161.37	0.00	-14.53	53.4	161.37	0.00	-14.63	55.9	161.37	0.00	-15.13	62.2
161.37	0.00	-15.63	70.5	161.37	0.00	-15.97	76.2	161.37	0.00	-16.30	80.2
161.37	0.00	-16.63	83.3	161.37	0.00	-16.73	88.0	161.37	0.00	-16.83	91.7
163.61	-0.03	-14.39	94.5	167.72	-0.03	-10.28	97.9	172.41	-0.03	-5.59	101.8
175.37	-0.02	-3.63	104.3	176.85	-0.02	-3.15	105.4	177.91	-0.02	-3.09	106.2
178.84	-0.02	-3.16	106.9	179.69	-0.02	-3.31	107.5	180.39	-0.01	-3.61	107.9
181.05	-0.01	-3.95	108.4	181.69	-0.01	-4.31	108.8	182.31	-0.01	-4.69	109.2
182.89	-0.01	-5.11	109.6	183.48	-0.01	-5.52	110.0	184.00	-0.01	-6.00	110.3
184.54	-0.01	-6.46	110.7	185.06	-0.01	-6.94	111.1	185.58	0.00	-7.42	111.4
186.10	0.00	-7.90	111.8	186.62	0.00	-8.38	112.1	187.14	0.00	-8.86	112.5
187.68	0.00	-9.32	112.9	188.22	0.00	-9.78	113.3	188.78	0.00	-10.22	113.7
189.34	0.00	-10.66	114.1	189.94	0.00	-11.06	114.6	190.60	0.00	-11.40	115.1
191.36	0.00	-11.64	115.7	192.20	0.00	-11.80	116.4	193.13	0.00	-11.87	117.2
194.40	0.00	-11.59	118.2	195.90	0.00	-11.10	119.5	197.84	0.00	-10.16	121.1
200.52	0.00	-8.48	123.3	204.09	0.00	-5.91	126.3	210.20	0.00	0.00	131.7
210.40	0.00	0.00	137.0	210.60	0.00	0.00	142.3	210.80	0.00	0.00	147.7
211.00	0.00	0.00	153.0	211.09	0.00	0.00	158.8	211.18	0.00	0.00	164.7
211.27	0.00	0.00	170.6	211.18	0.00	0.00	175.2	211.09	0.00	0.00	179.9
211.00	0.00	0.00	184.6	210.97	0.00	0.00	190.4	210.94	0.00	0.00	196.2
210.90	0.00	0.00	202.0	210.87	0.00	0.00	207.9	210.84	0.00	0.00	213.7
210.81	0.00	0.00	219.5	210.78	0.00	0.00	225.3	210.75	0.00	0.00	231.1
210.71	0.00	0.00	236.9	210.68	0.00	0.00	242.7	210.65	0.00	0.00	248.6

ID

29 SECTION 3331.00 TIME = 242.52 HRS WS = 175.18 WIDTH = 71.8

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	2.8	203.00	0.00	0.00	4.8
202.00	0.00	0.00	6.6	201.00	0.00	0.00	8.2	200.00	0.00	0.00	9.6
199.00	0.00	0.00	11.0	198.00	0.00	0.00	12.4	197.00	0.00	0.00	13.9
196.00	0.00	0.00	15.3	195.00	0.00	0.00	16.6	194.00	0.00	0.00	17.9
193.00	0.00	0.00	19.2	192.00	0.00	0.00	20.4	191.00	0.00	0.00	21.6
190.00	0.00	0.00	22.8	189.00	0.00	0.00	24.0	188.00	0.00	0.00	25.2
187.00	0.00	0.00	26.5	186.00	0.00	0.00	27.8	185.00	0.00	0.00	29.1
184.00	0.00	0.00	30.4	183.00	0.00	0.00	31.8	182.00	0.00	0.00	33.6
181.00	0.00	0.00	36.1	180.00	0.00	0.00	41.4	179.50	0.00	0.00	45.2
178.04	-0.01	-0.96	48.9	171.58	-0.01	-6.92	54.4	165.96	-0.01	-12.04	59.1
165.28	-0.01	-11.72	59.6	161.87	-0.01	-14.13	62.5	161.68	0.00	-13.32	66.1
161.68	0.00	-12.32	69.5	161.68	0.00	-11.32	73.0	161.68	0.00	-11.28	78.0
161.68	0.00	-11.25	83.0	161.68	0.00	-11.22	88.0	161.68	0.00	-11.24	93.3
161.68	0.00	-11.27	98.6	161.68	0.00	-11.29	104.0	161.68	0.00	-11.32	109.3
163.26	-0.01	-10.73	113.2	166.73	-0.01	-8.27	116.1	168.02	-0.01	-7.98	117.2
169.06	-0.01	-7.94	118.1	170.76	-0.01	-7.24	119.5	171.50	-0.01	-7.50	120.1
173.51	-0.01	-6.49	121.7	175.84	-0.01	-5.16	123.7	178.76	0.00	-3.24	126.1
182.27	0.00	-0.73	129.1	184.00	0.00	0.00	132.3	185.00	0.00	0.00	135.5
186.00	0.00	0.00	138.1	187.00	0.00	0.00	140.5	188.00	0.00	0.00	143.2
189.00	0.00	0.00	147.4	189.50	0.00	0.00	151.3	190.00	0.00	0.00	155.2
191.00	0.00	0.00	158.5	192.00	0.00	0.00	160.1	193.00	0.00	0.00	161.8
194.00	0.00	0.00	163.1	195.18	0.00	0.18	164.2	196.39	0.00	0.39	165.2
197.45	0.00	0.45	166.1	198.44	0.00	0.44	166.9	199.38	0.00	0.38	167.7
200.27	0.00	0.27	168.5	201.14	0.00	0.14	169.2	202.00	0.00	0.00	169.9
202.85	0.00	-0.15	170.6	203.74	0.00	-0.26	171.4	204.63	0.00	-0.37	172.1
205.55	0.00	-0.45	172.9	206.50	0.00	-0.50	173.7	207.67	0.00	-0.33	174.7
209.00	0.00	0.00	176.0	210.00	0.00	0.00	177.6	210.23	0.00	0.00	183.5
210.46	0.00	0.00	189.4	210.39	0.00	0.00	194.8	210.33	0.00	0.00	200.2
210.26	0.00	0.00	205.5	210.20	0.00	0.00	210.9	210.13	0.00	0.00	216.3
210.07	0.00	0.00	221.7	210.00	0.00	0.00	227.1	209.97	0.00	0.00	231.9
209.93	0.00	0.00	236.7	209.90	0.00	0.00	241.6	209.95	0.00	0.00	245.6
210.00	0.00	0.00	249.7	210.10	0.00	0.00	255.3	210.05	0.00	0.00	259.8
210.00	0.00	0.00	264.3								

ID

28 SECTION 3236.00 TIME = 242.52 HRS WS = 174.94 WIDTH = 76.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	6.0	199.00	0.00	0.00	8.6
198.00	0.00	0.00	10.5	197.00	0.00	0.00	12.3	196.00	0.00	0.00	13.9
195.00	0.00	0.00	15.3	194.00	0.00	0.00	16.6	193.00	0.00	0.00	17.9
192.00	0.00	0.00	19.1	191.00	0.00	0.00	20.3	190.00	0.00	0.00	21.5
189.00	0.00	0.00	22.7	188.00	0.00	0.00	23.9	187.00	0.00	0.00	25.0
186.00	0.00	0.00	26.2	185.00	0.00	0.00	27.4	184.00	0.00	0.00	28.6
183.00	0.00	0.00	29.8	182.00	0.00	0.00	31.2	181.00	0.00	0.00	32.7
180.00	0.00	0.00	34.7	179.00	0.00	0.00	38.8	178.90	0.00	0.00	41.1
179.00	0.00	0.00	42.7	179.10	0.00	0.00	47.1	176.38	0.00	-2.62	51.9
172.08	0.00	-6.42	55.5	167.78	0.00	-10.22	59.1	166.27	0.00	-11.23	60.4
164.63	0.00	-12.37	61.7	162.24	0.00	-14.26	70.5	162.23	0.00	-13.76	74.2
162.23	0.00	-12.77	77.8	162.23	0.00	-12.50	84.9	162.22	0.00	-12.24	88.6
162.22	0.00	-12.31	91.8	162.22	0.00	-12.38	95.0	162.22	0.00	-11.78	98.0
162.22	0.00	-10.78	101.9	162.22	0.00	-10.28	107.0	162.22	0.00	-10.78	110.6
162.22	0.00	-11.78	112.8	162.22	0.00	-12.78	115.6	162.22	0.00	-13.78	118.2
166.85	0.00	-10.15	122.7	168.54	0.00	-9.46	124.1	168.92	0.00	-10.08	124.4
170.52	0.00	-8.98	125.8	174.56	0.00	-5.44	129.1	179.66	0.00	-1.34	133.4
182.00	0.00	0.00	136.6	183.00	0.00	0.00	140.6	183.18	0.00	0.00	145.3
183.37	0.00	0.00	150.0	183.55	0.00	0.00	154.7	183.37	0.00	0.00	160.4
183.18	0.00	0.00	166.1	183.00	0.00	0.00	171.8	182.95	0.00	0.00	175.5
182.90	0.00	0.00	179.2	183.00	0.00	0.00	184.9	184.00	0.00	0.00	187.7
185.00	0.00	0.00	189.6	186.00	0.00	0.00	191.6	187.00	0.00	0.00	193.9
188.00	0.00	0.00	196.4	189.82	0.00	0.82	198.5	191.88	0.00	1.88	200.2
193.33	0.00	2.33	201.4	194.53	0.00	2.53	202.4	195.51	0.00	2.51	203.3
196.27	0.00	2.27	203.9	196.95	0.00	1.95	204.5	197.62	0.00	1.62	205.0
198.25	0.00	1.25	205.5	198.88	0.00	0.88	206.1	199.47	0.00	0.47	206.6
200.07	0.00	0.07	207.0	200.67	0.00	-0.33	207.5	201.25	0.00	-0.75	208.0
201.86	0.00	-1.14	208.5	202.46	0.00	-1.54	209.0	203.13	0.00	-1.87	209.6
203.85	0.00	-2.15	210.2	204.68	0.00	-2.32	210.9	205.61	0.00	-2.39	211.6
206.86	0.00	-2.14	212.7	209.00	0.00	0.00	218.5	209.00	0.00	0.00	224.4
209.00	0.00	0.00	230.2	209.00	0.00	0.00	236.1	209.00	0.00	0.00	242.0
209.00	0.00	0.00	247.8	209.00	0.00	0.00	253.7	209.00	0.00	0.00	259.5
209.00	0.00	0.00	265.4	209.00	0.00	0.00	271.2	209.00	0.00	0.00	277.1
209.00	0.00	0.00	283.0	209.00	0.00	0.00	288.8	209.00	0.00	0.00	294.7
209.00	0.00	0.00	300.5	209.00	0.00	0.00	306.4	209.00	0.00	0.00	312.2

ID

27 SECTION 3143.00 TIME = 242.52 HRS WS = 174.68 WIDTH = 76.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
198.00	0.00	0.00	0.0	197.00	0.00	0.00	2.2	196.00	0.00	0.00	4.0
195.00	0.00	0.00	5.4	194.00	0.00	0.00	6.7	193.00	0.00	0.00	7.9
192.00	0.00	0.00	9.0	191.00	0.00	0.00	10.2	190.00	0.00	0.00	11.3
189.00	0.00	0.00	12.4	188.00	0.00	0.00	13.5	187.00	0.00	0.00	14.7
186.00	0.00	0.00	16.0	185.00	0.00	0.00	17.3	184.00	0.00	0.00	18.6
183.00	0.00	0.00	19.9	182.00	0.00	0.00	21.2	181.00	0.00	0.00	22.6
180.00	0.00	0.00	24.0	179.00	0.00	0.00	25.3	178.00	0.00	0.00	26.8
177.00	0.00	0.00	28.2	175.99	0.00	-0.01	29.9	172.06	0.00	-2.94	31.7
164.54	0.00	-9.48	31.9	162.98	0.00	-10.34	39.2	162.62	0.00	-11.04	43.2
162.49	0.00	-11.52	48.4	162.47	0.00	-11.99	53.1	162.49	0.00	-12.43	56.1
162.53	0.00	-11.93	60.4	162.58	0.00	-11.44	66.3	162.61	0.00	-11.07	72.2
162.62	0.00	-10.72	77.0	162.65	0.00	-10.36	81.9	162.70	0.00	-9.31	87.7
162.76	0.00	-9.16	91.7	162.82	0.00	-9.20	94.5	165.49	0.00	-7.53	98.9
169.12	0.00	-4.90	102.0	170.35	0.00	-4.66	103.0	170.69	0.00	-5.32	103.3
171.04	0.00	-5.96	103.6	174.02	0.00	-3.98	106.1	177.73	0.00	-1.27	109.2
180.00	0.00	0.00	112.2	181.00	0.00	0.00	115.2	182.00	0.00	0.00	118.8
182.20	0.00	0.00	124.8	182.40	0.00	0.00	130.8	182.60	0.00	0.00	136.8
182.80	0.00	0.00	142.8	183.00	0.00	0.00	148.8	184.00	0.00	0.00	153.6
185.00	0.00	0.00	158.1	186.00	0.00	0.00	161.4	187.00	0.00	0.00	164.1
188.00	0.00	0.00	166.9	189.00	0.00	0.00	169.6	190.00	0.00	0.00	172.2
191.00	0.00	0.00	174.5	192.00	0.00	0.00	176.7	193.00	0.00	0.00	179.2
194.00	0.00	0.00	183.4	195.00	0.00	0.00	187.8	196.10	0.00	0.10	189.4
197.49	0.00	0.49	190.5	198.55	0.00	0.55	191.4	199.48	0.00	0.48	192.2
200.34	0.00	0.34	192.9	201.16	0.00	0.16	193.6	201.97	0.00	-0.03	194.3
202.76	0.00	-0.24	194.9	203.62	0.00	-0.38	195.6	204.51	0.00	-0.49	196.4
205.43	0.00	-0.57	197.2	206.60	0.00	-0.40	198.1	208.00	0.00	0.00	199.3
209.00	0.00	0.00	201.1	209.00	0.00	0.00	206.3	209.00	0.00	0.00	211.5

209.00	0.00	0.00	216.7	209.00	0.00	0.00	221.9	209.00	0.00	0.00	227.2
209.00	0.00	0.00	232.4	209.00	0.00	0.00	237.6	208.95	0.00	0.00	243.4
208.89	0.00	0.00	249.1	208.84	0.00	0.00	254.9	208.78	0.00	0.00	260.6
208.73	0.00	0.00	266.4	208.68	0.00	0.00	272.2	208.62	0.00	0.00	277.9
208.57	0.00	0.00	283.7	208.51	0.00	0.00	289.5	208.46	0.00	0.00	295.2

ID

26 SECTION 3053.00 TIME = 242.52 HRS WS = 174.45 WIDTH = 83.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
197.00	0.00	0.00	0.0	196.00	0.00	0.00	2.1	195.00	0.00	0.00	3.6
194.00	0.00	0.00	4.9	193.00	0.00	0.00	6.1	192.00	0.00	0.00	7.3
191.00	0.00	0.00	8.5	190.00	0.00	0.00	9.7	189.00	0.00	0.00	10.9
188.00	0.00	0.00	12.1	187.00	0.00	0.00	13.3	186.00	0.00	0.00	14.4
185.00	0.00	0.00	15.6	184.00	0.00	0.00	16.8	183.00	0.00	0.00	18.0
182.00	0.00	0.00	19.2	181.00	0.00	0.00	20.5	180.00	0.00	0.00	21.9
179.00	0.00	0.00	23.4	178.00	0.00	0.00	25.1	177.00	0.00	0.00	26.7
176.00	0.00	0.00	28.3	175.00	0.00	0.00	29.7	173.99	0.00	-0.01	31.1
173.00	0.00	0.00	33.5	164.39	0.00	-7.62	34.0	163.01	0.00	-7.99	36.3
162.38	0.00	-8.42	41.3	162.29	0.00	-8.61	44.5	162.34	0.00	-8.66	47.6
162.54	0.00	-9.46	53.6	162.72	0.00	-9.78	58.0	162.87	0.00	-10.13	61.9
163.04	0.00	-9.96	66.7	163.18	0.00	-9.32	71.0	163.33	0.00	-8.67	75.8
163.44	0.00	-8.16	79.5	163.54	0.00	-7.66	82.9	163.64	0.00	-7.96	86.6
163.76	0.00	-8.25	90.4	163.90	0.00	-8.43	94.9	164.05	0.00	-8.62	99.1
164.29	0.00	-8.71	105.0	168.71	0.00	-5.29	108.9	169.07	0.00	-5.93	109.2
169.59	0.00	-6.41	109.7	171.41	0.00	-5.59	111.2	176.87	0.00	-0.38	115.8
177.50	0.00	0.00	120.3	177.75	0.00	0.00	124.9	178.00	0.00	0.00	129.5
179.00	0.00	0.00	135.1	180.00	0.00	0.00	138.6	181.00	0.00	0.00	142.0
182.00	0.00	0.00	145.4	183.00	0.00	0.00	148.8	184.00	0.00	0.00	152.3
185.00	0.00	0.00	155.2	186.00	0.00	0.00	157.9	187.00	0.00	0.00	160.3
188.00	0.00	0.00	162.7	189.00	0.00	0.00	165.0	190.00	0.00	0.00	167.4
191.00	0.00	0.00	170.3	192.92	0.00	0.92	173.0	194.66	0.00	1.66	174.4
195.73	0.00	1.73	175.3	196.69	0.00	1.69	176.1	197.53	0.00	1.53	176.8
198.26	0.00	1.26	177.4	198.93	0.00	0.93	178.0	199.56	0.00	0.56	178.5
200.19	0.00	0.19	179.0	200.80	0.00	-0.20	179.5	201.41	0.00	-0.59	180.0
202.06	0.00	-0.94	180.6	202.74	0.00	-1.26	181.1	203.49	0.00	-1.51	181.8
204.28	0.00	-1.72	182.4	205.19	0.00	-1.81	183.2	206.42	0.00	-1.58	184.2
208.67	0.00	-0.33	186.1	209.00	0.00	0.00	191.9	209.00	0.00	0.00	197.7
209.00	0.00	0.00	203.5	209.00	0.00	0.00	209.3	209.00	0.00	0.00	215.1
209.00	0.00	0.00	220.9	209.00	0.00	0.00	226.7	209.00	0.00	0.00	232.5
208.89	0.00	0.00	238.2	208.78	0.00	0.00	243.9	208.67	0.00	0.00	249.5
208.56	0.00	0.00	255.2	208.44	0.00	0.00	260.9	208.33	0.00	0.00	266.5
208.22	0.00	0.00	272.2	208.11	0.00	0.00	277.9	208.00	0.00	0.00	283.5

ID

25 SECTION 2953.00 TIME = 242.52 HRS WS = 174.20 WIDTH = 95.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	2.0	194.00	0.00	0.00	3.7
193.00	0.00	0.00	4.9	192.00	0.00	0.00	6.1	191.00	0.00	0.00	7.4
190.00	0.00	0.00	8.6	189.00	0.00	0.00	9.8	188.00	0.00	0.00	11.1
187.00	0.00	0.00	12.5	186.00	0.00	0.00	13.9	185.00	0.00	0.00	15.4
184.00	0.00	0.00	16.9	183.00	0.00	0.00	18.4	182.00	0.00	0.00	20.0
181.00	0.00	0.00	21.6	180.00	0.00	0.00	23.1	179.00	0.00	0.00	24.7
178.00	0.00	0.00	26.2	177.00	0.00	0.00	27.8	176.00	0.00	0.00	29.5
170.32	0.00	-4.68	31.6	164.59	0.00	-9.43	36.5	164.51	0.00	-8.51	36.8
163.93	0.00	-8.08	41.5	163.81	0.00	-7.70	46.0	163.87	0.00	-7.14	50.7
163.97	0.00	-6.54	54.8	164.05	0.00	-5.96	58.2	164.14	0.00	-5.82	62.2
164.20	0.00	-5.71	66.2	164.24	0.00	-5.72	70.5	164.27	0.00	-5.75	74.9
164.29	0.00	-6.03	79.8	164.32	0.00	-6.30	84.7	164.35	0.00	-5.97	89.2
164.40	0.00	-5.62	93.7	164.46	0.00	-5.06	97.6	164.54	0.00	-4.48	101.6
164.62	0.00	-4.30	104.7	164.71	0.01	-4.31	107.8	164.92	0.01	-5.10	113.3
165.08	0.01	-5.93	117.0	167.04	0.00	-4.97	119.4	169.96	0.00	-3.04	122.0
170.18	0.00	-3.82	122.2	172.22	0.00	-2.78	124.1	175.90	0.00	-0.10	127.2
177.00	0.00	0.00	129.6	178.00	0.00	0.00	132.1	180.48	0.00	1.48	134.3
182.46	0.00	2.46	136.0	184.07	0.00	3.07	137.3	185.41	0.00	3.41	138.5
186.65	0.00	3.65	139.5	187.75	0.00	3.75	140.4	188.70	0.00	3.70	141.2
189.57	0.00	3.57	141.9	190.36	0.00	3.36	142.6	191.05	0.00	3.05	143.1
191.69	0.00	2.69	143.7	192.29	0.00	2.29	144.2	192.89	0.00	1.89	144.6

193.46	0.00	1.46	145.1	194.01	0.00	1.01	145.6	194.54	0.00	0.54	146.0
195.07	0.00	0.07	146.4	195.58	0.00	-0.42	146.8	196.10	0.00	-0.90	147.2
196.61	0.00	-1.39	147.6	197.12	0.00	-1.88	148.1	197.65	0.00	-2.35	148.5
198.19	0.00	-2.81	148.9	198.74	0.00	-3.26	149.4	199.34	0.00	-3.66	149.9
200.00	0.00	-4.00	150.4	200.68	0.00	-4.32	151.0	201.40	0.00	-4.60	151.6
202.14	0.00	-4.86	152.2	203.33	0.00	-4.67	153.2	205.14	0.00	-3.86	154.7
209.05	0.00	0.00	158.5	209.10	0.00	0.00	162.2	209.09	0.00	0.00	167.6
209.07	0.00	0.00	173.1	209.06	0.00	0.00	178.5	209.04	0.00	0.00	184.0
209.03	0.00	0.00	189.4	209.01	0.00	0.00	194.8	209.00	0.00	0.00	200.3
208.94	0.00	0.00	203.1	209.00	0.00	0.00	208.6	209.10	0.00	0.00	214.4
209.20	0.00	0.00	220.3	209.30	0.00	0.00	226.2	209.20	0.00	0.00	230.7
209.10	0.00	0.00	235.3	209.00	0.00	0.00	239.9	208.86	0.00	0.00	245.3
208.71	0.00	0.00	250.6	208.57	0.00	0.00	256.0	208.43	0.00	0.00	261.4
208.29	0.00	0.00	266.8	208.14	0.00	0.00	272.1	208.00	0.00	0.00	277.5

ID

24 SECTION 2879.00 TIME = 242.52 HRS WS = 173.99 WIDTH = 96.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	4.4	194.00	0.00	0.00	6.8
193.00	0.00	0.00	8.8	192.00	0.00	0.00	10.3	191.00	0.00	0.00	11.8
190.00	0.00	0.00	13.2	189.00	0.00	0.00	14.6	188.00	0.00	0.00	15.9
187.00	0.00	0.00	17.1	186.00	0.00	0.00	18.3	185.00	0.00	0.00	19.6
184.00	0.00	0.00	20.8	183.00	0.00	0.00	22.1	182.00	0.00	0.00	23.4
181.00	0.00	0.00	24.7	180.00	0.00	0.00	26.0	179.00	0.00	0.00	27.3
178.00	0.00	0.00	28.7	177.00	0.00	0.00	30.2	176.00	0.00	0.00	32.2
171.65	0.00	-3.35	35.1	167.49	0.00	-6.52	37.9	164.29	0.00	-8.74	44.6
163.95	0.00	-8.07	46.2	163.49	0.00	-8.04	53.4	163.47	-0.02	-7.55	57.8
163.52	0.01	-6.50	62.6	163.58	0.00	-6.19	67.2	163.64	0.00	-5.89	71.0
163.71	0.00	-6.06	75.8	163.78	0.00	-6.24	80.6	163.84	0.00	-6.24	84.5
163.89	0.00	-6.13	88.8	163.95	0.00	-5.58	93.2	164.00	0.01	-5.02	97.6
164.08	0.01	-4.59	102.7	164.19	0.01	-4.14	107.8	164.31	0.01	-4.36	112.3
164.48	0.01	-4.55	116.7	164.61	0.01	-5.41	119.8	164.70	0.01	-6.32	121.5
168.38	0.00	-3.63	124.9	169.04	0.00	-3.97	125.5	171.28	0.00	-2.72	127.5
171.55	0.00	-3.45	127.7	172.80	0.00	-3.20	128.8	176.48	0.00	-0.52	131.9
178.00	0.00	0.00	136.1	179.00	0.00	0.00	139.4	180.00	0.00	0.00	142.0
181.00	0.00	0.00	144.3	182.00	0.00	0.00	146.7	183.00	0.00	0.00	149.1
184.00	0.00	0.00	151.2	185.93	0.00	0.93	152.8	187.73	0.00	1.73	154.3
189.50	0.00	2.50	155.8	191.28	0.00	3.28	157.3	192.35	0.00	3.35	158.2
193.03	0.00	3.03	158.8	193.68	0.00	2.68	159.3	194.35	0.00	2.35	159.9
195.00	0.00	2.00	160.4	195.62	0.00	1.62	160.9	196.16	0.00	1.16	161.4
196.70	0.00	0.70	161.8	197.25	0.00	0.25	162.2	197.80	0.00	-0.20	162.7
198.35	0.00	-0.65	163.1	198.90	0.00	-1.10	163.6	199.46	0.00	-1.54	164.1
200.04	0.00	-1.96	164.5	200.63	0.00	-2.37	165.0	201.22	0.00	-2.78	165.5
201.81	0.00	-3.19	166.0	202.43	0.00	-3.57	166.5	203.29	0.00	-3.71	167.2
205.03	0.00	-2.97	168.7	208.09	0.00	0.00	172.8	208.17	0.00	0.00	177.0
208.26	0.00	0.00	181.1	208.27	0.00	0.00	186.6	208.28	0.00	0.00	192.1
208.29	0.00	0.00	197.5	208.38	0.00	0.00	203.3	208.47	0.00	0.00	209.2
208.56	0.00	0.00	215.0	208.64	0.00	0.00	220.8	208.73	0.00	0.00	226.6
208.82	0.00	0.00	232.4	208.91	0.00	0.00	238.2	209.00	0.00	0.00	244.0
209.05	0.00	0.00	248.4	209.10	0.00	0.00	252.8	209.05	0.00	0.00	257.3
209.00	0.00	0.00	261.8	208.67	0.00	0.00	266.3	208.33	0.00	0.00	270.9
208.00	0.00	0.00	275.4								

ID

23 SECTION 2798.00 TIME = 242.52 HRS WS = 173.82 WIDTH = 103.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
197.00	0.00	0.00	0.0	196.50	0.00	0.00	4.8	196.00	0.00	0.00	9.6
195.50	0.00	0.00	14.6	195.00	0.00	0.00	19.6	194.00	0.00	0.00	23.5
193.00	0.00	0.00	25.7	192.00	0.00	0.00	27.4	191.00	0.00	0.00	29.0
190.00	0.00	0.00	30.4	189.00	0.00	0.00	31.7	188.00	0.00	0.00	33.2
187.00	0.00	0.00	34.6	186.00	0.00	0.00	36.0	185.00	0.00	0.00	37.5
184.00	0.00	0.00	38.9	183.00	0.00	0.00	40.4	182.00	0.00	0.00	41.8
181.00	0.00	0.00	43.3	180.00	0.00	0.00	44.7	179.00	0.00	0.00	46.2
178.00	0.00	0.00	47.6	177.00	0.00	0.00	49.1	176.00	0.00	0.00	50.9
169.99	0.00	-5.00	53.6	164.62	0.00	-9.88	58.8	164.44	0.00	-9.56	59.3
164.11	0.00	-9.55	64.8	164.14	0.00	-9.19	68.6	164.27	0.00	-8.73	72.2
164.37	0.00	-8.13	74.3	164.62	0.00	-7.38	79.4	164.70	0.00	-6.30	81.0

164.96	0.00	-5.05	86.6	165.13	0.00	-4.38	90.6	165.38	0.00	-3.62	96.3
165.58	0.01	-3.23	100.6	165.74	0.01	-2.86	103.6	166.55	0.00	-2.18	108.0
165.30	0.00	-3.57	109.1	164.10	0.00	-4.90	111.2	163.18	0.01	-5.97	119.9
163.18	0.01	-6.13	124.9	163.18	0.01	-5.98	129.1	163.18	0.01	-5.82	133.3
163.18	0.01	-5.53	136.7	163.21	0.01	-5.20	144.2	167.58	0.00	-1.12	150.3
170.13	0.00	1.13	152.5	170.59	0.00	0.59	152.8	170.84	0.00	-0.16	153.0
171.90	0.00	-0.10	153.9	174.24	0.00	1.24	155.9	176.14	0.00	2.14	157.5
177.54	0.00	2.54	158.6	178.77	0.00	2.77	159.7	179.78	0.00	2.78	160.5
180.51	0.00	2.51	161.1	181.08	0.00	2.08	161.6	181.63	0.00	1.63	162.0
182.21	0.00	1.21	162.5	182.76	0.00	0.76	162.9	183.28	0.00	0.28	163.3
183.78	0.00	-0.22	163.7	184.18	0.00	-0.82	164.0	184.58	0.00	-1.42	164.3
184.96	0.00	-2.04	164.6	185.35	0.00	-2.65	164.9	185.74	0.00	-3.26	165.2
186.13	0.00	-3.87	165.5	186.52	0.00	-4.48	165.8	186.92	0.00	-5.08	166.1
187.30	0.00	-5.70	166.4	187.71	0.00	-6.29	166.7	188.12	0.00	-6.88	167.0
188.55	0.00	-7.45	167.3	188.97	0.00	-8.03	167.6	189.40	0.00	-8.60	168.0
189.81	0.00	-9.18	168.3	190.25	0.00	-9.75	168.6	190.68	0.00	-10.32	169.0
191.14	0.00	-10.86	169.3	191.62	0.00	-11.38	169.7	192.24	0.00	-11.76	170.2
192.97	0.00	-12.03	170.8	193.72	0.00	-12.28	171.4	194.50	0.00	-12.50	172.1
195.57	0.00	-12.44	173.0	200.58	0.00	-7.49	177.2	205.59	0.00	-2.54	181.4
208.20	0.00	0.00	185.6	208.13	0.00	0.00	189.6	208.07	0.00	0.00	193.7
208.00	0.00	0.00	197.7	207.92	0.00	0.00	203.6	207.83	0.00	0.00	209.6
207.75	0.00	0.00	215.5	207.67	0.00	0.00	221.4	207.58	0.00	0.00	227.4
207.50	0.00	0.00	233.3	207.42	0.00	0.00	239.2	207.33	0.00	0.00	245.2
207.25	0.00	0.00	251.1	207.17	0.00	0.00	257.1	207.08	0.00	0.00	263.0
207.00	0.00	0.00	268.9	206.89	0.00	0.00	273.4	206.77	0.00	0.00	277.8
206.89	0.00	0.00	281.8	207.00	0.00	0.00	285.8	207.12	0.00	0.00	291.1
207.25	0.00	0.00	296.4	207.38	0.00	0.00	301.7	207.50	0.00	0.00	307.0
207.62	0.00	0.00	312.3	207.75	0.00	0.00	317.6				

ID

22 SECTION 2730.00 TIME = 242.52 HRS WS = 173.64 WIDTH = 104.0

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	4.7	194.50	0.00	0.00	8.1
194.00	0.00	0.00	11.5	193.50	0.00	0.00	17.1	193.00	0.00	0.00	22.6
192.50	0.00	0.00	27.0	192.00	0.00	0.00	31.4	191.00	0.00	0.00	35.2
190.00	0.00	0.00	37.6	189.00	0.00	0.00	39.5	188.00	0.00	0.00	41.4
187.00	0.00	0.00	43.4	186.00	0.00	0.00	45.4	185.00	0.00	0.00	47.3
184.00	0.00	0.00	49.1	183.00	0.00	0.00	50.8	182.00	0.00	0.00	52.3
181.00	0.00	0.00	53.8	180.00	0.00	0.00	55.1	179.00	0.00	0.00	56.5
178.00	0.00	0.00	57.9	177.00	0.00	0.00	59.5	176.00	0.00	0.00	61.1
167.14	0.00	-7.86	63.2	165.09	0.00	-8.91	67.0	163.69	-0.01	-9.31	72.9
163.61	0.01	-8.39	74.0	163.57	0.00	-7.44	78.4	163.63	0.00	-6.38	81.3
163.77	0.00	-6.03	85.8	163.89	0.00	-6.12	89.8	164.00	0.00	-6.11	94.0
164.07	0.00	-6.13	97.7	164.12	0.00	-5.98	100.9	164.15	0.00	-5.86	104.1
164.18	0.02	-5.32	107.4	164.13	-0.08	-4.87	110.6	164.29	0.14	-4.72	112.2
164.23	-0.04	-4.77	114.7	164.26	0.00	-4.75	118.5	164.18	0.00	-4.82	130.4
164.15	0.01	-4.60	136.5	164.16	0.01	-4.35	142.6	164.35	0.01	-4.41	155.3
168.26	0.00	-0.75	160.7	169.68	0.00	-0.32	162.4	170.85	0.00	-0.15	163.4
171.73	0.00	-0.27	164.1	172.08	0.00	-0.92	164.4	172.32	0.00	-1.68	164.6
173.78	0.00	-1.22	165.9	175.21	0.00	-0.79	167.1	176.50	0.00	-0.50	168.1
177.74	0.00	-0.26	169.2	178.92	0.00	-0.08	170.1	180.12	0.00	0.12	171.1
181.27	0.00	0.27	172.1	182.33	0.00	0.33	173.0	183.34	0.00	0.34	173.8
184.18	0.00	0.18	174.5	184.98	0.00	-0.02	175.2	185.72	0.00	-0.28	175.8
186.39	0.00	-0.61	176.3	186.99	0.00	-1.01	176.8	187.55	0.00	-1.45	177.2
188.10	0.00	-1.90	177.7	188.63	0.00	-2.37	178.1	189.14	0.00	-2.86	178.5
189.63	0.00	-3.37	178.9	190.13	0.00	-3.87	179.3	190.61	0.00	-4.39	179.7
191.09	0.00	-4.91	180.0	191.57	0.00	-5.43	180.4	192.05	0.00	-5.95	180.8
192.54	0.00	-6.46	181.2	193.04	0.00	-6.96	181.6	193.56	0.00	-7.44	182.0
194.10	0.00	-7.90	182.4	194.68	0.00	-8.32	182.9	195.30	0.00	-8.70	183.4
196.10	0.00	-8.90	184.1	197.05	0.00	-8.95	184.9	198.47	0.00	-8.54	186.1
205.05	0.00	-1.95	191.6	207.00	0.00	0.00	197.1	207.00	0.00	0.00	202.6
207.00	0.00	0.00	208.2	207.00	0.00	0.00	213.7	207.00	0.00	0.00	219.2
207.00	0.00	0.00	224.7	207.00	0.00	0.00	230.3	207.00	0.00	0.00	235.8
207.00	0.00	0.00	241.3	207.00	0.00	0.00	246.8	207.00	0.00	0.00	252.4
206.00	0.00	0.00	257.2	205.60	0.00	0.00	260.8	205.20	0.00	0.00	264.4
206.00	0.00	0.00	269.9	207.00	0.00	0.00	273.6	207.07	0.00	0.00	279.1
207.15	0.00	0.00	284.6	207.22	0.00	0.00	290.1	207.29	0.00	0.00	295.6
207.37	0.00	0.00	301.1	207.44	0.00	0.00	306.5	207.51	0.00	0.00	312.0
207.59	0.00	0.00	317.5	207.66	0.00	0.00	323.0				

ID												
21	SECTION	2633.00	TIME = 242.52 HRS			WS = 173.35		WIDTH =		90.1		
	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	0.00	4.5	204.00	0.00	0.00	7.8
203.00	0.00	0.00	10.5	202.00	0.00	0.00	0.00	12.9	201.00	0.00	0.00	15.3
200.00	0.00	0.00	17.5	199.00	0.00	0.00	0.00	19.6	198.00	0.00	0.00	21.6
197.00	0.00	0.00	23.4	196.00	0.00	0.00	0.00	25.0	195.00	0.00	0.00	26.7
194.00	0.00	0.00	28.5	193.00	0.00	0.00	0.00	31.0	192.00	0.00	0.00	36.6
191.00	0.00	0.00	41.6	190.00	0.00	0.00	0.00	45.0	189.00	0.00	0.00	47.4
188.00	0.00	0.00	49.0	187.00	0.00	0.00	0.00	50.4	186.00	0.00	0.00	51.7
185.00	0.00	0.00	53.0	184.00	0.00	0.00	0.00	54.2	183.00	0.00	0.00	55.4
182.00	0.00	0.00	56.5	181.00	0.00	0.00	0.00	57.8	180.00	0.00	0.00	59.3
179.00	0.00	0.00	60.8	178.00	0.00	0.00	0.00	62.4	177.00	0.00	0.00	63.9
176.00	0.00	0.00	65.4	175.00	0.00	0.00	0.00	66.9	174.02	0.00	0.02	68.2
173.00	0.00	0.00	70.4	172.00	0.00	0.00	0.00	72.6	158.76	0.00	-12.24	72.8
156.89	-0.01	-13.61	79.2	157.09	-0.01	-12.91	83.7	157.98	-0.01	-11.02		88.6
159.01	0.00	-8.99	93.5	160.44	0.00	-7.06	100.2	163.06	0.00	-3.94		111.8
163.69	0.00	-3.21	114.5	164.85	0.00	-2.15	119.5	164.87	0.00	-2.46		121.1
164.41	0.00	-3.26	125.4	165.04	0.00	-2.95	136.8	165.12	0.00	-3.87		138.3
165.73	0.01	-4.27	143.7	166.65	0.01	-4.35	149.8	167.26	0.01	-4.74		153.4
169.39	0.00	-3.61	155.6	169.66	0.00	-4.34	155.8	169.90	0.00	-5.10		156.0
170.14	0.00	-5.86	156.2	170.63	0.00	-6.37	156.6	170.87	0.00	-7.13		156.8
172.17	0.00	-6.83	158.4	172.92	0.00	-7.08	159.5	173.41	-0.01	-7.59		159.7
174.52	-0.01	-7.48	160.6	176.57	-0.01	-6.43	162.2	178.52	-0.01	-5.48		163.8
180.40	-0.01	-4.60	165.4	182.26	-0.01	-3.74	166.9	184.21	-0.01	-2.79		168.5
186.22	-0.01	-1.78	170.2	188.11	-0.01	-0.89	171.8	189.98	-0.01	-0.02		173.4
191.00	0.00	0.00	175.0	192.00	0.00	0.00	176.7	193.00	0.00	0.00		178.2
194.00	0.00	0.00	179.7	195.00	0.00	0.00	181.2	196.00	0.00	0.00		182.7
197.00	0.00	0.00	184.1	198.00	0.00	0.00	185.4	199.00	0.00	0.00		186.6
200.00	0.00	0.00	187.7	201.00	0.00	0.00	188.9	202.00	0.00	0.00		190.2
203.00	0.00	0.00	191.5	204.00	0.00	0.00	193.0	205.00	0.00	0.00		194.7
206.00	0.00	0.00	197.1	206.12	0.00	0.00	203.1	206.24	0.00	0.00		209.0
206.36	0.00	0.00	215.0	206.48	0.00	0.00	221.0	206.60	0.00	0.00		226.9
206.30	0.00	0.00	230.7	206.00	0.00	0.00	234.4	205.59	0.00	0.00		238.7
206.00	0.00	0.00	241.5	207.00	0.00	0.00	245.6	207.01	0.00	0.00		251.2
207.02	0.00	0.00	256.9	207.03	0.00	0.00	262.6	207.03	0.00	0.00		268.3
207.04	0.00	0.00	274.0	207.05	0.00	0.00	279.7	207.06	0.00	0.00		285.4
207.07	0.00	0.00	291.1	207.08	0.00	0.00	296.8	207.09	0.00	0.00		302.5
207.10	0.00	0.00	308.2	207.10	0.00	0.00	313.8	207.11	0.00	0.00		319.5
207.12	0.00	0.00	325.2	207.13	0.00	0.00	330.9	207.14	0.00	0.00		336.6

ID												
20	SECTION	2586.00	TIME = 242.52 HRS			WS = 173.30		WIDTH =		116.3		
	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
208.00	0.00	0.00		0.0	207.50	0.00	0.00	4.2	207.00	0.00	0.00	8.3
206.00	0.00	0.00		10.8	205.00	0.00	0.00	12.5	203.57	0.00	-0.43	13.8
202.18	0.00	-0.82		15.0	200.84	0.00	-1.16	16.1	199.68	0.00	-1.32	17.1
198.57	0.00	-1.43		18.0	197.47	0.00	-1.53	18.9	196.37	0.00	-1.63	19.9
195.25	0.00	-1.75		20.8	194.14	0.00	-1.86	21.7	193.04	0.00	-1.96	22.6
191.95	0.00	-2.05		23.5	190.85	0.00	-2.15	24.5	189.75	0.00	-2.25	25.4
188.68	0.00	-2.32		26.3	187.60	0.00	-2.40	27.2	186.53	0.00	-2.47	28.0
185.46	0.00	-2.54		28.9	184.40	0.00	-2.60	29.8	183.25	0.00	-2.75	30.8
182.10	0.00	-2.90		31.7	180.93	0.00	-3.07	32.7	179.51	0.00	-3.49	33.9
177.96	0.00	-4.04		35.2	176.27	0.00	-4.73	36.6	168.14	0.00	-11.86	43.6
167.90	0.00	-11.10		43.8	165.65	-0.10	-12.35	46.0	165.34	-0.04	-11.66	46.3
160.90	0.16	-15.10		50.9	159.42	-0.45	-15.58	52.2	159.17	-0.17	-14.83	52.5
158.72	-0.09	-14.28		52.9	157.71	0.41	-14.29	54.4	156.64	-0.13	-14.36	55.7
157.00	0.03	-13.00		58.3	159.83	0.00	-9.17	63.2	162.41	0.05	-5.60	66.6
163.62	-0.15	-4.12		68.3	165.12	0.02	-2.37	70.1	168.64	0.05	0.90	75.3
169.97	0.00	1.97		77.8	171.67	0.00	2.67	82.0	173.16	0.00	3.96	87.1
173.63	0.00	4.49		93.0	174.02	0.00	4.95	97.0	168.12	0.00	-0.88	102.5
166.17	0.00	-2.58		107.9	166.44	0.00	-2.06	111.5	161.40	-0.01	-6.85	116.0
160.20	-0.01	-7.80		121.3	161.10	-0.01	-6.40	127.2	160.74	-0.01	-6.26	133.3
161.79	0.00	-4.81		143.1	162.47	0.00	-4.53	146.2	163.27	0.00	-4.24	148.8
164.39	0.00	-3.61		151.7	167.48	0.00	-1.52	156.8	168.98	0.00	-1.02	158.0
170.22	0.00	-0.78		159.1	171.88	0.01	-0.12	161.0	172.20	0.01	-0.80	161.2

172.44	0.01	-1.56	161.4	175.00	0.00	0.00	169.7	176.00	0.00	0.00	174.1
177.00	0.00	0.00	177.6	178.00	0.00	0.00	180.7	179.00	0.00	0.00	183.4
180.00	0.00	0.00	185.9	181.00	0.00	0.00	187.9	182.00	0.00	0.00	189.7
183.00	0.00	0.00	191.4	184.00	0.00	0.00	192.9	185.00	0.00	0.00	194.5
186.00	0.00	0.00	196.2	187.00	0.00	0.00	198.0	188.00	0.00	0.00	199.7
189.00	0.00	0.00	201.6	190.00	0.00	0.00	203.3	191.00	0.00	0.00	205.1
192.00	0.00	0.00	207.0	193.00	0.00	0.00	209.0	194.00	0.00	0.00	211.1
195.00	0.00	0.00	213.4	196.00	0.00	0.00	215.6	197.00	0.00	0.00	218.0
198.00	0.00	0.00	220.4	199.00	0.00	0.00	222.7	200.00	0.00	0.00	224.6
201.00	0.00	0.00	226.2	202.00	0.00	0.00	227.7	203.00	0.00	0.00	229.1
204.00	0.00	0.00	230.8	205.00	0.00	0.00	233.0	206.00	0.00	0.00	238.9
206.33	0.00	0.00	243.2	206.67	0.00	0.00	247.6	207.00	0.00	0.00	252.0
207.10	0.00	0.00	255.1	207.20	0.00	0.00	258.2	207.00	0.00	0.00	263.9
206.00	0.00	0.00	266.1	205.00	0.00	0.00	268.0	204.00	0.00	0.00	270.3
203.70	0.00	0.00	271.9	204.00	0.00	0.00	274.3	205.00	0.00	0.00	276.8
206.00	0.00	0.00	279.0	207.00	0.00	0.00	282.5	207.00	0.00	0.00	288.4
207.00	0.00	0.00	294.3	207.00	0.00	0.00	300.1	207.00	0.00	0.00	306.0
207.00	0.00	0.00	311.9	207.00	0.00	0.00	317.7	207.00	0.00	0.00	323.6
207.00	0.00	0.00	329.5	207.00	0.00	0.00	335.4	207.00	0.00	0.00	341.2
207.00	0.00	0.00	347.1	207.00	0.00	0.00	353.0	207.00	0.00	0.00	358.8
207.00	0.00	0.00	364.7	207.00	0.00	0.00	370.6				

ID

19 SECTION 2430.00 TIME = 242.52 HRS WS = 172.76 WIDTH = 113.8

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
207.00	0.00	0.00	0.0	206.00	0.00	0.00	2.2	205.00	0.00	0.00	3.8
204.00	0.00	0.00	5.2	203.00	0.00	0.00	6.3	202.00	0.00	0.00	7.6
201.00	0.00	0.00	8.8	200.00	0.00	0.00	10.1	199.00	0.00	0.00	11.5
198.00	0.00	0.00	12.8	197.00	0.00	0.00	14.2	196.00	0.00	0.00	15.7
194.92	0.00	-0.08	17.3	192.95	0.00	-1.05	18.9	190.91	0.00	-2.09	20.6
188.64	0.00	-3.36	22.5	186.25	0.00	-4.75	24.5	183.84	0.00	-6.16	26.6
181.44	0.00	-7.56	28.6	178.80	0.00	-9.20	30.8	176.36	0.00	-10.64	32.8
174.62	0.00	-11.38	34.3	173.17	0.00	-11.83	35.5	170.01	0.00	-13.99	38.2
169.68	0.00	-13.31	38.5	168.72	0.00	-13.28	39.5	168.48	0.00	-12.52	39.7
168.28	0.00	-11.72	39.9	168.07	0.00	-10.93	40.2	166.57	0.00	-11.43	41.7
165.16	0.00	-11.84	43.1	164.74	0.00	-11.26	43.5	163.10	0.00	-11.89	45.1
162.90	0.00	-11.10	45.3	161.45	0.00	-11.54	46.8	160.68	0.00	-11.33	47.5
160.20	0.00	-10.80	48.0	159.13	0.00	-10.87	49.1	154.45	0.00	-14.55	53.8
152.14	0.00	-15.86	56.1	149.57	-0.05	-17.43	58.7	149.79	-0.04	-16.21	60.7
152.39	-0.02	-12.61	64.7	157.72	-0.02	-7.09	72.5	162.51	-0.02	-2.09	80.5
165.60	0.17	0.87	85.6	167.37	0.00	2.51	88.5	168.18	0.00	3.18	89.8
168.74	0.00	2.74	90.5	171.42	0.00	4.42	93.0	173.19	0.00	5.19	95.8
173.03	0.00	4.03	98.3	169.51	0.00	0.01	101.4	168.27	0.00	-1.73	104.5
168.35	0.00	-1.75	106.4	166.29	0.00	-3.71	108.3	166.79	0.00	-3.01	110.2
164.42	-0.01	-5.18	117.3	165.75	0.00	-3.65	126.5	165.86	0.00	-3.34	127.6
167.49	0.00	-1.50	134.5	168.84	0.00	-0.06	139.7	170.08	0.00	1.08	143.1
170.77	0.00	1.27	147.0	171.09	0.00	1.09	150.0	173.09	0.00	2.09	153.8
173.72	0.00	1.72	157.0	173.71	0.00	0.71	159.0	174.00	0.00	0.00	161.4
175.00	0.00	0.00	163.8	176.00	0.00	0.00	166.8	177.00	0.00	0.00	171.9
177.33	0.00	0.00	176.0	177.67	0.00	0.00	180.1	178.00	0.00	0.00	184.1
178.50	0.00	0.00	187.8	179.00	0.00	0.00	191.5	180.00	0.00	0.00	196.3
181.00	0.00	0.00	199.9	182.00	0.00	0.00	203.8	183.00	0.00	0.00	207.8
184.00	0.00	0.00	210.9	185.00	0.00	0.00	213.3	186.00	0.00	0.00	215.4
187.00	0.00	0.00	217.8	188.00	0.00	0.00	221.2	188.41	0.00	0.00	224.6
188.00	0.00	0.00	229.0	187.00	0.00	0.00	232.2	186.00	0.00	0.00	234.7
185.00	0.00	0.00	237.8	184.73	0.00	0.00	241.2	185.00	0.00	0.00	243.7
186.00	0.00	0.00	247.6	187.00	0.00	0.00	250.3	188.00	0.00	0.00	252.6
189.00	0.00	0.00	254.9	190.00	0.00	0.00	257.1	191.00	0.00	0.00	259.4
192.00	0.00	0.00	261.6	193.00	0.00	0.00	263.8	194.00	0.00	0.00	266.0
195.00	0.00	0.00	268.1	196.00	0.00	0.00	269.9	197.00	0.00	0.00	271.4
198.00	0.00	0.00	272.7	199.00	0.00	0.00	273.8	200.00	0.00	0.00	275.0
201.00	0.00	0.00	276.0	202.00	0.00	0.00	277.1	203.00	0.00	0.00	278.3
204.00	0.00	0.00	279.6	205.00	0.00	0.00	281.3	206.00	0.00	0.00	283.5
206.16	0.00	0.00	288.6	206.31	0.00	0.00	293.8	206.47	0.00	0.00	299.0
206.63	0.00	0.00	304.1	206.78	0.00	0.00	309.3	206.94	0.00	0.00	314.4
206.96	0.00	0.00	319.7	206.98	0.00	0.00	325.0	207.00	0.00	0.00	330.4
207.10	0.00	0.00	335.7	207.00	0.00	0.00	341.2	206.96	0.00	0.00	346.1
206.93	0.00	0.00	351.0	206.89	0.00	0.00	356.0	206.91	0.00	0.00	361.7
206.93	0.00	0.00	367.4	206.96	0.00	0.00	373.1	206.98	0.00	0.00	378.9

207.00 0.00 0.00 384.6

ID

18 SECTION 2302.00 TIME = 242.52 HRS WS = 172.25 WIDTH = 111.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
207.00	0.00	0.00	0.0	206.00	0.00	0.00	2.2	205.00	0.00	0.00	3.6
204.00	0.00	0.00	4.7	202.96	0.00	-0.04	5.7	201.95	0.00	-0.05	6.5
200.97	0.00	-0.03	7.3	200.02	0.00	0.02	8.1	199.04	0.00	0.04	8.9
198.06	0.00	0.06	9.8	197.00	0.00	0.00	10.7	196.00	0.00	0.00	11.6
195.00	0.00	0.00	12.7	194.00	0.00	0.00	13.9	193.00	0.00	0.00	15.1
192.00	0.00	0.00	16.3	191.00	0.00	0.00	17.5	190.00	0.00	0.00	18.6
189.00	0.00	0.00	19.7	188.00	0.00	0.00	20.8	187.00	0.00	0.00	22.1
186.00	0.00	0.00	23.4	185.00	0.00	0.00	25.2	182.51	0.00	-1.49	27.5
179.93	0.00	-3.07	29.6	178.06	0.00	-3.94	31.2	176.61	0.00	-4.39	32.4
175.41	0.00	-4.59	33.4	174.34	0.00	-4.66	34.3	173.41	0.00	-4.59	35.1
172.74	0.00	-4.26	35.6	172.32	0.00	-3.68	36.2	171.80	0.00	-3.20	36.7
170.25	0.00	-3.75	38.0	169.77	0.00	-3.23	38.5	169.16	0.00	-2.83	39.1
166.71	0.00	-4.29	41.5	166.16	0.00	-3.84	42.1	165.86	0.00	-3.14	42.4
165.15	0.00	-2.85	43.1	164.95	0.00	-2.04	43.3	164.75	0.00	-1.24	43.5
161.63	0.00	-3.37	46.6	159.07	0.00	-4.93	49.2	153.91	0.00	-9.89	54.4
150.27	0.00	-13.73	58.0	149.66	-0.05	-15.34	62.5	151.45	-0.01	-14.05	65.6
154.07	-0.02	-11.93	69.1	158.25	-0.02	-7.86	75.9	160.91	-0.01	-5.32	81.3
163.13	-0.26	-2.99	86.9	164.37	0.74	-1.63	88.4	165.43	-0.20	-0.07	91.4
167.41	0.01	2.41	95.3	166.69	-0.09	2.69	96.5	166.25	0.00	2.35	102.6
167.00	0.01	3.20	112.0	167.22	0.01	3.32	115.7	167.47	0.01	3.47	120.1
167.75	0.02	2.75	125.6	167.86	0.12	1.86	127.1	168.02	0.00	1.02	132.1
169.66	0.00	2.16	134.3	171.73	0.00	3.73	137.8	170.71	0.00	1.71	138.8
170.76	0.00	0.76	140.2	171.17	0.00	0.17	144.5	172.05	0.00	0.05	146.6
172.81	0.00	0.47	150.9	172.82	0.00	0.15	155.8	173.00	0.00	0.00	160.8
173.50	0.00	0.00	164.1	174.00	0.00	0.00	167.4	175.00	0.00	0.00	171.3
176.00	0.00	0.00	175.3	177.00	0.00	0.00	179.9	178.00	0.00	0.00	184.9
178.38	0.00	0.00	188.1	178.76	0.00	0.00	191.3	178.69	0.00	0.00	196.1
178.63	0.00	0.00	200.8	178.56	0.00	0.00	205.6	179.00	0.00	0.00	210.3
180.00	0.00	0.00	213.8	181.00	0.00	0.00	215.9	182.00	0.00	0.00	218.2
183.00	0.00	0.00	220.9	184.00	0.00	0.00	224.5	185.00	0.00	0.00	228.9
186.00	0.00	0.00	232.8	187.00	0.00	0.00	235.9	188.00	0.00	0.00	238.9
189.00	0.00	0.00	242.2	190.00	0.00	0.00	246.0	191.00	0.00	0.00	249.0
192.00	0.00	0.00	251.6	193.00	0.00	0.00	254.6	193.50	0.00	0.00	260.4
194.00	0.00	0.00	266.2	195.00	0.00	0.00	270.0	196.00	0.00	0.00	272.7
197.00	0.00	0.00	274.8	198.00	0.00	0.00	276.6	199.00	0.00	0.00	278.1
200.00	0.00	0.00	279.5	201.00	0.00	0.00	280.9	202.00	0.00	0.00	282.1
203.00	0.00	0.00	283.4	204.00	0.00	0.00	285.0	205.00	0.00	0.00	286.8
206.00	0.00	0.00	289.9	206.10	0.00	0.00	294.5	206.20	0.00	0.00	299.0
206.13	0.00	0.00	303.4	206.07	0.00	0.00	307.8	206.00	0.00	0.00	312.2
205.90	0.00	0.00	317.9	205.80	0.00	0.00	323.7	205.70	0.00	0.00	329.4
205.60	0.00	0.00	335.1	205.50	0.00	0.00	340.9	205.40	0.00	0.00	346.6
205.30	0.00	0.00	352.3	205.48	0.00	0.00	357.6	205.65	0.00	0.00	362.9
205.83	0.00	0.00	368.2	206.00	0.00	0.00	373.5	206.25	0.00	0.00	378.5
206.50	0.00	0.00	383.6	206.75	0.00	0.00	388.6	207.00	0.00	0.00	393.6

ID

17 SECTION 2199.00 TIME = 242.52 HRS WS = 171.88 WIDTH = 116.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.67	0.00	0.00	4.3	204.67	0.00	-0.67	8.6
199.55	0.00	-5.45	12.9	196.87	0.00	-7.13	15.1	195.76	0.00	-7.24	16.0
194.87	0.00	-7.13	16.8	194.06	0.00	-6.94	17.5	193.26	0.00	-6.74	18.1
192.45	0.00	-6.55	18.8	191.81	0.00	-6.19	19.3	191.32	0.00	-5.68	19.7
190.81	0.00	-5.19	20.1	190.33	0.00	-4.67	20.5	189.86	0.00	-4.14	20.8
189.38	0.00	-3.62	21.2	188.90	0.00	-3.10	21.6	188.42	0.00	-2.58	22.0
187.93	0.00	-2.07	22.4	187.51	0.00	-1.49	22.7	187.10	0.00	-0.90	23.0
186.71	0.00	-0.29	23.3	186.32	0.00	0.32	23.6	185.93	0.00	0.94	23.9
185.53	0.00	1.53	24.2	185.15	0.00	2.15	24.5	184.76	0.00	2.76	24.8
184.37	0.00	3.37	25.1	183.99	0.00	3.99	25.4	183.60	0.00	4.60	25.7
183.16	0.00	5.16	26.0	182.72	0.00	5.72	26.4	182.27	0.00	6.27	26.8
181.84	0.00	6.84	27.1	181.38	0.00	7.38	27.5	180.93	0.00	7.93	27.8
180.46	0.00	8.46	28.2	179.99	0.00	8.99	28.6	179.48	0.00	9.48	29.0
178.86	0.00	9.86	29.5	178.14	0.00	10.14	30.1	177.32	0.00	10.32	30.8

176.40	0.00	10.40	31.6	175.25	0.00	10.25	32.5	172.69	0.00	8.69	34.7
169.25	0.00	5.75	37.7	168.58	0.00	5.58	40.8	166.47	0.00	3.57	43.9
162.39	0.00	-0.61	47.5	160.31	0.00	-3.19	50.8	159.61	0.00	-4.39	54.3
159.64	0.00	-4.66	59.9	159.88	0.00	-4.72	65.4	160.16	0.00	-4.24	71.6
161.56	0.00	-2.64	76.7	161.66	0.00	-2.34	81.9	161.68	0.00	-1.97	86.8
161.69	0.00	-1.61	90.6	161.70	0.00	-1.95	92.2	161.74	0.00	-2.26	101.4
162.54	0.00	-2.46	103.2	162.55	0.00	-3.45	106.2	162.57	0.00	-4.43	110.2
162.60	0.00	-5.40	114.2	162.61	0.00	-6.39	118.0	165.90	0.00	-4.10	121.5
165.89	0.00	-4.61	126.7	165.91	0.00	-5.09	133.3	165.91	0.00	-5.59	137.9
166.02	0.00	-5.98	139.7	167.19	0.00	-5.81	147.1	167.42	0.00	-6.58	147.3
167.65	0.00	-7.35	147.5	167.88	0.00	-8.12	147.7	168.11	0.00	-8.89	147.9
170.10	0.00	-7.90	150.0	171.80	0.00	-7.20	151.4	173.14	0.00	-6.86	152.5
175.04	0.00	-5.96	154.1	177.23	0.00	-4.77	156.0	179.89	0.00	-3.11	158.2
183.03	0.00	-0.97	160.8	185.00	0.00	0.00	163.6	186.00	0.00	0.00	166.2
187.00	0.00	0.00	169.0	188.00	0.00	0.00	172.0	189.00	0.00	0.00	175.2
190.00	0.00	0.00	178.2	191.00	0.00	0.00	181.2	192.00	0.00	0.00	184.1
193.00	0.00	0.00	187.8	193.50	0.00	0.00	193.3	194.00	0.00	0.00	198.8
195.00	0.00	0.00	202.9	196.00	0.00	0.00	205.8	197.00	0.00	0.00	208.7
198.00	0.00	0.00	211.8	199.00	0.00	0.00	215.7	199.22	0.00	0.00	219.6
199.00	0.00	0.00	224.1	198.77	0.00	0.00	228.1	199.00	0.00	0.00	231.1
200.00	0.00	0.00	233.3	201.00	0.00	0.00	234.8	202.00	0.00	0.00	236.1
203.00	0.00	0.00	237.3	204.00	0.00	0.00	238.7	205.00	0.00	0.00	240.4
206.00	0.00	0.00	243.1	206.11	0.00	0.00	248.8	206.22	0.00	0.00	254.5
206.33	0.00	0.00	260.2	206.44	0.00	0.00	265.8	206.56	0.00	0.00	271.5
206.67	0.00	0.00	277.2	206.78	0.00	0.00	282.9	206.89	0.00	0.00	288.5
207.00	0.00	0.00	294.2	207.14	0.00	0.00	299.6	207.29	0.00	0.00	304.9
207.43	0.00	0.00	310.3	207.57	0.00	0.00	315.7	207.71	0.00	0.00	321.0
207.86	0.00	0.00	326.4	208.00	0.00	0.00	331.8				

ID

16 SECTION 2120.00 TIME = 242.52 HRS WS = 171.82 WIDTH = 172.0

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	1.7	203.00	0.00	0.00	3.0
202.00	0.00	0.00	4.2	201.00	0.00	0.00	5.4	200.00	0.00	0.00	6.6
199.00	0.00	0.00	7.9	198.00	0.00	0.00	9.3	197.00	0.00	0.00	10.9
196.00	0.00	0.00	12.6	195.00	0.00	0.00	14.4	194.00	0.00	0.00	16.8
193.00	0.00	0.00	19.5	192.00	0.00	0.00	23.5	191.00	0.00	0.00	29.4
190.00	0.00	0.00	33.7	189.00	0.00	0.00	36.5	188.00	0.00	0.00	39.4
187.00	0.00	0.00	42.6	186.00	0.00	0.00	45.4	185.00	0.00	0.00	48.1
184.00	0.00	0.00	50.6	183.00	0.00	0.00	53.2	182.00	0.00	0.00	55.6
181.00	0.00	0.00	58.0	180.00	0.00	0.00	60.0	179.00	0.00	0.00	62.0
177.39	0.00	-0.61	63.9	175.44	0.00	-1.56	65.5	173.98	0.00	-2.02	66.8
172.67	0.00	-2.33	67.9	171.82	0.00	-2.18	69.4	170.45	0.01	-2.55	72.0
170.13	0.00	-1.87	72.2	169.76	-0.01	-1.24	72.4	169.43	-0.01	-0.57	72.6
169.17	-0.01	0.17	72.8	167.58	-0.01	-0.42	74.2	164.39	-0.02	-2.61	78.6
164.14	-0.02	-1.86	78.8	163.90	-0.02	-1.10	79.0	161.18	-0.02	-2.81	81.3
159.80	-0.02	-3.90	86.5	157.36	-0.02	-6.04	89.8	157.06	0.00	-6.63	94.2
157.06	0.00	-6.93	100.9	157.06	0.00	-7.94	104.5	157.06	0.00	-8.94	107.4
157.06	0.00	-9.08	110.3	157.06	0.00	-9.24	115.0	157.06	0.00	-9.08	120.8
157.80	-0.01	-8.19	125.5	163.40	-0.02	-1.60	135.2	164.15	0.91	0.15	135.8
164.40	-0.33	0.90	136.8	164.73	-0.44	1.73	137.2	166.67	0.61	4.17	140.0
166.68	-0.36	4.68	142.1	167.69	-0.14	5.76	148.9	169.36	-0.02	7.50	154.4
168.93	-0.02	7.13	158.6	168.94	-0.02	7.04	161.4	168.96	-0.59	6.96	166.8
169.59	0.72	6.59	170.5	168.87	-0.02	4.87	175.9	168.86	-0.15	3.86	180.4
168.82	-0.08	2.82	182.8	168.17	-0.75	1.17	186.3	168.63	-0.29	0.63	189.8
169.54	0.74	0.54	194.1	169.56	0.73	-0.44	198.7	168.86	-0.61	-2.14	204.2
169.15	0.87	-2.85	207.0	168.21	-0.74	-4.79	210.0	169.50	0.75	-4.50	218.2
168.95	-0.59	-6.05	225.6	169.43	0.77	-6.57	226.7	168.83	-0.61	-8.17	228.9
168.41	-0.02	-9.59	232.8	168.85	0.77	-10.15	233.8	167.70	0.10	-12.30	234.1
167.18	-0.28	-13.82	234.4	166.91	-0.78	-15.09	234.6	166.82	0.17	-16.17	234.8
167.06	0.83	-16.94	235.0	166.34	0.34	-17.96	235.2	166.10	-0.38	-18.05	235.4
166.53	0.24	-17.47	235.6	166.50	0.45	-17.29	235.8	166.26	-0.75	-17.74	236.0
166.69	-0.79	-18.31	236.2	166.93	-0.25	-19.07	236.4	167.41	0.47	-19.59	236.6
167.89	0.93	-20.11	236.8	168.44	0.93	-20.56	237.2	169.85	-0.18	-20.15	240.0
173.26	-0.10	-17.74	242.7	175.61	-0.06	-16.39	244.5	178.07	-0.04	-14.93	246.4
180.49	-0.03	-13.51	248.3	183.04	-0.02	-11.96	250.4	185.70	-0.02	-10.30	252.6
188.66	-0.02	-8.34	255.0	192.38	-0.02	-5.62	258.1	196.94	-0.02	-2.06	262.0
200.00	0.00	0.00	265.3	201.00	0.00	0.00	267.8	202.00	0.00	0.00	269.9
203.00	0.00	0.00	271.9	204.00	0.00	0.00	274.0	205.00	0.00	0.00	276.1

206.00	0.00	0.00	278.6	207.00	0.00	0.00	281.4	207.25	0.00	0.00	287.2
207.50	0.00	0.00	293.0	207.75	0.00	0.00	298.7	208.00	0.00	0.00	304.5
208.20	0.00	0.00	310.3	208.40	0.00	0.00	316.1	208.60	0.00	0.00	321.9
208.80	0.00	0.00	327.7	209.00	0.00	0.00	333.5				

ID

15 SECTION 2047.00 TIME = 242.52 HRS WS = 171.62 WIDTH = 154.8

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	2.0	203.00	0.00	0.00	3.5
202.00	0.00	0.00	4.8	201.00	0.00	0.00	5.9	200.00	0.00	0.00	6.9
199.00	0.00	0.00	8.0	198.00	0.00	0.00	9.1	197.00	0.00	0.00	10.2
196.00	0.00	0.00	11.3	195.00	0.00	0.00	12.5	194.00	0.00	0.00	13.7
193.00	0.00	0.00	15.2	192.00	0.00	0.00	16.8	191.00	0.00	0.00	18.7
190.00	0.00	0.00	21.1	189.00	0.00	0.00	23.9	188.00	0.00	0.00	27.1
187.00	0.00	0.00	30.5	186.00	0.00	0.00	33.5	185.00	0.00	0.00	36.0
184.00	0.00	0.00	38.0	183.00	0.00	0.00	40.0	182.00	0.00	0.00	41.8
181.00	0.00	0.00	43.8	180.00	0.00	0.00	46.0	179.00	0.00	0.00	48.9
178.00	0.00	0.00	53.3	177.00	0.00	0.00	59.2	176.50	0.00	0.00	62.5
176.00	0.00	0.00	65.7	175.00	0.00	0.00	71.6	171.77	0.00	-2.73	75.7
166.49	0.00	-7.51	80.1	159.92	0.00	-13.58	87.9	159.92	0.00	-13.08	88.4
156.64	0.00	-15.86	93.3	156.61	0.00	-15.39	93.5	156.56	0.00	-14.44	94.4
156.52	0.00	-13.48	97.2	156.45	0.00	-12.55	103.9	157.14	0.03	-10.87	108.8
160.97	0.06	-6.03	113.9	165.38	-0.09	-0.62	123.0	168.43	0.00	3.43	128.8
167.96	0.00	3.96	129.7	168.74	-0.01	5.24	130.4	168.50	0.00	5.50	130.6
168.34	0.00	5.54	130.8	168.98	-0.01	6.45	131.3	168.60	0.00	6.33	132.9
168.44	0.00	6.44	137.7	168.04	0.00	7.04	147.2	167.84	0.00	6.94	152.8
167.44	0.00	6.44	159.3	166.63	0.00	4.63	171.6	166.16	0.00	3.16	178.7
165.83	0.01	2.33	183.4	165.47	-0.01	1.47	188.0	165.04	-0.02	0.04	192.7
164.31	-0.02	-1.69	199.8	163.67	0.07	-3.33	206.3	163.41	-0.05	-4.59	209.0
163.09	0.03	-5.91	215.0	163.23	0.84	-6.78	218.7	161.03	-1.00	-9.97	223.6
160.49	-0.87	-11.51	224.5	160.88	-0.08	-12.12	224.8	160.94	0.94	-13.06	226.5
159.58	0.21	-15.42	226.8	158.75	-0.29	-17.25	227.0	158.45	-0.46	-18.55	227.2
158.70	-0.45	-19.30	227.4	158.98	0.55	-20.02	227.6	158.57	0.30	-21.43	227.8
158.33	-0.34	-22.67	228.0	158.61	-0.72	-23.39	228.2	159.99	-0.14	-23.01	228.4
160.79	0.42	-22.71	228.6	161.03	0.43	-22.97	228.8	162.01	0.02	-22.99	229.0
162.30	0.03	-23.70	229.2	163.63	0.04	-23.37	229.4	164.00	0.04	-24.00	229.6
165.41	0.03	-23.59	229.8	165.84	0.03	-24.16	230.0	167.30	0.02	-23.70	230.2
169.35	0.01	-22.65	230.4	171.41	0.00	-21.59	230.6	173.45	-0.01	-20.55	230.8
174.15	-0.01	-20.85	231.0	175.91	-0.01	-20.09	232.4	179.25	-0.01	-17.75	235.1
182.89	-0.01	-15.11	238.1	186.34	-0.01	-12.66	240.9	189.29	-0.01	-10.72	243.3
191.49	-0.01	-9.51	245.1	193.65	-0.01	-8.35	246.9	195.73	-0.01	-7.27	248.6
197.79	-0.01	-6.21	250.2	200.12	-0.01	-4.88	252.2	203.14	-0.01	-2.86	254.7
207.00	0.00	0.00	259.6	207.13	0.00	0.00	261.6	207.00	0.00	0.00	263.2
206.90	0.00	0.00	267.1	207.00	0.00	0.00	270.2	207.25	0.00	0.00	274.7
207.50	0.00	0.00	279.2	207.75	0.00	0.00	283.7	208.00	0.00	0.00	288.2

ID

14 SECTION 1944.00 TIME = 242.52 HRS WS = 171.25 WIDTH = 121.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.50	0.00	0.00	4.0	204.00	0.00	0.00	8.0
203.00	0.00	0.00	10.4	202.00	0.00	0.00	11.9	201.00	0.00	0.00	13.1
200.00	0.00	0.00	14.3	199.00	0.00	0.00	15.3	198.00	0.00	0.00	16.4
197.00	0.00	0.00	17.4	196.00	0.00	0.00	18.5	195.00	0.00	0.00	19.6
194.00	0.00	0.00	20.9	193.00	0.00	0.00	22.4	192.00	0.00	0.00	24.1
191.00	0.00	0.00	26.0	190.00	0.00	0.00	28.0	189.00	0.00	0.00	30.0
188.00	0.00	0.00	31.7	187.00	0.00	0.00	33.3	186.00	0.00	0.00	34.8
185.00	0.00	0.00	36.4	184.00	0.00	0.00	38.1	183.00	0.00	0.00	40.1
182.00	0.00	0.00	43.0	181.00	0.00	0.00	48.9	180.00	0.00	0.00	54.2
174.81	-0.01	-4.19	58.8	171.29	-0.01	-6.71	61.7	171.05	-0.01	-5.95	61.9
169.93	0.00	-6.07	62.9	168.48	0.00	-6.52	65.2	168.07	0.00	-5.93	67.2
166.88	0.00	-6.12	73.2	166.50	0.00	-5.50	75.2	166.27	0.00	-4.73	76.9
166.20	0.00	-3.80	78.0	166.01	0.00	-2.99	79.4	165.70	0.07	-2.30	81.4
165.20	0.02	-2.30	85.0	164.82	0.02	-2.18	89.0	164.53	0.02	-1.47	92.7
164.31	0.01	-0.69	96.3	164.03	0.00	0.03	102.8	163.75	-0.03	0.75	110.1
164.31	0.13	1.30	114.3	166.54	0.00	3.53	118.6	164.56	-0.30	1.56	122.8
163.70	0.00	0.60	124.8	163.25	0.58	0.25	126.3	162.18	-0.13	0.18	128.3
160.05	0.00	-0.95	134.7	159.02	-0.01	-1.47	137.9	155.61	0.00	-4.39	150.6

155.24	-0.01	-4.76	168.4	163.33	0.00	2.33	176.6	165.29	-0.01	3.29	178.6
165.49	0.00	2.49	178.8	165.89	0.00	1.89	179.2	166.21	0.00	1.21	179.5
166.41	0.00	0.41	179.7	166.61	0.00	-0.39	179.9	166.81	0.00	-1.19	180.1
167.01	0.00	-1.99	180.3	167.21	0.00	-2.79	180.5	167.44	0.03	-3.56	180.7
167.61	-0.03	-4.39	180.9	167.81	0.00	-5.19	181.1	168.01	0.00	-5.99	181.3
168.21	0.00	-6.79	181.5	168.42	0.00	-7.58	181.7	168.62	0.00	-8.38	181.9
168.82	0.00	-9.18	182.1	169.01	-0.01	-9.99	182.3	169.21	0.00	-10.79	182.5
169.42	0.00	-11.58	182.7	169.69	-0.02	-12.31	182.9	170.23	-0.02	-12.77	183.1
170.81	-0.02	-13.19	183.3	171.37	-0.02	-13.63	183.5	171.90	-0.02	-14.09	183.7
172.42	-0.02	-14.58	183.9	172.92	-0.02	-15.08	184.1	173.41	-0.01	-15.59	184.3
173.89	-0.01	-16.11	184.5	174.35	-0.01	-16.65	184.7	174.81	-0.01	-17.19	184.9
175.26	-0.01	-17.74	185.1	175.71	0.00	-18.29	185.3	176.16	0.00	-18.84	185.5
176.46	0.00	-19.54	185.7	177.75	0.00	-19.25	186.8	181.87	0.00	-16.13	190.2
184.75	0.00	-14.25	192.6	187.40	0.00	-12.60	194.9	190.16	0.00	-10.84	197.2
193.55	0.00	-8.45	200.0	199.09	0.00	-3.91	204.7	203.50	0.00	0.00	209.1
204.00	0.00	0.00	213.5	205.00	0.00	0.00	218.3	206.00	0.00	0.00	221.3
207.00	0.00	0.00	225.2								

ID

13 SECTION 1796.00 TIME = 242.52 HRS WS = 170.85 WIDTH = 110.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.50	0.00	0.00	3.8	204.00	0.00	0.00	7.5
203.00	0.00	0.00	9.9	202.00	0.00	0.00	11.6	201.00	0.00	0.00	13.1
200.00	0.00	0.00	14.3	199.00	0.00	0.00	15.5	198.00	0.00	0.00	16.7
197.00	0.00	0.00	17.8	196.00	0.00	0.00	19.0	195.00	0.00	0.00	20.2
194.00	0.00	0.00	21.5	193.00	0.00	0.00	22.7	192.00	0.00	0.00	24.0
191.00	0.00	0.00	25.3	190.00	0.00	0.00	26.5	189.00	0.00	0.00	27.8
188.00	0.00	0.00	29.1	187.00	0.00	0.00	30.3	186.00	0.00	0.00	31.6
185.00	0.00	0.00	32.9	184.00	0.00	0.00	34.2	183.00	0.00	0.00	35.6
182.00	0.00	0.00	37.1	180.63	-0.01	-0.37	38.8	178.54	-0.01	-1.46	40.5
176.44	0.00	-2.56	42.3	174.50	0.00	-3.50	43.9	172.68	0.00	-4.32	45.4
170.96	0.00	-5.04	46.8	170.69	0.00	-4.31	47.0	170.02	0.00	-3.98	47.6
165.18	0.00	-7.82	52.3	164.13	0.01	-7.87	54.5	162.58	0.01	-8.42	57.8
160.65	0.01	-9.35	62.8	160.02	0.01	-8.98	65.5	160.11	-0.03	-7.89	74.3
161.02	0.00	-5.98	75.9	160.90	0.00	-5.10	76.8	161.55	0.00	-3.46	77.5
160.82	0.00	-3.18	78.1	162.70	0.00	-0.30	79.8	162.19	0.00	0.19	81.0
163.34	0.00	2.34	82.1	163.28	0.00	3.28	83.8	165.07	0.00	5.27	86.6
164.91	0.07	5.31	89.6	167.42	0.00	7.62	93.8	164.05	0.00	4.05	101.7
155.42	-0.01	-5.57	120.3	156.84	0.00	-4.65	144.2	159.03	0.00	-2.96	146.4
163.63	0.00	0.63	151.0	165.81	0.00	1.81	153.1	166.01	0.00	1.01	153.3
166.21	0.00	0.21	153.5	166.41	0.00	-0.59	153.7	166.61	0.00	-1.39	153.9
166.81	0.00	-2.19	154.1	167.01	0.00	-2.99	154.3	167.21	0.00	-3.79	154.5
167.41	0.00	-4.59	154.7	167.61	0.00	-5.39	154.9	167.81	0.00	-6.19	155.1
168.01	0.00	-6.99	155.3	168.21	0.00	-7.79	155.5	168.41	0.00	-8.59	155.7
168.61	0.00	-9.39	155.9	168.81	0.00	-10.19	156.1	169.01	0.00	-10.99	156.3
169.22	0.00	-11.78	156.5	169.66	-0.01	-12.34	156.7	170.13	-0.02	-12.87	156.9
170.65	-0.02	-13.35	157.1	171.15	-0.02	-13.85	157.3	171.64	-0.02	-14.36	157.5
172.12	-0.01	-14.88	157.7	172.58	-0.01	-15.42	157.9	173.03	-0.01	-15.97	158.1
173.48	-0.01	-16.52	158.3	173.92	-0.01	-17.08	158.5	174.35	0.00	-17.65	158.7
174.78	0.00	-18.22	158.9	175.05	0.00	-18.95	159.1	177.93	0.00	-17.07	161.6
181.02	0.00	-14.98	164.1	184.35	0.00	-12.65	166.9	189.32	0.00	-8.02	171.1
194.29	0.00	-3.38	175.3	198.00	0.00	0.00	179.4	199.00	0.00	0.00	184.2
200.00	0.00	0.00	185.9	201.00	0.00	0.00	187.3	202.00	0.00	0.00	188.5
203.00	0.00	0.00	189.7	204.00	0.00	0.00	190.9	205.00	0.00	0.00	192.3
206.00	0.00	0.00	194.1	207.00	0.00	0.00	197.0				

ID

12 SECTION 1665.00 TIME = 242.52 HRS WS = 170.19 WIDTH = 74.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.50	0.00	0.00	5.1	205.00	0.00	0.00	10.3
204.50	0.00	0.00	14.3	204.00	0.00	0.00	18.3	203.00	0.00	0.00	22.0
202.00	0.00	0.00	24.1	200.07	-0.03	-0.93	25.9	198.28	-0.03	-1.72	27.3
196.57	-0.03	-2.43	28.7	194.94	-0.03	-3.06	29.9	193.36	-0.03	-3.64	31.1
191.80	-0.03	-4.20	32.2	190.22	-0.03	-4.78	33.3	188.62	-0.03	-5.38	34.5
187.00	-0.04	-6.00	35.5	185.34	-0.04	-6.66	36.6	183.65	-0.04	-7.35	37.7
181.85	-0.04	-8.15	38.9	179.90	-0.04	-9.10	40.2	177.58	-0.04	-10.42	41.9
174.68	-0.04	-12.32	44.0	172.04	-0.04	-13.95	45.8	169.66	-0.04	-15.34	47.4

167.50	-0.04	-16.50	48.8	165.47	-0.03	-17.53	50.2	163.62	-0.03	-18.38	51.5
161.87	-0.03	-19.13	52.7	160.00	-0.03	-20.00	54.2	158.13	-0.02	-20.87	55.7
157.33	-0.02	-20.67	56.3	156.81	-0.02	-20.19	56.7	156.12	-0.02	-19.88	57.2
156.03	0.00	-18.97	57.5	155.99	0.00	-18.01	57.7	155.94	0.00	-17.06	57.9
155.90	0.00	-16.10	58.1	155.85	0.00	-15.15	58.3	155.79	0.00	-14.21	58.5
155.73	0.00	-13.27	58.7	155.68	0.00	-12.32	58.9	155.66	0.00	-11.34	59.1
155.63	0.00	-10.37	59.5	155.62	0.00	-9.38	60.1	155.61	0.00	-8.39	60.4
155.57	0.00	-7.43	62.3	155.48	0.00	-7.02	69.7	155.47	0.00	-6.53	76.4
155.47	0.00	-6.03	80.4	155.47	0.00	-5.53	85.4	155.46	0.00	-4.54	89.1
155.46	0.00	-3.54	94.1	155.46	0.00	-3.54	96.9	155.46	0.00	-4.04	101.3
158.23	0.00	-1.77	108.2	162.11	0.00	1.62	112.1	163.60	0.00	2.60	113.5
164.38	0.00	2.38	114.3	165.01	0.00	2.01	115.0	165.34	0.00	1.34	116.1
165.76	0.00	0.76	117.0	166.39	0.00	0.39	117.9	167.12	0.00	0.12	118.7
168.01	0.00	0.01	119.6	169.00	0.00	0.00	120.5	170.00	0.00	0.00	121.4
171.00	0.00	0.00	122.3	172.00	0.00	0.00	123.2	173.00	0.00	0.00	124.3
174.00	0.00	0.00	125.4	175.00	0.00	0.00	126.5	176.00	0.00	0.00	127.4
177.00	0.00	0.00	128.4	178.00	0.00	0.00	129.3	179.00	0.00	0.00	130.2
180.00	0.00	0.00	131.1	181.00	0.00	0.00	132.1	182.00	0.00	0.00	132.9
183.00	0.00	0.00	133.8	184.00	0.00	0.00	134.7	185.00	0.00	0.00	135.6
186.00	0.00	0.00	136.5	187.00	0.00	0.00	137.3	188.00	0.00	0.00	138.2
189.00	0.00	0.00	139.1	190.00	0.00	0.00	139.9	191.00	0.00	0.00	140.8
192.01	0.00	0.01	141.6	192.99	0.00	-0.01	142.4	194.00	0.00	0.00	143.3
195.00	0.00	0.00	144.1	196.00	0.00	0.00	145.0	197.00	0.00	0.00	145.9
198.00	0.00	0.00	146.8	199.00	0.00	0.00	147.7	200.00	0.00	0.00	148.6
201.00	0.00	0.00	149.6	202.00	0.00	0.00	150.6	203.00	0.00	0.00	151.6
204.00	0.00	0.00	152.7	205.00	0.00	0.00	153.9	206.00	0.00	0.00	155.3
207.00	0.00	0.00	156.9	208.00	0.00	0.00	159.4	209.00	0.00	0.00	164.0

ID

11 SECTION 1510.00 TIME = 242.52 HRS WS = 169.91 WIDTH = 94.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	5.0	204.00	0.00	0.00	7.1
203.00	0.00	0.00	8.7	202.00	0.00	0.00	10.0	201.00	0.00	0.00	11.2
200.00	0.00	0.00	12.4	199.00	0.00	0.00	13.6	198.00	0.00	0.00	14.8
197.00	0.00	0.00	16.2	196.00	0.00	0.00	17.6	195.00	0.00	0.00	19.1
194.00	0.00	0.00	20.7	193.00	0.00	0.00	22.3	192.00	0.00	0.00	24.0
191.00	0.00	0.00	25.9	190.00	0.00	0.00	28.4	189.00	0.00	0.00	31.7
188.00	0.00	0.00	35.1	187.00	0.00	0.00	37.8	186.00	0.00	0.00	40.1
185.00	0.00	0.00	42.4	184.00	0.00	0.00	44.6	183.00	0.00	0.00	46.5
182.00	0.00	0.00	48.2	181.00	0.00	0.00	49.7	180.00	0.00	0.00	51.2
179.00	0.00	0.00	52.6	178.00	0.00	0.00	54.1	177.00	0.00	0.00	55.6
176.00	0.00	0.00	57.2	175.00	0.00	0.00	58.9	174.00	0.00	0.00	60.6
173.00	0.00	0.00	62.3	172.00	0.00	0.00	64.0	171.00	0.00	0.00	65.7
169.15	0.00	-0.85	67.3	166.92	0.00	-2.08	69.2	164.00	0.00	-4.00	72.1
163.76	0.00	-3.24	72.3	163.53	0.00	-2.47	72.5	161.80	0.00	-3.20	80.1
161.51	0.00	-2.49	80.3	160.52	0.00	-2.48	81.2	160.31	0.00	-1.69	86.5
160.31	0.00	-0.69	86.9	157.88	0.00	-2.79	90.6	157.87	0.00	-2.47	95.6
157.85	0.00	-2.15	100.9	158.17	0.00	-1.64	107.4	157.53	0.00	-2.37	109.6
157.62	0.00	-2.38	113.6	157.42	0.00	-2.68	115.4	157.31	0.00	-2.69	117.0
156.96	0.00	-2.94	119.7	156.80	0.00	-3.20	122.7	156.79	0.00	-3.21	126.6
156.78	0.00	-3.22	130.4	156.77	0.00	-2.73	133.6	157.70	0.00	-1.30	138.3
160.32	0.00	1.82	142.0	160.32	0.00	2.32	147.4	161.80	0.00	3.80	148.7
163.22	0.00	4.22	151.0	164.03	0.00	4.03	152.0	164.12	0.00	3.12	153.5
164.30	0.00	2.30	154.9	164.79	0.00	1.79	156.0	165.28	0.00	1.28	156.9
165.50	0.00	0.50	158.0	166.26	0.00	0.26	158.7	167.13	0.00	0.13	159.4
168.03	0.00	0.03	160.0	169.01	0.00	0.01	160.6	170.00	0.00	0.00	161.1
171.00	0.00	0.00	161.7	172.00	0.00	0.00	162.3	173.00	0.00	0.00	162.9
174.00	0.00	0.00	163.4	175.00	0.00	0.00	164.0	176.00	0.00	0.00	164.6
177.00	0.00	0.00	165.2	178.00	0.00	0.00	165.9	179.00	0.00	0.00	166.5
180.00	0.00	0.00	167.1	181.00	0.00	0.00	167.7	182.00	0.00	0.00	168.3
183.00	0.00	0.00	168.9	184.00	0.00	0.00	169.5	185.00	0.00	0.00	170.1
189.60	0.00	3.60	170.8	190.33	0.00	3.33	171.4	191.04	0.00	3.04	172.0
191.74	0.00	2.74	172.5	192.42	0.00	2.42	173.1	193.07	0.00	2.07	173.7
193.73	0.00	1.73	174.2	194.37	0.00	1.37	174.8	195.02	0.00	1.02	175.3
195.66	0.00	0.66	175.8	196.33	0.00	0.33	176.4	197.00	0.00	0.00	176.9
197.71	0.00	-0.29	177.6	198.45	0.00	-0.55	178.2	199.23	0.00	-0.77	178.8
200.04	0.00	-0.96	179.5	200.88	0.00	-1.11	180.2	201.79	0.00	-1.21	181.0
202.76	0.00	-1.24	181.8	203.79	0.00	-1.21	182.6	204.97	0.00	-1.03	183.6
206.26	0.00	-0.74	184.7	207.86	0.00	-0.14	186.1	209.00	0.00	0.00	187.6

210.00	0.00	0.00	189.2	211.00	0.00	0.00	191.1	212.00	0.00	0.00	193.1
213.00	0.00	0.00	195.8	214.00	0.00	0.00	200.6				

ID

10 SECTION 1345.00 TIME = 242.52 HRS WS = 169.50 WIDTH = 86.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
202.00	0.00	0.00	0.0	201.00	0.00	0.00	5.2	200.00	0.00	0.00	9.6
199.00	0.00	0.00	14.3	196.30	0.00	-1.70	17.9	193.64	0.00	-3.36	20.2
191.71	0.00	-4.29	21.8	190.13	0.00	-4.87	23.1	188.72	0.00	-5.28	24.3
187.41	0.00	-5.59	25.4	186.17	0.00	-5.83	26.4	184.95	0.00	-6.05	27.4
183.73	0.00	-6.27	28.4	182.50	0.00	-6.50	29.5	181.28	0.00	-6.72	30.5
180.07	0.00	-6.93	31.5	178.93	0.00	-7.07	32.4	177.90	0.00	-7.10	33.3
176.95	0.00	-7.05	34.0	176.07	0.00	-6.92	34.8	175.28	0.00	-6.72	35.4
174.52	0.00	-6.48	36.0	173.78	0.00	-6.22	36.6	173.08	0.00	-5.92	37.2
172.40	-0.01	-5.60	37.7	171.71	-0.01	-5.29	38.2	171.02	-0.01	-4.98	38.7
170.32	-0.01	-4.68	39.3	169.58	-0.01	-4.42	39.8	169.34	-0.01	-3.66	40.0
168.54	0.00	-3.46	40.7	168.12	0.00	-2.88	41.1	167.06	0.00	-2.94	41.9
166.27	0.00	-2.73	42.6	165.54	0.00	-2.46	43.2	164.93	0.00	-2.07	43.7
164.63	0.00	-1.37	43.9	164.33	0.00	-0.67	44.1	164.04	0.00	0.04	44.3
163.74	0.00	0.74	44.5	163.44	0.00	1.44	44.7	163.14	0.00	2.14	44.9
162.85	0.00	2.85	45.1	162.61	0.00	3.61	45.3	156.54	0.00	-1.96	50.4
155.26	0.01	-2.74	65.0	155.26	0.01	-2.44	71.0	156.96	0.00	-0.44	76.0
156.98	0.00	-0.62	80.1	157.01	0.00	-0.79	84.6	157.04	0.00	-0.95	91.4
159.00	0.00	0.75	94.4	159.41	0.00	0.91	99.0	159.42	0.00	0.67	104.1
159.43	0.00	0.43	110.3	159.44	0.00	-0.56	114.9	159.53	0.00	-1.47	115.3
160.35	0.00	-1.65	118.6	163.02	0.00	0.02	120.8	163.27	0.00	-0.73	121.0
163.52	0.00	-1.48	121.2	163.77	0.00	-2.23	121.4	164.02	0.00	-2.98	121.6
164.26	0.00	-3.74	121.8	164.51	0.00	-4.49	122.0	164.76	0.00	-5.24	122.2
165.00	0.00	-6.00	122.4	165.24	0.00	-6.76	122.6	166.18	0.00	-6.82	123.4
167.85	0.00	-6.15	124.8	169.09	0.05	-5.91	126.2	169.57	-0.02	-6.43	126.4
171.02	-0.02	-5.98	127.6	172.59	-0.01	-5.41	128.9	174.41	-0.01	-4.59	130.4
176.36	-0.01	-3.64	132.0	178.56	-0.01	-2.44	133.8	181.53	-0.01	-0.47	136.3
183.00	0.00	0.00	139.1	184.00	0.00	0.00	142.0	185.00	0.00	0.00	144.6
186.00	0.00	0.00	146.9	187.00	0.00	0.00	149.2	188.00	0.00	0.00	151.3
189.00	0.00	0.00	153.4	190.00	0.00	0.00	155.3	191.00	0.00	0.00	157.1
192.00	0.00	0.00	158.8	193.00	0.00	0.00	160.6	194.00	0.00	0.00	162.5
195.00	0.00	0.00	164.4	196.00	0.00	0.00	166.1	197.00	0.00	0.00	167.7
198.00	0.00	0.00	169.2	199.00	0.00	0.00	171.1	200.00	0.00	0.00	173.3
201.00	0.00	0.00	178.1								

ID

9 SECTION 1193.00 TIME = 242.52 HRS WS = 169.33 WIDTH = 168.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	3.0	204.00	0.00	0.00	5.2
203.00	0.00	0.00	7.1	202.00	0.00	0.00	8.9	201.00	0.00	0.00	10.6
200.00	0.00	0.00	12.3	199.00	0.00	0.00	13.9	198.00	0.00	0.00	15.5
197.00	0.00	0.00	17.2	196.00	0.00	0.00	19.2	195.00	0.00	0.00	21.3
194.00	0.00	0.00	23.3	193.00	0.00	0.00	25.1	192.00	0.00	0.00	27.0
191.00	0.00	0.00	29.1	188.43	-0.08	-1.57	32.4	182.68	-0.13	-6.32	37.0
177.84	-0.02	-10.16	40.9	170.66	-0.21	-16.34	46.7	163.72	-0.22	-22.78	52.5
161.79	0.42	-24.21	59.1	161.17	-1.01	-23.83	65.1	161.59	0.99	-22.41	66.7
159.53	-1.01	-23.47	70.8	158.76	0.58	-23.24	73.6	158.52	0.11	-22.48	73.8
161.11	-0.73	-18.89	84.1	162.54	0.99	-17.32	86.0	161.60	-1.01	-18.40	86.9
163.42	0.99	-16.84	90.0	163.21	-1.01	-17.30	92.5	164.86	0.99	-15.14	94.6
165.14	-0.85	-13.86	101.2	166.39	0.97	-11.61	104.5	166.35	0.98	-10.65	109.1
165.98	-0.68	-10.02	112.6	166.85	0.82	-8.15	115.4	166.35	-0.01	-7.65	117.8
166.40	-0.59	-6.60	120.0	166.59	0.91	-5.42	123.2	166.45	0.95	-4.55	124.5
165.71	-0.01	-4.29	125.9	166.11	-0.65	-2.89	126.8	166.67	0.88	-1.33	127.7
166.33	-0.61	-0.67	128.7	167.05	0.75	1.05	129.3	166.93	0.79	1.93	129.6
165.95	-0.66	1.95	130.5	166.80	0.80	3.80	131.2	166.37	-0.01	4.37	132.2
165.78	-0.72	4.78	132.8	166.40	-0.01	6.40	134.9	166.39	-0.01	7.39	135.4
166.55	-0.01	8.55	135.6	166.70	-0.01	9.70	136.0	166.98	-0.01	10.98	136.7
166.23	-0.01	11.23	138.4	166.70	-0.01	12.70	143.4	165.44	-0.01	11.59	146.3
165.71	-0.01	12.01	150.0	163.38	-0.03	9.58	154.0	163.10	-0.03	9.20	158.1
163.56	-0.01	9.56	161.6	162.84	-0.04	7.84	164.7	162.48	-0.03	6.48	168.7
162.04	-0.01	5.04	171.1	160.75	0.01	2.75	174.3	157.70	0.03	-0.75	178.7
154.21	0.01	-4.70	184.1	155.10	-0.01	-2.90	189.6	157.44	-0.01	0.44	193.9

157.50	-0.01	0.50	194.1	157.77	-0.01	0.78	200.9	158.40	-0.01	0.40	205.9
158.56	-0.01	-0.44	206.1	162.09	-0.01	2.09	209.1	162.36	-0.01	1.36	209.3
162.61	-0.01	0.61	209.5	162.85	-0.01	-0.15	209.7	163.10	-0.01	-0.90	209.9
163.35	-0.01	-1.65	210.1	163.60	-0.01	-2.40	210.3	163.83	-0.01	-3.17	210.5
167.99	-0.01	-0.01	214.4	168.31	0.03	-0.69	214.6	168.74	0.00	-1.26	215.0
169.34	0.00	-1.66	216.0	169.77	0.00	-2.23	216.5	170.36	0.00	-2.64	217.0
171.00	0.00	-3.00	217.5	171.63	0.00	-3.37	218.0	172.27	0.00	-3.73	218.6
172.93	0.00	-4.07	219.1	173.59	0.00	-4.41	219.7	174.28	0.00	-4.72	220.2
175.02	0.00	-4.99	220.9	175.76	0.00	-5.24	221.5	176.54	0.00	-5.46	222.1
177.35	0.00	-5.65	222.8	178.22	0.00	-5.78	223.5	179.20	0.00	-5.80	224.3
180.28	0.00	-5.72	225.2	181.51	0.00	-5.49	226.3	182.94	0.00	-5.06	227.5
184.69	0.00	-4.31	228.9	186.93	0.00	-3.07	230.8	189.55	0.00	-1.45	233.0
192.00	0.00	0.00	235.3	193.00	0.00	0.00	237.6	194.00	0.00	0.00	240.2
195.00	0.00	0.00	243.2	196.00	0.00	0.00	246.8	197.00	0.00	0.00	252.4
197.50	0.00	0.00	256.5	198.00	0.00	0.00	260.6				

ID

8 SECTION 1048.00 TIME = 242.52 HRS WS = 168.88 WIDTH = 133.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
204.00	0.00	0.00	0.0	203.50	0.00	0.00	3.4	203.00	0.00	0.00	6.7
202.00	0.00	0.00	10.1	199.92	0.00	-1.08	12.7	197.12	0.00	-2.88	15.0
194.32	0.00	-4.68	17.4	191.16	0.00	-6.84	20.0	188.08	0.00	-8.92	22.6
184.88	0.00	-11.12	25.3	181.51	0.00	-13.49	28.1	177.71	0.00	-16.29	31.3
173.59	0.00	-19.41	34.8	169.14	0.00	-22.86	38.5	164.13	-0.01	-26.87	42.7
163.71	0.02	-26.29	43.2	159.83	-0.02	-29.17	47.0	154.64	-0.01	-33.37	52.2
151.72	-0.01	-35.27	55.1	151.48	-0.01	-34.52	55.4	151.28	-0.01	-33.72	55.6
150.67	-0.01	-33.34	56.2	149.66	-0.01	-33.35	57.2	149.44	-0.01	-32.57	57.4
148.96	-0.01	-32.04	57.9	148.28	-0.01	-31.72	58.6	148.04	-0.01	-30.96	58.8
147.63	0.08	-30.37	59.4	147.63	0.08	-29.37	59.8	147.63	0.08	-28.37	60.3
147.91	0.35	-27.09	60.8	148.12	0.37	-25.88	61.2	147.76	-0.51	-25.24	61.7
148.41	0.80	-23.59	62.3	148.16	0.08	-22.84	62.8	147.86	-0.50	-22.14	63.9
148.59	0.87	-20.41	65.4	148.20	-0.27	-19.80	65.6	147.94	-0.79	-19.06	65.8
148.55	-0.13	-17.45	66.1	149.20	0.55	-15.80	66.7	148.56	-0.42	-15.43	66.9
148.42	-0.62	-14.58	67.1	149.00	0.71	-13.00	67.8	148.50	-0.40	-12.50	68.4
149.12	0.64	-10.88	68.9	149.17	0.21	-9.83	69.3	149.00	-0.67	-9.00	69.9
149.61	0.28	-7.39	70.4	150.45	0.66	-5.55	71.5	149.90	-0.67	-5.10	72.1
150.34	-0.18	-3.67	72.5	152.39	0.07	-0.61	77.6	156.09	0.00	4.08	89.3
157.16	-0.27	6.16	93.2	158.11	0.79	7.16	94.3	158.46	-0.45	7.56	96.0
159.55	0.02	8.60	97.5	161.90	-0.18	10.90	101.9	163.99	0.78	12.49	104.7
163.72	0.00	11.72	105.2	165.16	0.00	12.16	107.7	163.68	0.00	9.68	110.6
163.82	0.00	8.83	110.8	165.28	0.00	9.28	112.1	165.35	0.00	8.35	119.9
164.45	-0.03	6.95	122.5	164.80	0.00	6.80	131.7	164.85	0.00	6.35	132.6
164.89	0.00	5.89	137.8	165.10	0.00	5.10	140.8	165.14	0.00	4.14	141.0
165.17	0.00	3.17	141.3	165.19	0.00	2.19	141.6	165.31	0.00	1.31	144.1
165.74	0.00	1.24	151.9	165.86	0.00	0.86	156.3	166.03	0.00	0.53	160.2
166.36	0.00	0.36	163.7	166.97	0.00	-0.03	167.4	167.88	0.00	-0.12	170.1
169.00	0.00	0.00	172.4	170.00	0.00	0.00	174.9	171.00	0.00	0.00	178.0
172.00	0.00	0.00	181.2	173.00	0.00	0.00	184.5	174.00	0.00	0.00	187.8
175.00	0.00	0.00	191.2	176.00	0.00	0.00	194.5	177.00	0.00	0.00	198.1
178.00	0.00	0.00	202.3	179.00	0.00	0.00	206.5	180.00	0.00	0.00	210.1
181.00	0.00	0.00	213.2	182.00	0.00	0.00	216.1	183.00	0.00	0.00	218.8
184.00	0.00	0.00	221.4	185.00	0.00	0.00	224.1	186.00	0.00	0.00	226.6
187.00	0.00	0.00	228.9	188.00	0.00	0.00	231.1	189.00	0.00	0.00	233.1
190.00	0.00	0.00	235.1	191.00	0.00	0.00	237.1	192.00	0.00	0.00	238.9
193.00	0.00	0.00	240.6	194.00	0.00	0.00	242.0	195.00	0.00	0.00	243.2
196.00	0.00	0.00	244.5	197.00	0.00	0.00	245.8	198.00	0.00	0.00	247.1
199.00	0.00	0.00	248.4	200.00	0.00	0.00	249.7	201.00	0.00	0.00	251.6
202.00	0.00	0.00	253.8	203.00	0.00	0.00	257.2				

ID

7 SECTION 921.00 TIME = 242.52 HRS WS = 168.41 WIDTH = 95.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
204.00	0.00	0.00	0.0	203.00	0.00	0.00	3.2	202.00	0.00	0.00	5.5
201.00	0.00	0.00	7.5	200.00	0.00	0.00	9.1	199.00	0.00	0.00	10.6
198.00	0.00	0.00	12.1	197.00	0.00	0.00	13.7	196.00	0.00	0.00	15.4
195.00	0.00	0.00	17.4	194.00	0.00	0.00	19.8	193.00	0.00	0.00	22.4
192.00	0.00	0.00	25.1	191.00	0.00	0.00	28.0	190.00	0.00	0.00	30.8

189.00	0.00	0.00	33.2	188.00	0.00	0.00	35.5	187.00	0.00	0.00	37.6
186.00	0.00	0.00	39.7	185.00	0.00	0.00	41.8	184.00	0.00	0.00	44.2
183.00	0.00	0.00	46.9	182.00	0.00	0.00	51.2	181.50	0.00	0.00	54.5
181.00	0.00	0.00	57.8	180.50	0.00	0.00	62.5	180.00	0.00	0.00	67.3
179.50	0.00	0.00	70.7	179.00	0.00	0.00	74.2	178.00	0.00	0.00	79.7
177.00	0.00	0.00	84.1	176.00	0.00	0.00	88.1	174.08	-0.01	-0.92	91.9
171.16	-0.03	-2.84	94.3	168.97	0.04	-4.03	96.1	168.39	-0.05	-3.61	96.5
167.51	0.01	-3.49	97.3	166.94	0.00	-3.06	98.2	165.59	0.00	-3.41	99.7
164.63	0.00	-3.37	100.7	163.66	0.00	-3.34	101.8	163.29	0.00	-2.71	102.1
162.87	0.00	-2.13	102.4	162.36	0.00	-1.64	103.0	161.86	0.00	-1.14	103.4
160.55	0.00	-1.45	104.6	159.23	0.00	-1.77	105.7	158.46	0.00	-1.54	107.3
158.22	0.00	-0.78	107.5	157.94	0.00	-0.06	107.7	155.57	0.00	-1.43	109.8
154.82	0.00	-1.18	110.9	154.83	0.00	-0.17	111.4	154.84	0.00	0.84	111.6
154.41	0.00	1.41	112.1	153.07	0.00	1.07	116.0	153.04	0.00	2.04	118.9
153.02	0.00	2.52	120.9	153.06	0.00	2.06	123.3	153.13	0.00	1.63	127.6
153.16	0.00	1.16	131.9	153.57	0.00	1.27	137.5	153.71	0.00	1.11	144.1
155.57	0.00	3.27	146.3	156.33	0.00	4.33	149.1	156.37	0.00	4.56	152.1
156.54	0.00	4.54	154.7	157.70	0.00	4.70	157.9	157.99	0.00	3.99	160.7
158.43	0.00	3.44	163.0	158.80	0.00	2.80	167.1	158.79	0.00	1.79	168.5
158.78	0.00	0.78	169.4	158.80	0.00	-0.20	170.5	160.07	0.00	0.07	172.7
160.07	0.00	-0.93	173.8	160.32	0.00	-1.68	175.1	160.35	0.00	-2.65	177.8
160.42	0.00	-3.58	181.5	161.85	0.00	-3.15	182.8	161.88	0.00	-4.12	183.2
162.85	0.00	-4.15	186.1	163.92	0.00	-4.08	187.1	165.48	0.00	-3.52	189.1
167.00	0.00	-3.00	191.0	167.41	0.03	-3.59	191.7	168.44	0.00	-3.56	192.5
169.33	-0.01	-3.67	193.2	171.48	-0.01	-2.52	195.0	173.60	-0.01	-1.40	196.8
175.78	-0.01	-0.22	198.6	177.00	0.00	0.00	200.5	178.00	0.00	0.00	202.7
179.00	0.00	0.00	205.6	179.50	0.00	0.00	209.7	180.00	0.00	0.00	213.8
180.50	0.00	0.00	218.5	181.00	0.00	0.00	223.2	182.00	0.00	0.00	225.4
183.00	0.00	0.00	226.9	184.00	0.00	0.00	228.3	185.00	0.00	0.00	229.6
186.00	0.00	0.00	230.9	187.00	0.00	0.00	232.2	188.00	0.00	0.00	233.5
189.00	0.00	0.00	234.9	190.00	0.00	0.00	236.1	191.00	0.00	0.00	237.4
192.00	0.00	0.00	238.6	193.00	0.00	0.00	239.9	194.00	0.00	0.00	241.4
195.00	0.00	0.00	242.9	196.00	0.00	0.00	244.7	197.00	0.00	0.00	246.6
198.00	0.00	0.00	248.4	199.00	0.00	0.00	250.3	200.00	0.00	0.00	252.4
201.00	0.00	0.00	254.8	202.00	0.00	0.00	258.0	203.00	0.00	0.00	261.8
204.00	0.00	0.00	264.8	205.00	0.00	0.00	267.6	206.00	0.00	0.00	271.2

ID

6 SECTION 790.00 TIME = 242.52 HRS WS = 168.23 WIDTH = 110.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
203.00	0.00	0.00	0.0	202.00	0.00	0.00	1.9	201.00	0.00	0.00	3.3
200.00	0.00	0.00	4.4	199.00	0.00	0.00	5.5	198.00	0.00	0.00	6.5
197.00	0.00	0.00	7.5	196.00	0.00	0.00	8.4	195.00	0.00	0.00	9.4
194.00	0.00	0.00	10.4	193.00	0.00	0.00	11.5	192.00	0.00	0.00	12.6
191.00	0.00	0.00	13.8	190.00	0.00	0.00	15.1	189.00	0.00	0.00	16.6
188.00	0.00	0.00	18.4	187.00	0.00	0.00	20.5	186.00	0.00	0.00	23.3
185.00	0.00	0.00	26.8	184.00	0.00	0.00	31.1	183.00	0.00	0.00	36.5
182.50	0.00	0.00	40.2	182.00	0.00	0.00	43.9	181.00	0.00	0.00	48.1
180.00	0.00	0.00	50.9	179.00	0.00	0.00	54.2	178.50	0.00	0.00	58.4
178.00	0.00	0.00	62.5	177.50	0.00	0.00	68.0	177.00	0.00	0.00	73.5
176.67	0.00	0.00	77.6	176.33	0.00	0.00	81.6	176.00	0.00	0.00	85.7
175.00	0.00	0.00	90.0	174.00	0.00	0.00	92.8	173.00	0.00	0.00	94.9
172.00	0.00	0.00	96.8	171.00	0.00	0.00	98.9	170.00	0.00	0.00	101.6
169.00	0.00	0.00	105.1	168.00	0.00	0.00	108.2	167.02	0.00	0.02	111.1
166.06	0.00	0.06	114.5	165.10	0.00	0.10	118.1	164.30	0.02	0.30	121.3
163.61	0.01	0.61	125.3	163.11	0.00	1.11	128.8	163.08	0.00	2.08	129.2
162.70	0.00	2.70	132.3	162.56	0.00	3.56	134.1	162.55	0.00	4.55	134.3
162.35	0.00	5.35	135.3	162.16	0.00	6.16	136.4	161.98	0.00	6.98	137.2
161.12	0.00	7.12	141.1	160.87	0.00	7.87	142.7	160.82	0.00	8.82	143.0
160.12	0.00	9.12	146.0	158.14	0.01	7.64	151.0	156.69	0.01	6.69	154.8
155.91	0.01	5.41	157.3	152.33	0.00	1.33	177.1	153.43	0.00	1.43	201.4
159.92	0.01	6.92	210.4	162.86	-0.01	8.86	213.3	163.51	-0.01	8.51	214.0
163.92	0.00	7.92	214.4	164.26	0.00	7.26	214.7	164.67	0.00	6.67	215.1
165.06	0.00	6.06	215.5	165.48	0.00	5.48	215.9	165.88	0.00	4.88	216.4
166.29	0.00	4.29	216.8	166.68	0.00	3.69	217.1	167.12	0.00	3.12	217.6
167.43	0.01	2.43	217.9	167.73	0.01	1.73	218.1	168.04	0.01	1.04	218.3
168.35	0.01	0.35	218.5	168.68	0.01	-0.32	218.7	169.01	0.01	-0.99	218.9
169.36	0.01	-1.64	219.1	169.72	0.03	-2.28	219.3	170.10	0.01	-2.90	219.5
170.44	0.02	-3.56	219.7	171.12	-0.01	-3.88	220.2	174.30	-0.01	-1.70	222.9

176.89	-0.01	-0.11	225.1	178.00	0.00	0.00	226.9	179.00	0.00	0.00	228.5
180.00	0.00	0.00	229.9	181.00	0.00	0.00	231.0	182.15	0.00	0.15	232.0
183.24	0.00	0.24	233.0	184.28	0.00	0.28	233.8	185.24	0.00	0.24	234.6
186.14	0.00	0.14	235.4	187.00	0.00	0.00	236.1	187.87	0.00	-0.13	236.8
188.80	0.00	-0.20	237.6	189.77	0.00	-0.23	238.4	190.78	0.00	-0.22	239.3
191.85	0.00	-0.15	240.2	192.98	0.00	-0.02	241.1	194.00	0.00	0.00	242.1
195.00	0.00	0.00	243.1	196.00	0.00	0.00	244.1	197.00	0.00	0.00	245.1
198.00	0.00	0.00	246.2	199.00	0.00	0.00	247.2	200.00	0.00	0.00	248.3
201.00	0.00	0.00	249.4	202.00	0.00	0.00	250.7	203.00	0.00	0.00	252.1
204.00	0.00	0.00	253.6	205.00	0.00	0.00	255.5	206.00	0.00	0.00	257.8
207.00	0.00	0.00	261.6								

ID

5 SECTION 692.00 TIME = 242.52 HRS WS = 167.93 WIDTH = 86.0

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	2.6	199.00	0.00	0.00	4.3
198.00	0.00	0.00	5.7	197.00	0.00	0.00	7.0	196.00	0.00	0.00	8.2
195.00	0.00	0.00	9.4	194.00	0.00	0.00	10.5	193.00	0.00	0.00	11.6
192.00	0.00	0.00	12.7	191.00	0.00	0.00	13.9	190.00	0.00	0.00	15.1
189.00	0.00	0.00	16.4	188.00	0.00	0.00	17.7	187.00	0.00	0.00	19.0
186.00	0.00	0.00	20.4	185.00	0.00	0.00	21.8	184.00	0.00	0.00	23.2
183.00	0.00	0.00	24.6	182.00	0.00	0.00	26.1	181.00	0.00	0.00	27.7
180.00	0.00	0.00	29.5	179.00	0.00	0.00	31.2	177.45	0.00	-0.55	32.7
175.84	0.00	-1.16	34.0	174.37	-0.01	-1.63	35.3	173.02	0.00	-1.98	36.4
171.70	-0.01	-2.30	37.5	170.39	-0.03	-2.61	38.5	169.10	0.04	-2.90	39.6
167.89	-0.06	-3.11	40.5	167.65	0.00	-2.35	40.7	166.61	0.00	-2.39	41.7
166.17	0.00	-1.83	42.2	165.13	0.00	-1.87	43.2	163.52	0.00	-2.48	44.6
162.33	0.00	-2.67	45.9	161.71	0.00	-2.29	46.4	160.42	0.00	-2.58	47.5
159.58	0.00	-2.42	48.2	158.26	0.00	-2.74	49.3	156.56	0.00	-3.44	50.7
156.31	0.00	-2.69	50.9	156.06	0.00	-1.94	51.1	155.82	0.00	-1.18	51.3
153.37	0.00	-2.63	53.4	151.63	0.00	-3.37	56.5	150.88	0.00	-3.12	58.5
150.88	0.00	-2.12	60.5	150.88	0.00	-1.12	62.0	150.88	0.00	-0.12	63.8
150.88	0.00	0.88	66.8	150.88	0.00	0.98	70.0	150.88	0.00	1.08	73.1
150.88	0.00	0.98	76.2	150.88	0.00	0.88	79.2	150.88	0.00	-0.12	82.3
150.88	0.00	-1.12	84.3	150.88	0.00	-2.12	85.8	150.88	0.00	-3.12	87.9
151.27	0.00	-3.73	89.8	151.65	0.00	-4.35	92.0	151.82	0.00	-5.18	93.3
153.16	0.00	-4.84	96.4	155.78	0.00	-3.22	98.9	156.03	0.00	-3.97	99.1
156.83	0.00	-4.17	99.8	157.73	0.00	-4.27	102.3	159.37	0.00	-3.63	104.6
160.00	0.00	-4.00	106.7	160.90	0.00	-4.10	108.1	162.36	0.00	-3.64	111.7
163.42	0.00	-3.58	115.4	164.65	0.00	-3.35	119.5	165.54	0.00	-3.46	123.2
167.02	0.01	-2.98	125.8	169.73	-0.07	-1.27	128.1	172.00	0.00	0.00	132.6
173.00	0.00	0.00	137.0	174.00	0.00	0.00	141.9	174.50	0.00	0.00	144.9
175.00	0.00	0.00	148.0	176.00	0.00	0.00	152.7	177.00	0.00	0.00	156.6
178.00	0.00	0.00	160.4	179.00	0.00	0.00	165.9	180.00	0.00	0.00	171.3
181.00	0.00	0.00	175.0	182.00	0.00	0.00	177.9	183.00	0.00	0.00	181.0
184.00	0.00	0.00	184.9	185.00	0.00	0.00	189.4	186.00	0.00	0.00	194.4
187.00	0.00	0.00	198.0	188.00	0.00	0.00	200.0	189.00	0.00	0.00	201.4
190.00	0.00	0.00	202.6	191.00	0.00	0.00	203.6	192.00	0.00	0.00	204.6
193.00	0.00	0.00	205.6	194.00	0.00	0.00	206.4	195.00	0.00	0.00	207.3
196.00	0.00	0.00	208.1	197.00	0.00	0.00	208.8	198.00	0.00	0.00	209.5
199.00	0.00	0.00	210.2	200.00	0.00	0.00	210.9	201.00	0.00	0.00	211.6
202.00	0.00	0.00	212.3	203.00	0.00	0.00	213.0	204.00	0.00	0.00	213.7
205.00	0.00	0.00	214.5	206.00	0.00	0.00	215.3	207.00	0.00	0.00	216.3
208.00	0.00	0.00	217.4	209.00	0.00	0.00	219.2				

ID

4 SECTION 582.00 TIME = 242.52 HRS WS = 167.78 WIDTH = 103.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	2.4	199.00	0.00	0.00	3.8
198.00	0.00	0.00	4.9	197.00	0.00	0.00	5.8	196.00	0.00	0.00	6.8
194.99	0.00	-0.01	7.6	193.99	0.00	-0.01	8.4	193.00	0.00	0.00	9.3
192.00	0.00	0.00	10.1	191.00	0.00	0.00	10.9	190.00	0.00	0.00	11.7
189.00	0.00	0.00	12.5	188.00	0.00	0.00	13.3	187.00	0.00	0.00	14.1
186.00	0.00	0.00	14.9	185.00	0.00	0.00	15.7	184.00	0.00	0.00	16.5
183.00	0.00	0.00	17.3	182.02	0.00	0.02	18.1	181.00	0.00	0.00	19.0
180.00	0.00	0.00	19.9	179.00	0.00	0.00	20.8	178.00	0.00	0.00	21.8
177.00	0.00	0.00	22.9	176.00	0.00	0.00	24.1	175.00	0.00	0.00	25.4

174.00	0.00	0.00	26.8	173.00	0.00	0.00	28.3	172.00	0.00	0.00	29.9
171.00	0.00	0.00	31.5	170.00	0.00	0.00	33.3	169.00	0.00	0.00	35.5
168.00	0.00	0.00	38.6	167.00	0.00	0.00	42.1	166.00	0.00	0.00	45.1
164.99	0.00	-0.01	48.7	164.48	0.00	-0.02	52.6	163.96	0.00	-0.04	56.4
163.43	0.00	-0.07	61.0	161.23	0.00	-1.77	65.3	159.44	0.00	-2.56	66.8
156.83	0.00	-4.17	69.0	155.14	0.00	-4.86	70.5	154.81	0.00	-4.19	71.0
154.44	0.00	-3.56	71.3	153.64	0.00	-3.36	72.0	152.64	0.00	-3.36	72.8
150.76	0.00	-4.24	74.4	150.22	0.00	-3.78	75.9	150.21	0.00	-2.79	77.0
150.19	0.00	-1.81	78.8	150.18	0.00	-0.82	80.4	150.16	0.00	0.16	83.5
150.14	0.00	0.24	87.4	150.12	0.00	0.32	91.2	150.14	0.00	0.24	95.2
150.16	0.00	0.16	99.1	150.19	0.00	-0.81	102.9	150.20	0.00	-1.79	105.1
150.22	0.00	-2.78	107.1	150.25	0.00	-3.75	109.4	150.26	0.00	-4.74	109.7
150.30	0.00	-5.70	111.9	153.37	0.00	-3.63	115.3	154.06	0.00	-3.94	115.9
154.75	0.00	-4.25	116.5	154.77	0.00	-5.23	117.2	156.99	0.00	-4.01	119.6
160.03	0.00	-1.97	122.2	162.90	0.00	-0.10	125.1	163.97	0.00	-0.03	129.0
164.99	0.00	-0.01	133.1	166.00	0.00	0.00	136.8	167.00	0.00	0.00	139.9
168.00	0.00	0.00	143.2	169.00	0.00	0.00	146.7	170.00	0.00	0.00	149.5
171.00	0.00	0.00	151.9	172.00	0.00	0.00	153.7	173.00	0.00	0.00	155.4
174.00	0.00	0.00	157.2	175.00	0.00	0.00	159.0	176.00	0.00	0.00	160.9
177.00	0.00	0.00	163.6	178.00	0.00	0.00	167.6	179.00	0.00	0.00	172.5
180.00	0.00	0.00	176.7	181.00	0.00	0.00	180.8	182.00	0.00	0.00	185.6
183.00	0.00	0.00	191.2	184.00	0.00	0.00	195.7	185.00	0.00	0.00	199.7
186.00	0.00	0.00	202.5	187.00	0.00	0.00	204.2	188.00	0.00	0.00	205.5
189.00	0.00	0.00	206.6	190.00	0.00	0.00	207.6	191.00	0.00	0.00	208.6
192.00	0.00	0.00	209.5	193.00	0.00	0.00	210.4	194.00	0.00	0.00	211.4
195.00	0.00	0.00	212.3	196.00	0.00	0.00	213.3	197.00	0.00	0.00	214.2
198.00	0.00	0.00	215.2	199.00	0.00	0.00	216.2	200.00	0.00	0.00	217.2
201.00	0.00	0.00	218.2	202.00	0.00	0.00	219.3	203.00	0.00	0.00	220.3
204.00	0.00	0.00	221.4	205.00	0.00	0.00	222.6	206.00	0.00	0.00	224.1
207.00	0.00	0.00	225.8	208.00	0.00	0.00	228.7				

ID

3 SECTION 455.00 TIME = 242.52 HRS WS = 167.44 WIDTH = 85.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	1.6	199.00	0.00	0.00	2.8
198.00	0.00	0.00	3.8	196.99	0.00	-0.01	4.7	196.00	0.00	0.00	5.5
195.00	0.00	0.00	6.3	194.01	0.00	0.01	7.2	193.00	0.00	0.00	8.0
192.00	0.00	0.00	8.9	191.00	0.00	0.00	9.8	190.00	0.00	0.00	10.8
189.00	0.00	0.00	11.8	188.00	0.00	0.00	12.9	187.00	0.00	0.00	13.9
186.00	0.00	0.00	15.0	185.00	0.00	0.00	16.1	184.00	0.00	0.00	17.2
183.00	0.00	0.00	18.3	182.00	0.00	0.00	19.4	181.00	0.00	0.00	20.5
180.00	0.00	0.00	21.6	179.00	0.00	0.00	22.7	178.00	0.00	0.00	23.8
177.00	0.00	0.00	25.0	176.00	0.00	0.00	26.1	175.00	0.00	0.00	27.2
174.00	0.00	0.00	28.4	173.00	0.00	0.00	29.5	172.00	0.00	0.00	30.5
171.00	0.00	0.00	31.5	169.95	0.00	-0.05	32.4	168.91	0.00	-0.09	33.3
167.88	0.00	-0.12	34.1	166.91	0.00	-0.09	35.0	165.94	0.00	-0.06	35.8
165.00	0.00	0.00	36.6	164.00	0.00	0.00	37.3	163.04	0.00	0.04	38.1
162.07	0.00	0.07	39.0	161.11	0.00	0.11	39.8	160.10	0.00	0.10	40.6
159.10	0.00	0.10	41.5	158.11	0.00	0.11	42.4	157.28	0.00	0.28	43.3
156.57	0.00	0.57	44.2	155.98	0.00	0.98	45.2	155.44	0.00	1.44	46.2
154.69	0.00	1.69	46.9	153.59	0.00	1.59	48.0	152.53	0.00	1.52	49.1
149.80	0.00	-0.20	51.8	149.39	0.00	-0.56	57.9	149.32	0.00	-0.58	63.8
149.36	0.00	-0.59	67.6	149.41	0.00	-0.59	71.3	149.48	0.00	-1.52	76.2
149.53	0.00	-2.47	78.7	149.58	-0.01	-3.42	80.8	149.61	-0.01	-4.39	82.3
149.66	-0.01	-5.34	84.8	151.36	-0.01	-4.64	88.6	151.93	-0.01	-5.07	89.0
152.27	-0.01	-5.73	90.5	154.90	-0.01	-4.10	92.7	156.53	-0.01	-3.47	94.1
157.09	-0.01	-3.91	94.6	157.60	-0.01	-4.40	95.0	159.96	0.00	-3.04	97.3
163.71	0.00	-0.29	100.4	164.39	0.00	-0.11	103.7	164.93	0.00	-0.07	107.0
165.46	0.00	-0.04	110.3	165.98	0.00	-0.02	113.6	167.00	0.00	0.00	118.2
168.00	0.00	0.00	121.4	169.00	0.00	0.00	124.2	170.00	0.00	0.00	127.4
171.00	0.00	0.00	131.9	172.00	0.00	0.00	135.2	173.00	0.00	0.00	137.7
174.00	0.00	0.00	140.2	175.00	0.00	0.00	143.2	176.00	0.00	0.00	147.1
177.00	0.00	0.00	150.8	178.00	0.00	0.00	154.7	179.00	0.00	0.00	158.9
180.00	0.00	0.00	164.7	180.50	0.00	0.00	168.3	181.00	0.00	0.00	171.8
182.00	0.00	0.00	175.5	183.00	0.00	0.00	177.4	184.00	0.00	0.00	178.8
185.00	0.00	0.00	179.9	186.00	0.00	0.00	180.9	187.00	0.00	0.00	181.9
188.00	0.00	0.00	182.8	189.00	0.00	0.00	183.6	190.00	0.00	0.00	184.5
191.00	0.00	0.00	185.3	192.00	0.00	0.00	186.1	193.00	0.00	0.00	186.9
194.00	0.00	0.00	187.8	195.00	0.00	0.00	188.6	196.00	0.00	0.00	189.4

197.00	0.00	0.00	190.2	198.00	0.00	0.00	191.0	199.00	0.00	0.00	191.9
200.00	0.00	0.00	192.8	201.00	0.00	0.00	193.7	202.00	0.00	0.00	194.9
203.00	0.00	0.00	196.3	204.00	0.00	0.00	199.5				

ID

2 SECTION 287.00 TIME = 242.52 HRS WS = 167.15 WIDTH = 98.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
200.00	0.00	0.00	0.0	199.00	0.00	0.00	1.7	198.00	0.00	0.00	2.8
196.95	0.00	-0.05	3.9	196.00	0.00	0.00	4.7	195.00	0.00	0.00	5.4
194.00	0.00	0.00	6.2	193.00	0.00	0.00	6.9	192.00	0.00	0.00	7.6
191.00	0.00	0.00	8.2	190.00	0.00	0.00	8.9	189.04	0.00	0.04	9.5
188.01	0.00	0.01	10.4	187.00	0.00	0.00	11.3	186.00	0.00	0.00	12.3
185.00	0.00	0.00	13.3	184.00	0.00	0.00	14.4	183.00	0.00	0.00	15.5
182.00	0.00	0.00	16.8	181.00	0.00	0.00	18.1	180.00	0.00	0.00	19.4
179.00	0.00	0.00	20.6	178.00	0.00	0.00	21.9	177.00	0.00	0.00	23.1
176.00	0.00	0.00	24.4	175.00	0.00	0.00	25.6	174.00	0.00	0.00	26.8
173.00	0.00	0.00	28.1	172.00	0.00	0.00	29.3	171.00	0.00	0.00	30.6
170.00	0.00	0.00	32.4	169.00	0.00	0.00	34.3	168.00	0.00	0.00	36.8
167.00	0.00	0.00	39.9	166.00	0.00	0.00	42.5	165.01	0.00	0.01	45.1
164.21	0.00	0.21	48.0	163.95	0.00	0.95	52.4	162.92	0.00	0.42	58.0
162.32	0.00	0.32	63.9	161.12	0.00	0.12	69.6	158.72	0.00	-1.28	72.9
157.09	0.00	-1.91	74.3	155.86	0.00	-2.14	75.4	153.90	0.00	-3.10	77.0
153.34	0.00	-2.66	77.6	152.72	0.00	-2.28	78.3	152.06	0.00	-1.94	79.0
151.29	0.00	-1.71	81.5	151.11	0.00	-0.89	84.5	149.62	0.00	-1.38	85.9
149.53	0.00	-0.47	89.4	149.45	0.00	-0.30	94.6	149.45	0.00	-0.05	99.8
149.45	0.00	-0.30	105.0	149.51	0.00	-0.49	110.2	149.59	0.00	-1.41	112.9
150.86	0.00	-1.14	114.7	151.17	0.00	-1.83	116.3	151.22	0.00	-2.78	118.9
153.23	0.00	-1.77	121.5	154.62	0.00	-1.38	122.7	155.53	0.00	-1.47	123.4
157.21	0.00	-0.79	124.9	158.39	0.00	-0.61	125.8	159.56	0.00	-0.44	126.8
160.57	0.00	-0.43	127.7	160.81	0.00	-1.19	127.9	161.44	0.00	-1.56	128.4
164.21	0.00	0.21	130.8	165.01	0.00	0.01	132.2	166.00	0.00	0.00	133.8
167.00	0.00	0.00	136.4	167.50	0.00	0.00	140.8	168.00	0.00	0.00	145.2
168.50	0.00	0.00	150.1	169.00	0.00	0.00	155.0	170.00	0.00	0.00	160.9
170.50	0.00	0.00	164.0	171.00	0.00	0.00	167.1	172.00	0.00	0.00	172.2
173.00	0.00	0.00	175.4	174.00	0.00	0.00	177.9	175.00	0.00	0.00	180.1
176.00	0.00	0.00	182.5	177.00	0.00	0.00	185.4	178.00	0.00	0.00	189.4
178.50	0.00	0.00	192.4	179.00	0.00	0.00	195.5	179.50	0.00	0.00	200.2
180.00	0.00	0.00	204.9	180.33	0.00	0.00	209.2	180.67	0.00	0.00	213.6
181.00	0.00	0.00	217.9	182.00	0.00	0.00	223.8	183.00	0.00	0.00	228.4
184.00	0.00	0.00	234.1	185.00	0.00	0.00	238.8	186.00	0.00	0.00	243.5
187.00	0.00	0.00	248.4	188.00	0.00	0.00	254.2	188.50	0.00	0.00	258.7
189.00	0.00	0.00	263.2	190.00	0.00	0.00	267.0	191.00	0.00	0.00	269.5
192.00	0.00	0.00	271.4	193.00	0.00	0.00	273.2	194.00	0.00	0.00	274.9
195.00	0.00	0.00	276.6	196.00	0.00	0.00	278.4	197.00	0.00	0.00	280.1
198.00	0.00	0.00	281.8	199.00	0.00	0.00	283.4	200.00	0.00	0.00	285.0
201.00	0.00	0.00	286.5	202.00	0.00	0.00	288.1	203.00	0.00	0.00	290.1
204.00	0.00	0.00	292.8								

TIME = 500.00 HRS DT = 60 SECS TIME STEP = 30019

SECTION	W.S.ELEV. FT	WIDTH FT	DEPTH FT	Q CFS	V FPS	SLOPE	D50 MM	QS/Q 1000 PPM	FR	SED. YIELD TONS
0.010	152.45	39.9	4.05	353	3.19	0.002509	1.10	0.91	0.34	0.229E+06
287.000	153.18	43.2	3.32	353	3.09	0.002518	1.06	0.94	0.34	0.222E+06
455.000	153.61	44.5	3.01	353	3.05	0.002501	1.12	0.88	0.33	0.221E+06
582.000	153.93	43.5	2.82	353	3.11	0.002631	1.32	0.84	0.34	0.221E+06
692.000	154.22	41.3	2.98	353	3.25	0.002828	1.61	0.88	0.35	0.220E+06
790.000	154.52	48.1	3.61	353	3.19	0.003116	2.07	0.98	0.37	0.218E+06
921.000	154.87	45.4	3.62	353	2.66	0.001655	1.73	0.45	0.27	0.220E+06
1048.000	155.06	34.5	9.39	353	1.87	0.000413	0.90	0.15	0.14	0.218E+06
1193.000	155.13	34.4	6.85	353	2.62	0.001145	0.81	0.25	0.23	0.223E+06
1345.000	155.31	32.3	5.74	353	2.99	0.001657	0.86	0.64	0.28	0.214E+06
1510.000	155.59	28.9	4.61	353	3.49	0.002360	1.12	0.87	0.33	0.209E+06
1665.000	156.00	29.4	4.05	353	3.97	0.003636	1.51	1.68	0.40	0.207E+06
1796.000	156.59	39.9	4.36	353	4.07	0.005545	2.55	2.38	0.49	0.198E+06
1944.000	157.40	43.7	3.67	353	3.76	0.004763	2.56	1.79	0.45	0.193E+06
2047.000	157.89	42.7	3.82	353	3.52	0.003988	2.48	1.34	0.40	0.185E+06
2120.000	158.18	41.9	3.51	353	3.39	0.003208	2.31	1.06	0.38	0.177E+06
2199.000	158.44	42.6	3.96	353	3.11	0.002533	2.30	0.77	0.34	0.170E+06
2302.000	158.69	37.6	5.46	353	2.68	0.001358	1.18	0.23	0.25	0.166E+06
2430.000	158.88	33.3	4.47	353	3.52	0.002812	1.20	0.74	0.36	0.166E+06
2586.000	159.59	59.8	3.01	353	3.85	0.007818	3.21	2.61	0.55	0.163E+06
2633.000	159.91	45.9	2.47	353	3.86	0.005848	3.21	1.79	0.48	0.159E+06
2730.000	160.63	82.7	2.52	353	3.34	0.007464	3.62	1.77	0.52	0.152E+06
2798.000	161.07	80.5	2.20	353	2.84	0.004151	3.41	0.76	0.40	0.147E+06
2879.000	161.38	78.0	1.89	353	2.61	0.003018	3.33	0.49	0.35	0.144E+06
2953.000	161.60	78.2	2.20	353	2.40	0.002281	3.33	0.32	0.31	0.141E+06
3053.000	161.81	74.2	3.29	353	2.06	0.001361	2.99	0.16	0.24	0.136E+06
3143.000	161.92	65.5	2.96	353	1.93	0.000934	2.82	0.10	0.20	0.132E+06
3236.000	162.01	66.5	3.19	353	1.94	0.000935	3.04	0.10	0.21	0.127E+06
3331.000	162.09	61.2	3.46	353	1.84	0.000702	3.00	0.07	0.18	0.121E+06
3392.000	162.13	58.2	3.67	353	1.77	0.000591	3.05	0.05	0.17	0.115E+06
3502.000	162.20	57.6	4.08	353	1.64	0.000457	2.81	0.04	0.15	0.105E+06
3589.000	162.24	55.1	4.35	353	1.62	0.000415	2.84	0.03	0.14	0.968E+05
3681.000	162.28	53.9	4.59	353	1.51	0.000332	2.38	0.03	0.13	0.893E+05
3837.000	162.33	51.3	4.88	353	1.59	0.000359	2.19	0.02	0.13	0.647E+05
3990.000	188.53	31.5	2.23	353	7.06	0.025255	1.09	0.07	0.99	0.325E+05
4140.000	190.49	41.8	3.53	353	2.93	0.001996	1.11	0.07	0.30	0.325E+05
4256.000	190.86	24.7	2.33	353	7.36	0.022389	1.14	0.07	0.93	0.325E+05
4347.000	192.48	27.1	3.49	353	4.15	0.003968	1.15	0.07	0.41	0.325E+05

ID

37 SECTION 4256.00 TIME = 500.00 HRS WS = 190.86 WIDTH = 24.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
216.00	0.00	0.00	0.0	215.00	0.00	0.00	3.5	214.00	0.00	0.00	6.2
213.00	0.00	0.00	9.0	212.00	0.00	0.00	12.6	211.00	0.00	0.00	16.9
210.67	0.00	0.00	21.9	210.33	0.00	0.00	26.9	210.00	0.00	0.00	31.9
209.67	0.00	0.00	37.0	209.33	0.00	0.00	42.0	209.00	0.00	0.00	47.1
208.00	0.00	0.00	48.2	207.00	0.00	0.00	48.6	206.00	0.00	0.00	49.1
205.00	0.00	0.00	49.5	204.00	0.00	0.00	49.9	203.00	0.00	0.00	50.4
202.00	0.00	0.00	50.8	201.00	0.00	0.00	51.3	200.00	0.00	0.00	51.7
199.00	0.00	0.00	52.1	198.00	0.00	0.00	52.6	197.00	0.00	0.00	53.0
196.00	0.00	0.00	53.5	195.00	0.00	0.00	53.9	194.00	0.00	0.00	54.4
193.00	0.00	0.00	54.9	192.00	0.00	0.00	55.4	191.00	0.00	0.00	55.9
190.00	0.00	0.00	56.4	189.00	0.00	0.00	57.1	188.53	0.00	0.00	60.0
188.65	0.00	0.00	64.6	188.76	0.00	0.00	69.1	188.88	0.00	0.00	73.7
189.00	0.00	0.00	78.3	190.00	0.00	0.00	79.8	191.00	0.00	0.00	80.8
192.00	0.00	0.00	81.5	193.00	0.00	0.00	82.0	194.00	0.00	0.00	82.5
195.00	0.00	0.00	82.9	196.00	0.00	0.00	83.4	197.00	0.00	0.00	83.8
198.00	0.00	0.00	84.3	199.00	0.00	0.00	84.7	200.00	0.00	0.00	85.2
201.00	0.00	0.00	85.6	202.00	0.00	0.00	86.0	203.00	0.00	0.00	86.5
204.00	0.00	0.00	86.9	205.00	0.00	0.00	87.4	206.00	0.00	0.00	88.0
207.00	0.00	0.00	88.7	208.00	0.00	0.00	89.4	209.00	0.00	0.00	90.6
209.20	0.00	0.00	96.1	209.40	0.00	0.00	101.5	209.60	0.00	0.00	107.0
209.80	0.00	0.00	112.4	210.00	0.00	0.00	117.8	210.25	0.00	0.00	122.5
210.50	0.00	0.00	127.1	210.75	0.00	0.00	131.7	211.00	0.00	0.00	136.3

212.00	0.00	0.00	141.4	212.50	0.00	0.00	146.4	213.00	0.00	0.00	151.3
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ID

36	SECTION	4140.00	TIME = 500.00 HRS	WS = 190.49	WIDTH =	41.8
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
215.00	0.00	0.00	0.0	214.00	0.00	0.00	2.4	213.00	0.00	0.00	4.3
212.00	0.00	0.00	6.2	211.00	0.00	0.00	9.1	210.67	0.00	0.00	13.4
210.33	0.00	0.00	17.7	210.00	0.00	0.00	22.1	209.00	0.00	0.00	25.8
208.00	0.00	0.00	27.9	207.00	0.00	0.00	29.3	206.00	0.00	0.00	30.6
205.00	0.00	0.00	31.9	204.00	0.00	0.00	33.1	203.00	0.00	0.00	34.3
202.00	0.00	0.00	35.6	201.00	0.00	0.00	36.9	200.00	0.00	0.00	38.4
199.00	0.00	0.00	40.0	198.00	0.00	0.00	41.8	197.00	0.00	0.00	43.7
196.00	0.00	0.00	45.9	195.00	0.00	0.00	48.2	194.00	0.00	0.00	50.3
193.00	0.00	0.00	52.2	192.00	0.00	0.00	53.9	191.00	0.00	0.00	55.5
190.00	0.00	0.00	57.2	189.00	0.00	0.00	59.0	188.00	0.00	0.00	61.2
187.00	0.00	0.00	65.0	186.99	0.00	0.00	69.0	186.97	0.00	0.00	73.0
186.96	0.00	0.00	77.1	186.98	0.00	0.00	82.9	187.00	0.00	0.00	88.8
188.00	0.00	0.00	93.2	189.00	0.00	0.00	95.4	190.00	0.00	0.00	97.3
191.00	0.00	0.00	99.1	192.00	0.00	0.00	100.7	193.00	0.00	0.00	102.5
194.00	0.00	0.00	104.4	195.00	0.00	0.00	106.3	196.00	0.00	0.00	108.3
197.00	0.00	0.00	110.1	198.00	0.00	0.00	111.7	199.00	0.00	0.00	113.4
200.00	0.00	0.00	115.1	201.00	0.00	0.00	116.6	202.00	0.00	0.00	117.9
203.00	0.00	0.00	119.3	204.00	0.00	0.00	120.8	205.00	0.00	0.00	122.3
206.00	0.00	0.00	123.9	207.00	0.00	0.00	125.8	208.00	0.00	0.00	128.6
209.00	0.00	0.00	133.4	209.33	0.00	0.00	138.1	209.67	0.00	0.00	142.9
210.00	0.00	0.00	147.6	211.00	0.00	0.00	151.6	212.00	0.00	0.00	155.3
212.11	0.00	0.00	159.7	212.23	0.00	0.00	164.2				

ID

35	SECTION	3990.00	TIME = 500.00 HRS	WS = 188.53	WIDTH =	31.5
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
214.00	0.00	0.00	0.0	213.00	0.00	0.00	3.2	212.00	0.00	0.00	5.7
211.00	0.00	0.00	8.4	210.00	0.00	0.00	11.4	209.00	0.00	0.00	15.7
208.67	0.00	0.00	20.7	208.33	0.00	0.00	25.8	208.00	0.00	0.00	30.8
207.00	0.00	0.00	34.6	206.00	0.00	0.00	36.9	205.00	0.00	0.00	38.4
204.00	0.00	0.00	39.8	203.00	0.00	0.00	41.0	202.00	0.00	0.00	42.2
201.00	0.00	0.00	43.4	200.00	0.00	0.00	44.7	199.00	0.00	0.00	46.0
198.00	0.00	0.00	47.8	197.00	0.00	0.00	49.6	196.00	0.00	0.00	51.7
195.00	0.00	0.00	53.5	194.00	0.00	0.00	55.2	193.00	0.00	0.00	56.8
192.00	0.00	0.00	58.4	191.00	0.00	0.00	60.2	190.00	0.00	0.00	62.2
189.00	0.00	0.00	64.3	188.00	0.00	0.00	67.2	187.00	0.00	0.00	70.9
186.65	0.00	0.00	76.1	186.30	0.00	0.00	81.2	186.53	0.00	0.00	85.5
186.77	0.00	0.00	89.7	187.00	0.00	0.00	93.9	188.00	0.00	0.00	96.2
189.00	0.00	0.00	98.1	190.00	0.00	0.00	99.7	191.00	0.00	0.00	101.2
192.00	0.00	0.00	102.7	193.00	0.00	0.00	104.4	194.00	0.00	0.00	106.1
195.00	0.00	0.00	107.6	196.00	0.00	0.00	109.2	197.00	0.00	0.00	110.7
198.00	0.00	0.00	112.3	199.00	0.00	0.00	114.1	200.00	0.00	0.00	116.2
201.00	0.00	0.00	118.7	202.00	0.00	0.00	121.5	203.00	0.00	0.00	123.6
204.00	0.00	0.00	125.5	205.00	0.00	0.00	127.5	206.00	0.00	0.00	129.5
207.00	0.00	0.00	132.4	207.50	0.00	0.00	136.5	208.00	0.00	0.00	140.5
208.50	0.00	0.00	145.9	209.00	0.00	0.00	151.3	210.00	0.00	0.00	154.5
211.00	0.00	0.00	157.5	212.00	0.00	0.00	162.0	212.15	0.00	0.00	165.2
212.30	0.00	0.00	168.3								

ID

34	SECTION	3837.00	TIME = 500.00 HRS	WS = 162.33	WIDTH =	51.3
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Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
216.00	0.00	0.00	0.0	215.00	0.00	0.00	2.1	214.00	0.00	0.00	3.5
213.00	0.00	0.00	4.9	212.00	0.00	0.00	6.2	211.00	0.00	0.00	7.6
210.00	0.00	0.00	8.9	209.00	0.00	0.00	10.3	208.00	0.00	0.00	11.6
207.00	0.00	0.00	12.9	206.00	0.00	0.00	14.2	205.00	0.00	0.00	15.5
204.00	0.00	0.00	16.8	203.00	0.00	0.00	18.0	202.00	0.00	0.00	19.2
201.00	0.00	0.00	20.4	199.54	0.00	-0.46	21.7	197.99	0.00	-1.01	23.0
196.35	0.00	-1.65	24.4	194.66	0.00	-2.34	25.8	192.82	0.00	-3.18	27.3
190.97	0.00	-4.03	28.9	189.08	0.00	-4.92	30.5	187.15	0.00	-5.85	32.1

185.09	0.00	-6.91	33.8	182.83	0.00	-8.17	35.7	180.33	0.00	-9.67	37.8
180.09	0.00	-8.91	38.0	179.64	0.00	-8.36	38.4	172.45	0.00	-14.55	44.6
171.13	0.00	-14.87	46.0	170.41	0.00	-14.59	46.7	162.65	0.00	-21.35	54.4
157.46	0.00	-26.14	61.2	157.46	0.00	-26.54	67.9	157.46	0.00	-27.04	77.6
157.46	0.00	-27.54	83.3	157.46	0.00	-28.54	83.5	157.46	0.00	-29.54	88.3
157.46	0.00	-30.54	90.6	157.46	0.00	-31.54	93.5	157.46	0.00	-32.54	96.7
157.46	0.00	-33.54	98.5	157.46	0.00	-34.54	99.7	157.45	0.00	-35.55	101.1
158.09	0.00	-35.91	101.9	158.29	0.00	-36.71	102.1	161.01	0.00	-34.99	104.8
165.49	0.00	-31.51	109.3	166.66	0.00	-31.34	110.5	166.93	0.00	-32.07	110.7
167.13	0.00	-32.87	110.9	167.33	0.00	-33.67	111.1	167.53	0.00	-34.47	111.3
167.73	0.00	-35.27	111.5	170.29	0.00	-33.71	113.9	172.25	0.00	-32.75	115.6
173.56	0.00	-32.44	116.7	173.81	0.00	-33.19	116.9	174.63	0.00	-33.37	117.6
180.53	0.00	-28.47	122.5	187.65	0.00	-21.85	128.5	194.78	0.00	-15.22	134.5
200.22	0.00	-10.28	139.0	205.65	0.00	-5.35	143.6	211.25	0.00	0.00	149.5
211.50	0.00	0.00	155.3	211.75	0.00	0.00	161.2	212.00	0.00	0.00	167.0

ID

33 SECTION 3681.00 TIME = 500.00 HRS WS = 162.28 WIDTH = 53.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
217.00	0.00	0.00	0.0	216.00	0.00	0.00	3.4	215.00	0.00	0.00	5.6
214.00	0.00	0.00	7.2	213.00	0.00	0.00	8.8	212.00	0.00	0.00	10.5
211.00	0.00	0.00	12.1	210.00	0.00	0.00	13.8	209.00	0.00	0.00	15.4
208.00	0.00	0.00	17.0	207.00	0.00	0.00	18.6	206.00	0.00	0.00	20.2
205.00	0.00	0.00	21.8	204.00	0.00	0.00	23.2	203.00	0.00	0.00	24.6
202.00	0.00	0.00	26.0	201.00	0.00	0.00	27.4	200.00	0.00	0.00	28.6
199.00	0.00	0.00	29.9	198.00	0.00	0.00	31.2	197.00	0.00	0.00	32.5
196.00	0.00	0.00	33.8	195.00	0.00	0.00	35.0	194.00	0.00	0.00	36.3
193.00	0.00	0.00	37.6	192.00	0.00	0.00	38.8	191.00	0.00	0.00	40.1
190.00	0.00	0.00	41.3	189.00	0.00	0.00	42.7	188.00	0.00	0.00	44.2
187.00	0.00	0.00	45.7	186.00	0.00	0.00	47.1	185.00	0.00	0.00	48.6
184.00	0.00	0.00	50.1	183.00	0.00	0.00	51.6	181.61	0.00	-0.39	53.4
157.69	0.00	-23.31	59.7	157.69	0.00	-23.16	60.0	157.69	0.00	-23.01	63.6
157.69	0.00	-23.16	69.2	157.69	0.00	-23.31	76.1	157.69	0.00	-24.31	81.6
157.69	0.00	-25.31	84.9	157.69	0.00	-26.31	85.3	157.69	0.00	-27.31	85.7
157.69	0.00	-28.31	86.0	157.69	0.00	-29.31	87.8	157.69	0.00	-30.31	90.7
157.69	0.00	-31.31	95.1	157.69	0.00	-32.31	96.4	157.69	0.00	-33.31	98.1
157.69	0.00	-34.31	98.3	157.69	0.00	-35.31	101.4	157.69	0.00	-36.31	101.6
157.69	0.00	-37.31	102.4	157.89	0.00	-38.11	108.7	160.18	0.00	-36.82	110.6
161.39	0.00	-36.61	111.6	163.89	0.00	-35.12	113.7	166.30	0.00	-33.70	115.7
167.05	0.00	-33.96	116.3	167.31	0.00	-34.69	116.5	168.15	0.00	-34.85	117.2
169.75	0.00	-34.25	118.6	171.49	0.00	-33.51	120.0	173.40	0.00	-32.60	121.6
175.58	0.00	-31.42	123.4	178.30	0.00	-29.70	125.7	182.77	0.00	-26.23	129.5
189.73	0.00	-19.47	135.3	196.69	0.00	-12.71	141.2	203.65	0.00	-5.95	147.0
209.80	0.00	0.00	152.9	210.00	0.00	0.00	158.7	210.25	0.00	0.00	164.4
210.50	0.00	0.00	170.1	210.75	0.00	0.00	175.8	211.00	0.00	0.00	181.4
211.09	0.00	0.00	187.4	211.18	0.00	0.00	193.4	211.27	0.00	0.00	199.4
211.36	0.00	0.00	205.4	211.45	0.00	0.00	211.3	211.55	0.00	0.00	217.3
211.64	0.00	0.00	223.3	211.73	0.00	0.00	229.3	211.82	0.00	0.00	235.3
211.91	0.00	0.00	241.2	212.00	0.00	0.00	247.2				

ID

32 SECTION 3589.00 TIME = 500.00 HRS WS = 162.24 WIDTH = 55.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
218.00	0.00	0.00	0.0	217.00	0.00	0.00	2.4	216.00	0.00	0.00	4.2
215.00	0.00	0.00	5.7	214.00	0.00	0.00	7.2	213.00	0.00	0.00	8.8
212.00	0.00	0.00	10.4	211.00	0.00	0.00	12.1	210.00	0.00	0.00	13.6
209.00	0.00	0.00	15.2	208.00	0.00	0.00	16.5	207.00	0.00	0.00	17.8
206.00	0.00	0.00	19.0	205.00	0.00	0.00	20.2	204.00	0.00	0.00	21.4
203.00	0.00	0.00	22.7	202.00	0.00	0.00	24.1	201.00	0.00	0.00	25.5
200.00	0.00	0.00	26.9	199.00	0.00	0.00	28.4	198.00	0.00	0.00	29.9
197.00	0.00	0.00	31.5	196.00	0.00	0.00	33.0	195.00	0.00	0.00	34.6
194.00	0.00	0.00	36.2	193.00	0.00	0.00	37.7	192.00	0.00	0.00	39.2
191.00	0.00	0.00	40.8	190.00	0.00	0.00	42.3	189.00	0.00	0.00	43.8
188.00	0.00	0.00	45.3	187.00	0.00	0.00	46.9	186.00	0.00	0.00	48.8
185.00	0.00	0.00	51.4	184.50	0.00	0.00	57.1	184.00	0.00	0.00	62.8
182.03	0.00	-1.47	68.5	175.23	0.00	-7.77	74.2	169.44	0.00	-12.56	79.1
165.44	0.00	-15.55	82.4	162.81	0.00	-17.19	84.6	157.89	0.00	-21.61	89.9

157.89	0.00	-21.11	93.1	157.89	0.00	-20.61	97.1	157.89	0.00	-20.11	101.9
157.89	0.00	-20.04	106.0	157.89	0.00	-19.98	110.1	157.89	0.00	-19.91	114.2
157.89	0.00	-19.95	119.4	157.89	0.00	-19.99	124.6	157.89	0.00	-20.03	129.8
157.89	0.00	-20.07	134.5	160.96	0.00	-17.05	139.3	167.30	0.00	-11.70	144.6
173.62	0.00	-6.38	149.9	176.75	0.00	-4.25	152.6	178.82	0.00	-3.18	154.3
180.95	0.00	-2.05	156.1	182.59	0.00	-1.41	157.4	184.13	0.00	-0.87	158.7
185.60	0.00	-0.40	160.0	187.01	0.00	0.01	161.1	188.27	0.00	0.27	162.2
189.25	0.00	0.25	163.0	190.20	0.00	0.20	163.8	191.09	0.00	0.09	164.5
191.84	0.00	-0.16	165.1	192.52	0.00	-0.48	165.7	193.17	0.00	-0.83	166.2
193.81	0.00	-1.19	166.7	194.46	0.00	-1.55	167.2	195.06	0.00	-1.94	167.7
195.64	0.00	-2.35	168.2	196.22	0.00	-2.78	168.6	196.77	0.00	-3.23	169.1
197.33	0.00	-3.67	169.6	197.90	0.00	-4.10	170.0	198.47	0.00	-4.53	170.5
199.10	0.00	-4.90	171.0	199.77	0.00	-5.23	171.5	200.52	0.00	-5.48	172.2
201.32	0.00	-5.68	172.8	202.17	0.00	-5.83	173.5	203.34	0.00	-5.66	174.5
205.18	0.00	-4.82	176.1	208.80	0.00	-2.20	179.1	211.09	0.00	0.00	184.8
211.18	0.00	0.00	190.5	211.27	0.00	0.00	196.2	211.36	0.00	0.00	201.9
211.45	0.00	0.00	207.6	211.55	0.00	0.00	213.3	211.64	0.00	0.00	219.0
211.73	0.00	0.00	224.7	211.82	0.00	0.00	230.4	211.91	0.00	0.00	236.1
212.00	0.00	0.00	241.8								

ID

31 SECTION 3502.00 TIME = 500.00 HRS WS = 162.20 WIDTH = 57.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
219.00	0.00	0.00	0.0	218.00	0.00	0.00	2.1	217.00	0.00	0.00	3.7
216.00	0.00	0.00	5.2	215.00	0.00	0.00	6.6	214.00	0.00	0.00	8.0
213.00	0.00	0.00	9.4	212.00	0.00	0.00	10.8	211.00	0.00	0.00	12.2
210.00	0.00	0.00	13.6	209.00	0.00	0.00	14.9	208.00	0.00	0.00	16.3
207.00	0.00	0.00	17.7	206.00	0.00	0.00	19.2	205.00	0.00	0.00	20.8
204.00	0.00	0.00	22.7	203.00	0.00	0.00	24.8	202.00	0.00	0.00	27.0
201.00	0.00	0.00	29.1	200.00	0.00	0.00	30.9	199.00	0.00	0.00	32.4
198.00	0.00	0.00	33.8	197.00	0.00	0.00	35.2	196.00	0.00	0.00	36.5
195.00	0.00	0.00	37.8	194.00	0.00	0.00	39.1	193.00	0.00	0.00	40.3
192.00	0.00	0.00	41.6	191.00	0.00	0.00	42.8	190.00	0.00	0.00	44.0
189.00	0.00	0.00	45.3	188.00	0.00	0.00	46.4	187.00	0.00	0.00	47.6
186.00	0.00	0.00	48.7	185.00	0.00	0.00	49.8	184.00	0.00	0.00	50.9
183.00	0.00	0.00	51.9	182.00	0.00	0.00	53.0	181.00	0.00	0.00	54.0
180.00	0.00	0.00	55.2	179.00	0.00	0.00	56.5	160.08	0.00	-17.91	58.3
158.12	0.00	-18.88	62.0	158.12	0.00	-18.88	65.2	158.12	0.00	-19.38	69.5
158.12	0.00	-19.88	73.8	158.12	0.00	-19.88	79.1	158.12	0.00	-19.88	84.4
158.12	0.00	-19.88	89.7	158.12	0.00	-19.53	93.8	158.12	0.00	-19.17	97.8
158.12	0.00	-19.53	106.4	160.76	0.00	-17.24	114.5	163.42	0.00	-15.58	116.7
163.98	0.00	-16.02	117.2	165.24	0.00	-15.76	118.2	167.70	0.00	-14.30	120.3
169.76	0.00	-13.24	122.0	171.57	0.00	-12.43	123.5	172.91	0.00	-12.09	124.6
174.22	0.00	-11.78	125.7	175.28	0.00	-11.72	126.6	176.13	0.00	-11.87	127.3
176.98	0.00	-12.02	128.0	177.82	0.00	-12.18	128.6	178.65	0.00	-12.35	129.3
179.36	0.00	-12.64	129.9	180.08	0.00	-12.92	130.5	180.78	0.00	-13.22	131.0
181.50	0.00	-13.50	131.6	182.20	0.00	-13.80	132.1	182.96	0.00	-14.04	132.8
183.73	0.00	-14.27	133.4	184.49	0.00	-14.51	134.0	185.26	0.00	-14.74	134.6
186.05	0.00	-14.95	135.3	186.94	0.00	-15.06	136.0	187.92	0.00	-15.08	136.8
188.92	0.00	-15.08	137.6	189.95	0.00	-15.05	138.5	191.23	0.00	-14.77	139.5
192.54	0.00	-14.46	140.6	194.03	0.00	-13.97	141.9	196.08	0.00	-12.92	143.6
200.00	0.00	-10.00	146.9	205.47	0.00	-4.98	151.5	210.90	0.00	0.00	156.1
210.92	0.00	0.00	160.9	210.94	0.00	0.00	165.7	210.96	0.00	0.00	170.5
210.98	0.00	0.00	175.4	211.00	0.00	0.00	180.2	211.10	0.00	0.00	185.4
211.19	0.00	0.00	190.5	211.29	0.00	0.00	195.7	211.39	0.00	0.00	200.9
211.48	0.00	0.00	206.1	211.58	0.00	0.00	211.3	211.50	0.00	0.00	216.5
211.41	0.00	0.00	221.7	211.33	0.00	0.00	227.0	211.25	0.00	0.00	232.2
211.17	0.00	0.00	237.4	211.08	0.00	0.00	242.7	211.00	0.00	0.00	247.9
210.98	0.00	0.00	251.7								

ID

30 SECTION 3392.00 TIME = 500.00 HRS WS = 162.13 WIDTH = 58.2

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	3.5	204.00	0.00	0.00	5.6
203.00	0.00	0.00	7.3	202.00	0.00	0.00	8.8	201.00	0.00	0.00	10.1
200.00	0.00	0.00	11.5	199.00	0.00	0.00	12.7	198.00	0.00	0.00	13.8
197.00	0.00	0.00	14.9	195.79	0.00	-0.21	16.0	194.59	0.00	-0.41	17.0

193.41	0.00	-0.59	18.0	192.27	0.00	-0.73	18.9	191.11	0.00	-0.89	19.9
189.98	0.00	-1.02	20.8	188.86	0.00	-1.14	21.8	187.73	0.00	-1.27	22.7
186.59	0.00	-1.41	23.7	185.46	0.00	-1.54	24.6	184.32	0.00	-1.68	25.6
183.14	0.00	-1.86	26.6	181.95	0.00	-2.05	27.6	180.60	0.00	-2.40	28.7
179.12	0.00	-2.88	30.0	177.06	0.00	-3.94	31.7	176.11	0.00	-3.89	32.5
175.82	0.00	-3.18	32.7	174.04	0.00	-3.96	34.4	170.13	0.00	-6.87	38.3
163.63	0.00	-12.37	44.8	162.06	0.00	-13.84	46.4	158.51	0.00	-17.29	50.0
158.47	0.00	-17.43	53.4	158.47	0.00	-17.53	55.9	158.47	0.00	-18.03	62.2
158.47	0.00	-18.53	70.5	158.47	0.00	-18.86	76.2	158.47	0.00	-19.20	80.2
158.47	0.00	-19.53	83.3	158.47	0.00	-19.63	88.0	158.47	0.00	-19.73	91.7
158.47	0.00	-19.53	94.5	158.47	0.00	-19.53	99.9	159.53	0.00	-18.47	102.4
161.96	0.00	-17.04	104.4	163.24	0.00	-16.76	105.4	164.18	0.00	-16.82	106.2
165.03	0.00	-16.97	106.9	165.79	0.00	-17.21	107.5	166.42	0.00	-17.58	107.9
167.01	0.00	-17.99	108.4	167.60	0.00	-18.40	108.8	168.17	0.00	-18.83	109.2
168.72	0.00	-19.28	109.6	169.27	0.00	-19.73	110.0	169.78	0.00	-20.22	110.3
170.31	0.00	-20.69	110.7	170.83	0.00	-21.17	111.1	171.35	0.00	-21.65	111.4
171.88	0.00	-22.12	111.8	172.41	0.00	-22.59	112.1	172.95	0.00	-23.05	112.5
173.51	0.00	-23.49	112.9	174.08	0.00	-23.92	113.3	174.66	0.00	-24.34	113.7
175.25	0.00	-24.75	114.1	175.87	0.00	-25.13	114.6	176.55	0.00	-25.44	115.1
177.34	0.00	-25.66	115.7	178.19	0.00	-25.80	116.4	179.14	0.00	-25.86	117.2
180.43	0.00	-25.57	118.2	181.94	0.00	-25.06	119.5	183.88	0.00	-24.12	121.1
186.57	0.00	-22.43	123.3	190.15	0.00	-19.85	126.3	196.50	0.00	-13.70	131.7
202.85	0.00	-7.55	137.0	209.20	0.00	-1.40	142.3	210.80	0.00	0.00	147.7
211.00	0.00	0.00	153.0	211.09	0.00	0.00	158.8	211.18	0.00	0.00	164.7
211.27	0.00	0.00	170.6	211.18	0.00	0.00	175.2	211.09	0.00	0.00	179.9
211.00	0.00	0.00	184.6	210.97	0.00	0.00	190.4	210.94	0.00	0.00	196.2
210.90	0.00	0.00	202.0	210.87	0.00	0.00	207.9	210.84	0.00	0.00	213.7
210.81	0.00	0.00	219.5	210.78	0.00	0.00	225.3	210.75	0.00	0.00	231.1
210.71	0.00	0.00	236.9	210.68	0.00	0.00	242.7	210.65	0.00	0.00	248.6

ID

29 SECTION 3331.00 TIME = 500.00 HRS WS = 162.09 WIDTH = 61.2

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	2.8	203.00	0.00	0.00	4.8
202.00	0.00	0.00	6.6	201.00	0.00	0.00	8.2	200.00	0.00	0.00	9.6
199.00	0.00	0.00	11.0	198.00	0.00	0.00	12.4	197.00	0.00	0.00	13.9
196.00	0.00	0.00	15.3	195.00	0.00	0.00	16.6	194.00	0.00	0.00	17.9
193.00	0.00	0.00	19.2	192.00	0.00	0.00	20.4	191.00	0.00	0.00	21.6
190.00	0.00	0.00	22.8	189.00	0.00	0.00	24.0	188.00	0.00	0.00	25.2
187.00	0.00	0.00	26.5	186.00	0.00	0.00	27.8	185.00	0.00	0.00	29.1
184.00	0.00	0.00	30.4	183.00	0.00	0.00	31.8	182.00	0.00	0.00	33.6
181.00	0.00	0.00	36.1	178.87	0.00	-1.13	41.4	174.40	0.00	-5.10	45.2
169.92	0.00	-9.08	48.9	164.04	0.00	-14.46	53.9	162.12	0.00	-15.89	55.5
160.52	0.00	-16.48	56.8	158.63	0.00	-17.38	62.5	158.63	0.00	-16.37	66.1
158.63	0.00	-15.38	69.5	158.63	0.00	-14.37	73.0	158.63	0.00	-14.34	78.0
158.63	0.00	-14.31	83.0	158.63	0.00	-14.27	88.0	158.63	0.00	-14.30	93.3
158.63	0.00	-14.33	98.6	158.63	0.00	-14.35	104.0	158.63	0.00	-14.37	109.3
161.12	0.00	-12.88	115.9	162.93	0.00	-12.07	117.4	163.91	0.00	-12.09	118.3
165.12	0.00	-11.88	119.3	165.69	0.00	-12.31	119.7	166.10	0.00	-12.90	120.1
168.10	0.00	-11.91	121.7	170.41	0.00	-10.59	123.7	173.33	0.00	-8.67	126.1
176.84	0.00	-6.16	129.1	180.64	0.00	-3.36	132.3	184.44	0.00	-0.56	135.5
186.00	0.00	0.00	138.1	187.00	0.00	0.00	140.5	188.00	0.00	0.00	143.2
189.00	0.00	0.00	147.4	189.50	0.00	0.00	151.3	190.00	0.00	0.00	155.2
191.00	0.00	0.00	158.5	192.00	0.00	0.00	160.1	193.00	0.00	0.00	161.8
194.00	0.00	0.00	163.1	195.18	0.00	0.18	164.2	196.39	0.00	0.39	165.2
197.45	0.00	0.45	166.1	198.44	0.00	0.44	166.9	199.38	0.00	0.38	167.7
200.27	0.00	0.27	168.5	201.14	0.00	0.14	169.2	202.00	0.00	0.00	169.9
202.85	0.00	-0.15	170.6	203.74	0.00	-0.26	171.4	204.63	0.00	-0.37	172.1
205.55	0.00	-0.45	172.9	206.50	0.00	-0.50	173.7	207.67	0.00	-0.33	174.7
209.00	0.00	0.00	176.0	210.00	0.00	0.00	177.6	210.23	0.00	0.00	183.5
210.46	0.00	0.00	189.4	210.39	0.00	0.00	194.8	210.33	0.00	0.00	200.2
210.26	0.00	0.00	205.5	210.20	0.00	0.00	210.9	210.13	0.00	0.00	216.3
210.07	0.00	0.00	221.7	210.00	0.00	0.00	227.1	209.97	0.00	0.00	231.9
209.93	0.00	0.00	236.7	209.90	0.00	0.00	241.6	209.95	0.00	0.00	245.6
210.00	0.00	0.00	249.7	210.10	0.00	0.00	255.3	210.05	0.00	0.00	259.8
210.00	0.00	0.00	264.3								

ID

28 SECTION 3236.00 TIME = 500.00 HRS WS = 162.01 WIDTH = 66.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	6.0	199.00	0.00	0.00	8.6
198.00	0.00	0.00	10.5	197.00	0.00	0.00	12.3	196.00	0.00	0.00	13.9
195.00	0.00	0.00	15.3	194.00	0.00	0.00	16.6	193.00	0.00	0.00	17.9
192.00	0.00	0.00	19.1	191.00	0.00	0.00	20.3	190.00	0.00	0.00	21.5
189.00	0.00	0.00	22.7	188.00	0.00	0.00	23.9	187.00	0.00	0.00	25.0
186.00	0.00	0.00	26.2	185.00	0.00	0.00	27.4	184.00	0.00	0.00	28.6
183.00	0.00	0.00	29.8	182.00	0.00	0.00	31.2	181.00	0.00	0.00	32.7
180.00	0.00	0.00	34.7	179.00	0.00	0.00	38.8	178.57	0.00	-0.33	41.1
176.72	0.00	-2.28	42.7	171.47	0.00	-7.63	47.1	160.48	0.00	-18.53	56.3
160.36	0.00	-18.15	56.5	159.84	0.00	-18.17	58.3	159.81	0.00	-17.70	58.5
159.68	0.00	-17.33	60.6	159.38	0.00	-17.13	70.5	159.31	0.00	-16.69	74.2
159.26	0.00	-15.75	77.8	159.13	0.00	-15.60	84.9	159.06	0.00	-15.41	88.5
159.00	0.00	-15.54	91.8	158.94	0.00	-15.67	95.0	158.90	0.00	-15.11	98.0
158.86	0.00	-14.15	101.9	158.83	0.00	-13.68	107.0	158.82	0.00	-14.19	110.6
158.82	0.00	-15.19	112.8	158.84	0.00	-16.17	115.6	159.54	0.00	-16.47	119.5
164.70	0.00	-12.30	123.8	165.05	0.00	-12.95	124.1	165.32	0.00	-13.68	124.3
165.61	0.00	-13.89	124.6	170.12	0.00	-9.88	128.4	175.59	0.00	-5.41	133.4
179.36	0.00	-2.64	136.6	183.00	0.00	0.00	140.6	183.18	0.00	0.00	145.3
183.37	0.00	0.00	150.0	183.55	0.00	0.00	154.7	183.37	0.00	0.00	160.4
183.18	0.00	0.00	166.1	183.00	0.00	0.00	171.8	182.95	0.00	0.00	175.5
182.90	0.00	0.00	179.2	183.00	0.00	0.00	184.9	184.00	0.00	0.00	187.7
185.00	0.00	0.00	189.6	186.00	0.00	0.00	191.6	187.00	0.00	0.00	193.9
188.00	0.00	0.00	196.4	189.82	0.00	0.82	198.5	191.88	0.00	1.88	200.2
193.33	0.00	2.33	201.4	194.53	0.00	2.53	202.4	195.51	0.00	2.51	203.3
196.27	0.00	2.27	203.9	196.95	0.00	1.95	204.5	197.62	0.00	1.62	205.0
198.25	0.00	1.25	205.5	198.88	0.00	0.88	206.1	199.47	0.00	0.47	206.6
200.07	0.00	0.07	207.0	200.67	0.00	-0.33	207.5	201.25	0.00	-0.75	208.0
201.86	0.00	-1.14	208.5	202.46	0.00	-1.54	209.0	203.13	0.00	-1.87	209.6
203.85	0.00	-2.15	210.2	204.68	0.00	-2.32	210.9	205.61	0.00	-2.39	211.6
206.86	0.00	-2.14	212.7	209.00	0.00	0.00	218.5	209.00	0.00	0.00	224.4
209.00	0.00	0.00	230.2	209.00	0.00	0.00	236.1	209.00	0.00	0.00	242.0
209.00	0.00	0.00	247.8	209.00	0.00	0.00	253.7	209.00	0.00	0.00	259.5
209.00	0.00	0.00	265.4	209.00	0.00	0.00	271.2	209.00	0.00	0.00	277.1
209.00	0.00	0.00	283.0	209.00	0.00	0.00	288.8	209.00	0.00	0.00	294.7
209.00	0.00	0.00	300.5	209.00	0.00	0.00	306.4	209.00	0.00	0.00	312.2

ID

27 SECTION 3143.00 TIME = 500.00 HRS WS = 161.92 WIDTH = 65.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
198.00	0.00	0.00	0.0	197.00	0.00	0.00	2.2	196.00	0.00	0.00	4.0
195.00	0.00	0.00	5.4	194.00	0.00	0.00	6.7	193.00	0.00	0.00	7.9
192.00	0.00	0.00	9.0	191.00	0.00	0.00	10.2	190.00	0.00	0.00	11.3
189.00	0.00	0.00	12.4	188.00	0.00	0.00	13.5	187.00	0.00	0.00	14.7
186.00	0.00	0.00	16.0	185.00	0.00	0.00	17.3	184.00	0.00	0.00	18.6
183.00	0.00	0.00	19.9	182.00	0.00	0.00	21.2	181.00	0.00	0.00	22.6
180.00	0.00	0.00	24.0	179.00	0.00	0.00	25.3	178.00	0.00	0.00	26.8
177.00	0.00	0.00	28.2	175.99	0.00	-0.01	29.9	172.06	0.00	-2.94	31.7
158.96	0.00	-15.07	31.9	158.96	0.00	-14.37	39.2	158.96	0.00	-14.71	43.2
158.96	0.00	-15.06	48.4	158.96	0.00	-15.51	53.1	158.96	0.00	-15.97	56.1
158.96	0.00	-15.52	60.4	158.96	0.00	-15.07	66.3	158.96	0.00	-14.73	72.2
158.96	0.00	-14.41	77.0	158.97	0.00	-14.07	81.9	158.98	0.00	-13.06	87.7
159.65	0.00	-12.28	92.5	163.75	0.00	-8.29	101.3	165.35	0.00	-7.68	102.6
165.70	0.00	-8.32	102.9	166.03	0.00	-8.98	103.1	166.45	0.00	-9.56	103.5
166.80	0.00	-10.21	103.8	169.55	0.00	-8.45	106.1	173.27	0.00	-5.73	109.2
176.90	0.00	-3.10	112.2	180.45	0.00	-0.55	115.2	182.00	0.00	0.00	118.8
182.20	0.00	0.00	124.8	182.40	0.00	0.00	130.8	182.60	0.00	0.00	136.8
182.80	0.00	0.00	142.8	183.00	0.00	0.00	148.8	184.00	0.00	0.00	153.6
185.00	0.00	0.00	158.1	186.00	0.00	0.00	161.4	187.00	0.00	0.00	164.1
188.00	0.00	0.00	166.9	189.00	0.00	0.00	169.6	190.00	0.00	0.00	172.2
191.00	0.00	0.00	174.5	192.00	0.00	0.00	176.7	193.00	0.00	0.00	179.2
194.00	0.00	0.00	183.4	195.00	0.00	0.00	187.8	196.10	0.00	0.10	189.4
197.49	0.00	0.49	190.5	198.55	0.00	0.55	191.4	199.48	0.00	0.48	192.2
200.34	0.00	0.34	192.9	201.16	0.00	0.16	193.6	201.97	0.00	-0.03	194.3
202.76	0.00	-0.24	194.9	203.62	0.00	-0.38	195.6	204.51	0.00	-0.49	196.4
205.43	0.00	-0.57	197.2	206.60	0.00	-0.40	198.1	208.00	0.00	0.00	199.3
209.00	0.00	0.00	201.1	209.00	0.00	0.00	206.3	209.00	0.00	0.00	211.5

209.00	0.00	0.00	216.7	209.00	0.00	0.00	221.9	209.00	0.00	0.00	227.2
209.00	0.00	0.00	232.4	209.00	0.00	0.00	237.6	208.95	0.00	0.00	243.4
208.89	0.00	0.00	249.1	208.84	0.00	0.00	254.9	208.78	0.00	0.00	260.6
208.73	0.00	0.00	266.4	208.68	0.00	0.00	272.2	208.62	0.00	0.00	277.9
208.57	0.00	0.00	283.7	208.51	0.00	0.00	289.5	208.46	0.00	0.00	295.2

ID

26 SECTION 3053.00 TIME = 500.00 HRS WS = 161.81 WIDTH = 74.2

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
197.00	0.00	0.00	0.0	196.00	0.00	0.00	2.1	195.00	0.00	0.00	3.6
194.00	0.00	0.00	4.9	193.00	0.00	0.00	6.1	192.00	0.00	0.00	7.3
191.00	0.00	0.00	8.5	190.00	0.00	0.00	9.7	189.00	0.00	0.00	10.9
188.00	0.00	0.00	12.1	187.00	0.00	0.00	13.3	186.00	0.00	0.00	14.4
185.00	0.00	0.00	15.6	184.00	0.00	0.00	16.8	183.00	0.00	0.00	18.0
182.00	0.00	0.00	19.2	181.00	0.00	0.00	20.5	180.00	0.00	0.00	21.9
179.00	0.00	0.00	23.4	178.00	0.00	0.00	25.1	177.00	0.00	0.00	26.7
176.00	0.00	0.00	28.3	175.00	0.00	0.00	29.7	173.99	0.00	-0.01	31.1
173.00	0.00	0.00	33.5	165.38	0.00	-6.63	34.0	158.51	0.00	-12.49	34.2
158.97	0.00	-11.83	41.3	159.05	0.00	-11.84	44.5	159.09	0.00	-11.91	47.6
159.21	0.00	-12.79	53.6	159.30	0.00	-13.20	58.0	159.37	0.00	-13.62	61.9
159.45	0.00	-13.55	66.7	159.51	0.00	-12.99	71.0	159.57	0.00	-12.43	75.8
159.61	0.00	-11.98	79.5	159.65	0.00	-11.54	82.9	159.71	0.00	-11.89	86.6
159.76	0.00	-12.24	90.4	159.83	0.00	-12.50	94.9	160.16	0.00	-12.51	107.0
163.82	0.00	-9.18	110.0	164.17	0.00	-9.83	110.3	164.83	0.00	-10.17	110.8
165.09	0.00	-10.91	111.0	165.91	0.00	-11.09	111.7	170.72	0.00	-6.53	115.8
176.18	0.00	-1.32	120.3	177.75	0.00	0.00	124.9	178.00	0.00	0.00	129.5
179.00	0.00	0.00	135.1	180.00	0.00	0.00	138.6	181.00	0.00	0.00	142.0
182.00	0.00	0.00	145.4	183.00	0.00	0.00	148.8	184.00	0.00	0.00	152.3
185.00	0.00	0.00	155.2	186.00	0.00	0.00	157.9	187.00	0.00	0.00	160.3
188.00	0.00	0.00	162.7	189.00	0.00	0.00	165.0	190.00	0.00	0.00	167.4
191.00	0.00	0.00	170.3	192.92	0.00	0.92	173.0	194.66	0.00	1.66	174.4
195.73	0.00	1.73	175.3	196.69	0.00	1.69	176.1	197.53	0.00	1.53	176.8
198.26	0.00	1.26	177.4	198.93	0.00	0.93	178.0	199.56	0.00	0.56	178.5
200.19	0.00	0.19	179.0	200.80	0.00	-0.20	179.5	201.41	0.00	-0.59	180.0
202.06	0.00	-0.94	180.6	202.74	0.00	-1.26	181.1	203.49	0.00	-1.51	181.8
204.28	0.00	-1.72	182.4	205.19	0.00	-1.81	183.2	206.42	0.00	-1.58	184.2
208.67	0.00	-0.33	186.1	209.00	0.00	0.00	191.9	209.00	0.00	0.00	197.7
209.00	0.00	0.00	203.5	209.00	0.00	0.00	209.3	209.00	0.00	0.00	215.1
209.00	0.00	0.00	220.9	209.00	0.00	0.00	226.7	209.00	0.00	0.00	232.5
208.89	0.00	0.00	238.2	208.78	0.00	0.00	243.9	208.67	0.00	0.00	249.5
208.56	0.00	0.00	255.2	208.44	0.00	0.00	260.9	208.33	0.00	0.00	266.5
208.22	0.00	0.00	272.2	208.11	0.00	0.00	277.9	208.00	0.00	0.00	283.5

ID

25 SECTION 2953.00 TIME = 500.00 HRS WS = 161.60 WIDTH = 78.2

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	2.0	194.00	0.00	0.00	3.7
193.00	0.00	0.00	4.9	192.00	0.00	0.00	6.1	191.00	0.00	0.00	7.4
190.00	0.00	0.00	8.6	189.00	0.00	0.00	9.8	188.00	0.00	0.00	11.1
187.00	0.00	0.00	12.5	186.00	0.00	0.00	13.9	185.00	0.00	0.00	15.4
184.00	0.00	0.00	16.9	183.00	0.00	0.00	18.4	182.00	0.00	0.00	20.0
181.00	0.00	0.00	21.6	180.00	0.00	0.00	23.1	179.00	0.00	0.00	24.7
178.00	0.00	0.00	26.2	177.00	0.00	0.00	27.8	176.00	0.00	0.00	29.5
164.37	0.00	-10.64	33.6	162.84	0.00	-11.18	34.9	162.33	0.00	-10.69	35.7
160.77	0.00	-11.26	40.6	160.10	0.00	-11.43	46.0	159.80	0.00	-11.23	50.7
159.66	0.00	-10.86	54.8	159.61	0.00	-10.41	58.2	159.58	0.00	-10.39	62.2
159.56	0.00	-10.36	66.2	159.54	0.00	-10.44	70.5	159.50	0.00	-10.53	74.9
159.47	0.00	-10.86	79.8	159.44	0.00	-11.20	84.7	159.42	0.00	-10.92	89.2
159.40	0.00	-10.64	93.7	159.40	0.00	-10.14	97.6	159.40	0.00	-9.64	101.6
159.41	0.00	-9.53	104.7	159.44	0.00	-9.60	107.8	160.50	0.00	-9.53	115.2
164.32	0.00	-6.70	118.4	165.39	0.00	-6.63	119.3	168.54	0.00	-4.47	122.0
168.84	0.00	-5.16	122.2	171.08	0.00	-3.92	124.1	174.80	0.00	-1.20	127.2
177.00	0.00	0.00	129.6	178.00	0.00	0.00	132.1	180.48	0.00	1.48	134.3
182.46	0.00	2.46	136.0	184.07	0.00	3.07	137.3	185.41	0.00	3.41	138.5
186.65	0.00	3.65	139.5	187.75	0.00	3.75	140.4	188.70	0.00	3.70	141.2
189.57	0.00	3.57	141.9	190.36	0.00	3.36	142.6	191.05	0.00	3.05	143.1
191.69	0.00	2.69	143.7	192.29	0.00	2.29	144.2	192.89	0.00	1.89	144.6

193.46	0.00	1.46	145.1	194.01	0.00	1.01	145.6	194.54	0.00	0.54	146.0
195.07	0.00	0.07	146.4	195.58	0.00	-0.42	146.8	196.10	0.00	-0.90	147.2
196.61	0.00	-1.39	147.6	197.12	0.00	-1.88	148.1	197.65	0.00	-2.35	148.5
198.19	0.00	-2.81	148.9	198.74	0.00	-3.26	149.4	199.34	0.00	-3.66	149.9
200.00	0.00	-4.00	150.4	200.68	0.00	-4.32	151.0	201.40	0.00	-4.60	151.6
202.14	0.00	-4.86	152.2	203.33	0.00	-4.67	153.2	205.14	0.00	-3.86	154.7
209.05	0.00	0.00	158.5	209.10	0.00	0.00	162.2	209.09	0.00	0.00	167.6
209.07	0.00	0.00	173.1	209.06	0.00	0.00	178.5	209.04	0.00	0.00	184.0
209.03	0.00	0.00	189.4	209.01	0.00	0.00	194.8	209.00	0.00	0.00	200.3
208.94	0.00	0.00	203.1	209.00	0.00	0.00	208.6	209.10	0.00	0.00	214.4
209.20	0.00	0.00	220.3	209.30	0.00	0.00	226.2	209.20	0.00	0.00	230.7
209.10	0.00	0.00	235.3	209.00	0.00	0.00	239.9	208.86	0.00	0.00	245.3
208.71	0.00	0.00	250.6	208.57	0.00	0.00	256.0	208.43	0.00	0.00	261.4
208.29	0.00	0.00	266.8	208.14	0.00	0.00	272.1	208.00	0.00	0.00	277.5

ID

24 SECTION 2879.00 TIME = 500.00 HRS WS = 161.38 WIDTH = 78.0

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	4.4	194.00	0.00	0.00	6.8
193.00	0.00	0.00	8.8	192.00	0.00	0.00	10.3	191.00	0.00	0.00	11.8
190.00	0.00	0.00	13.2	189.00	0.00	0.00	14.6	188.00	0.00	0.00	15.9
187.00	0.00	0.00	17.1	186.00	0.00	0.00	18.3	185.00	0.00	0.00	19.6
184.00	0.00	0.00	20.8	183.00	0.00	0.00	22.1	182.00	0.00	0.00	23.4
181.00	0.00	0.00	24.7	180.00	0.00	0.00	26.0	179.00	0.00	0.00	27.3
178.00	0.00	0.00	28.7	177.00	0.00	0.00	30.2	176.00	0.00	0.00	32.2
171.66	0.00	-3.34	35.1	164.35	0.00	-9.67	35.3	159.49	0.00	-13.56	45.2
159.49	0.00	-12.55	46.2	159.49	0.00	-12.06	53.4	159.49	0.00	-11.56	57.8
159.49	0.00	-10.55	62.6	159.49	0.00	-10.30	67.2	159.49	0.00	-10.05	71.0
159.49	0.00	-10.30	75.8	159.49	0.00	-10.55	80.6	159.49	0.00	-10.61	84.5
159.49	0.00	-10.55	88.8	159.49	0.00	-10.07	93.2	159.49	0.00	-9.56	97.6
159.50	0.00	-9.20	102.7	159.96	0.00	-8.39	107.8	159.96	0.00	-8.74	112.3
159.96	0.00	-9.09	117.2	162.48	0.00	-7.57	121.1	165.16	0.00	-5.87	123.3
167.40	0.00	-4.61	125.2	167.82	0.00	-5.18	125.5	170.13	0.00	-3.87	127.5
170.42	0.00	-4.58	127.7	171.74	0.00	-4.26	128.8	175.43	0.00	-1.57	131.9
178.00	0.00	0.00	136.1	179.00	0.00	0.00	139.4	180.00	0.00	0.00	142.0
181.00	0.00	0.00	144.3	182.00	0.00	0.00	146.7	183.00	0.00	0.00	149.1
184.00	0.00	0.00	151.2	185.93	0.00	0.93	152.8	187.73	0.00	1.73	154.3
189.50	0.00	2.50	155.8	191.28	0.00	3.28	157.3	192.35	0.00	3.35	158.2
193.03	0.00	3.03	158.8	193.68	0.00	2.68	159.3	194.35	0.00	2.35	159.9
195.00	0.00	2.00	160.4	195.62	0.00	1.62	160.9	196.16	0.00	1.16	161.4
196.70	0.00	0.70	161.8	197.25	0.00	0.25	162.2	197.80	0.00	-0.20	162.7
198.35	0.00	-0.65	163.1	198.90	0.00	-1.10	163.6	199.46	0.00	-1.54	164.1
200.04	0.00	-1.96	164.5	200.63	0.00	-2.37	165.0	201.22	0.00	-2.78	165.5
201.81	0.00	-3.19	166.0	202.43	0.00	-3.57	166.5	203.29	0.00	-3.71	167.2
205.03	0.00	-2.97	168.7	208.09	0.00	0.00	172.8	208.17	0.00	0.00	177.0
208.26	0.00	0.00	181.1	208.27	0.00	0.00	186.6	208.28	0.00	0.00	192.1
208.29	0.00	0.00	197.5	208.38	0.00	0.00	203.3	208.47	0.00	0.00	209.2
208.56	0.00	0.00	215.0	208.64	0.00	0.00	220.8	208.73	0.00	0.00	226.6
208.82	0.00	0.00	232.4	208.91	0.00	0.00	238.2	209.00	0.00	0.00	244.0
209.05	0.00	0.00	248.4	209.10	0.00	0.00	252.8	209.05	0.00	0.00	257.3
209.00	0.00	0.00	261.8	208.67	0.00	0.00	266.3	208.33	0.00	0.00	270.9
208.00	0.00	0.00	275.4								

ID

23 SECTION 2798.00 TIME = 500.00 HRS WS = 161.07 WIDTH = 80.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
197.00	0.00	0.00	0.0	196.50	0.00	0.00	4.8	196.00	0.00	0.00	9.6
195.50	0.00	0.00	14.6	195.00	0.00	0.00	19.6	194.00	0.00	0.00	23.5
193.00	0.00	0.00	25.7	192.00	0.00	0.00	27.4	191.00	0.00	0.00	29.0
190.00	0.00	0.00	30.4	189.00	0.00	0.00	31.7	188.00	0.00	0.00	33.2
187.00	0.00	0.00	34.6	186.00	0.00	0.00	36.0	185.00	0.00	0.00	37.5
184.00	0.00	0.00	38.9	183.00	0.00	0.00	40.4	182.00	0.00	0.00	41.8
181.00	0.00	0.00	43.3	180.00	0.00	0.00	44.7	179.00	0.00	0.00	46.2
178.00	0.00	0.00	47.6	177.00	0.00	0.00	49.1	176.00	0.00	0.00	50.9
167.87	0.00	-7.13	54.2	163.34	0.00	-11.17	58.0	161.99	0.00	-12.02	59.7
159.56	0.00	-14.13	67.8	159.56	0.00	-13.80	68.3	159.56	0.00	-13.47	72.2
159.56	0.00	-12.97	74.3	159.56	0.00	-12.47	79.4	159.56	0.00	-11.47	81.0

159.56	0.00	-10.47	86.8	159.56	0.00	-9.97	90.6	159.56	0.00	-9.47	96.3
159.56	0.00	-9.27	100.6	159.56	0.00	-9.07	103.7	159.56	0.00	-9.21	108.0
159.56	0.00	-9.34	108.9	159.53	0.00	-9.50	111.0	159.32	0.00	-9.86	120.0
159.21	0.00	-10.12	124.9	159.13	0.00	-10.04	129.1	159.06	0.00	-9.97	133.3
158.87	0.00	-9.86	138.1	162.17	0.00	-6.26	145.9	168.42	0.00	-0.28	151.1
169.98	0.00	0.98	152.5	170.27	0.00	0.27	152.7	170.71	0.00	-0.29	153.0
171.78	0.00	-0.22	153.9	174.11	0.00	1.11	155.9	176.01	0.00	2.01	157.5
177.41	0.00	2.41	158.6	178.63	0.00	2.63	159.7	179.64	0.00	2.64	160.5
180.35	0.00	2.35	161.1	180.92	0.00	1.92	161.6	181.46	0.00	1.46	162.0
182.02	0.00	1.02	162.5	182.56	0.00	0.56	162.9	183.08	0.00	0.08	163.3
183.57	0.00	-0.43	163.7	183.97	0.00	-1.03	164.0	184.36	0.00	-1.64	164.3
184.73	0.00	-2.27	164.6	185.12	0.00	-2.88	164.9	185.50	0.00	-3.50	165.2
185.89	0.00	-4.11	165.5	186.27	0.00	-4.73	165.8	186.66	0.00	-5.34	166.1
187.04	0.00	-5.96	166.4	187.44	0.00	-6.56	166.7	187.84	0.00	-7.16	167.0
188.27	0.00	-7.73	167.3	188.69	0.00	-8.31	167.6	189.11	0.00	-8.89	168.0
189.53	0.00	-9.47	168.3	189.97	0.00	-10.03	168.6	190.39	0.00	-10.61	169.0
190.85	0.00	-11.15	169.3	191.34	0.00	-11.66	169.7	191.95	0.00	-12.05	170.2
192.68	0.00	-12.32	170.8	193.43	0.00	-12.57	171.4	194.22	0.00	-12.79	172.1
195.28	0.00	-12.72	173.0	200.29	0.00	-7.78	177.2	205.30	0.00	-2.83	181.4
208.20	0.00	0.00	185.6	208.13	0.00	0.00	189.6	208.07	0.00	0.00	193.7
208.00	0.00	0.00	197.7	207.92	0.00	0.00	203.6	207.83	0.00	0.00	209.6
207.75	0.00	0.00	215.5	207.67	0.00	0.00	221.4	207.58	0.00	0.00	227.4
207.50	0.00	0.00	233.3	207.42	0.00	0.00	239.2	207.33	0.00	0.00	245.2
207.25	0.00	0.00	251.1	207.17	0.00	0.00	257.1	207.08	0.00	0.00	263.0
207.00	0.00	0.00	268.9	206.89	0.00	0.00	273.4	206.77	0.00	0.00	277.8
206.89	0.00	0.00	281.8	207.00	0.00	0.00	285.8	207.12	0.00	0.00	291.1
207.25	0.00	0.00	296.4	207.38	0.00	0.00	301.7	207.50	0.00	0.00	307.0
207.62	0.00	0.00	312.3	207.75	0.00	0.00	317.6				

ID

22 SECTION 2730.00 TIME = 500.00 HRS WS = 160.63 WIDTH = 82.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
196.00	0.00	0.00	0.0	195.00	0.00	0.00	4.7	194.50	0.00	0.00	8.1
194.00	0.00	0.00	11.5	193.50	0.00	0.00	17.1	193.00	0.00	0.00	22.6
192.50	0.00	0.00	27.0	192.00	0.00	0.00	31.4	191.00	0.00	0.00	35.2
190.00	0.00	0.00	37.6	189.00	0.00	0.00	39.5	188.00	0.00	0.00	41.4
187.00	0.00	0.00	43.4	186.00	0.00	0.00	45.4	185.00	0.00	0.00	47.3
184.00	0.00	0.00	49.1	183.00	0.00	0.00	50.8	182.00	0.00	0.00	52.3
181.00	0.00	0.00	53.8	180.00	0.00	0.00	55.1	179.00	0.00	0.00	56.5
178.00	0.00	0.00	57.9	177.00	0.00	0.00	59.5	176.00	0.00	0.00	61.1
166.15	0.00	-8.85	63.3	162.22	0.00	-11.78	64.2	160.05	0.00	-12.96	73.4
159.98	0.00	-12.04	74.1	159.72	0.00	-11.30	78.5	159.69	0.00	-10.34	81.3
159.72	0.00	-10.10	85.8	159.73	0.00	-10.29	89.8	159.74	0.00	-10.38	94.0
159.73	0.00	-10.49	97.7	159.72	0.00	-10.40	100.9	159.70	0.00	-10.32	104.1
159.66	0.00	-9.86	107.5	159.62	0.00	-9.40	110.5	159.59	0.00	-9.43	112.1
159.53	0.00	-9.49	114.5	159.42	0.00	-9.60	118.4	158.97	0.00	-10.04	130.3
158.63	0.00	-10.13	136.6	158.11	0.00	-10.41	149.6	166.61	0.00	-2.15	163.4
167.62	0.00	-1.38	164.3	167.92	0.00	-2.08	164.5	168.34	0.00	-2.66	164.8
168.59	0.00	-3.41	165.0	169.96	0.00	-3.04	166.2	171.24	0.00	-2.77	167.2
171.52	0.00	-3.48	167.4	171.79	0.00	-4.21	167.6	172.41	0.00	-4.59	168.1
173.65	0.00	-4.35	169.2	174.83	0.00	-4.17	170.1	176.04	0.00	-3.96	171.1
177.20	0.00	-3.80	172.1	178.26	0.00	-3.74	173.0	179.28	0.00	-3.72	173.8
180.13	0.00	-3.87	174.5	180.94	0.00	-4.06	175.2	181.68	0.00	-4.32	175.8
182.35	0.00	-4.65	176.3	182.95	0.00	-5.05	176.8	183.51	0.00	-5.49	177.2
184.06	0.00	-5.94	177.7	184.59	0.00	-6.41	178.1	185.10	0.00	-6.90	178.5
185.59	0.00	-7.41	178.9	186.09	0.00	-7.91	179.3	186.57	0.00	-8.43	179.7
187.04	0.00	-8.96	180.0	187.52	0.00	-9.48	180.4	188.00	0.00	-10.00	180.8
188.49	0.00	-10.51	181.2	188.99	0.00	-11.01	181.6	189.50	0.00	-11.50	182.0
190.05	0.00	-11.95	182.4	190.63	0.00	-12.37	182.9	191.25	0.00	-12.75	183.4
192.04	0.00	-12.96	184.1	192.99	0.00	-13.01	184.9	194.41	0.00	-12.59	186.1
200.99	0.00	-6.01	191.6	207.00	0.00	0.00	197.1	207.00	0.00	0.00	202.6
207.00	0.00	0.00	208.2	207.00	0.00	0.00	213.7	207.00	0.00	0.00	219.2
207.00	0.00	0.00	224.7	207.00	0.00	0.00	230.3	207.00	0.00	0.00	235.8
207.00	0.00	0.00	241.3	207.00	0.00	0.00	246.8	207.00	0.00	0.00	252.4
206.00	0.00	0.00	257.2	205.60	0.00	0.00	260.8	205.20	0.00	0.00	264.4
206.00	0.00	0.00	269.9	207.00	0.00	0.00	273.6	207.07	0.00	0.00	279.1
207.15	0.00	0.00	284.6	207.22	0.00	0.00	290.1	207.29	0.00	0.00	295.6
207.37	0.00	0.00	301.1	207.44	0.00	0.00	306.5	207.51	0.00	0.00	312.0
207.59	0.00	0.00	317.5	207.66	0.00	0.00	323.0				

ID												
21	SECTION	2633.00	TIME = 500.00 HRS			WS = 159.91		WIDTH =		45.9		
	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	4.5	204.00	0.00	0.00	0.00	7.8
203.00	0.00	0.00	10.5	202.00	0.00	0.00	12.9	201.00	0.00	0.00	0.00	15.3
200.00	0.00	0.00	17.5	199.00	0.00	0.00	19.6	198.00	0.00	0.00	0.00	21.6
197.00	0.00	0.00	23.4	196.00	0.00	0.00	25.0	195.00	0.00	0.00	0.00	26.7
194.00	0.00	0.00	28.5	193.00	0.00	0.00	31.0	192.00	0.00	0.00	0.00	36.6
191.00	0.00	0.00	41.6	190.00	0.00	0.00	45.0	189.00	0.00	0.00	0.00	47.4
188.00	0.00	0.00	49.0	187.00	0.00	0.00	50.4	186.00	0.00	0.00	0.00	51.7
185.00	0.00	0.00	53.0	184.00	0.00	0.00	54.2	183.00	0.00	0.00	0.00	55.4
182.00	0.00	0.00	56.5	181.00	0.00	0.00	57.8	180.00	0.00	0.00	0.00	59.3
179.00	0.00	0.00	60.8	178.00	0.00	0.00	62.4	177.00	0.00	0.00	0.00	63.9
176.00	0.00	0.00	65.4	175.00	0.00	0.00	66.9	174.02	0.00	0.02	0.02	68.2
173.00	0.00	0.00	70.4	172.00	0.00	0.00	72.6	157.50	0.00	-13.51		72.9
157.45	0.01	-13.06	79.2	157.50	0.00	-12.51	83.7	157.51	0.00	-11.50		88.6
157.51	0.00	-10.50	93.5	157.53	0.00	-9.98	102.2	159.32	0.00	-7.69		116.0
160.68	0.00	-6.23	119.1	159.79	-0.01	-7.21	120.2	160.72	0.00	-6.62		127.7
159.87	-0.01	-7.81	134.5	160.73	0.00	-7.27	137.1	160.72	0.00	-8.27		138.5
161.21	0.00	-8.79	151.3	167.05	0.00	-3.95	157.8	167.31	0.00	-4.69		158.0
167.57	0.00	-5.43	158.2	167.82	0.00	-6.18	158.4	168.08	0.00	-6.92		158.6
168.32	0.00	-7.68	158.8	169.66	0.00	-7.34	159.9	169.92	0.00	-8.08		160.1
170.18	0.00	-8.82	160.3	170.45	0.00	-9.55	160.5	170.71	0.00	-10.29		160.7
170.96	0.00	-11.04	160.9	172.57	0.00	-10.43	162.2	174.46	0.00	-9.54		163.8
176.30	0.00	-8.70	165.4	178.14	0.00	-7.86	166.9	180.08	0.00	-6.92		168.5
182.07	0.00	-5.93	170.2	183.95	0.00	-5.05	171.8	185.83	0.00	-4.17		173.4
187.82	0.00	-3.18	175.0	189.81	0.00	-2.19	176.7	191.64	0.00	-1.36		178.2
193.41	0.00	-0.59	179.7	195.00	0.00	0.00	181.2	196.00	0.00	0.00		182.7
197.00	0.00	0.00	184.1	198.00	0.00	0.00	185.4	199.00	0.00	0.00		186.6
200.00	0.00	0.00	187.7	201.00	0.00	0.00	188.9	202.00	0.00	0.00		190.2
203.00	0.00	0.00	191.5	204.00	0.00	0.00	193.0	205.00	0.00	0.00		194.7
206.00	0.00	0.00	197.1	206.12	0.00	0.00	203.1	206.24	0.00	0.00		209.0
206.36	0.00	0.00	215.0	206.48	0.00	0.00	221.0	206.60	0.00	0.00		226.9
206.30	0.00	0.00	230.7	206.00	0.00	0.00	234.4	205.59	0.00	0.00		238.7
206.00	0.00	0.00	241.5	207.00	0.00	0.00	245.6	207.01	0.00	0.00		251.2
207.02	0.00	0.00	256.9	207.03	0.00	0.00	262.6	207.03	0.00	0.00		268.3
207.04	0.00	0.00	274.0	207.05	0.00	0.00	279.7	207.06	0.00	0.00		285.4
207.07	0.00	0.00	291.1	207.08	0.00	0.00	296.8	207.09	0.00	0.00		302.5
207.10	0.00	0.00	308.2	207.10	0.00	0.00	313.8	207.11	0.00	0.00		319.5
207.12	0.00	0.00	325.2	207.13	0.00	0.00	330.9	207.14	0.00	0.00		336.6

ID												
20	SECTION	2586.00	TIME = 500.00 HRS			WS = 159.59		WIDTH =		59.8		
	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
208.00	0.00	0.00	0.0	207.50	0.00	0.00	4.2	207.00	0.00	0.00	8.3	
206.00	0.00	0.00	10.8	205.00	0.00	0.00	12.5	203.57	0.00	-0.43	13.8	
202.18	0.00	-0.82	15.0	200.84	0.00	-1.16	16.1	199.68	0.00	-1.32	17.1	
198.57	0.00	-1.43	18.0	197.47	0.00	-1.53	18.9	196.37	0.00	-1.63	19.9	
195.25	0.00	-1.75	20.8	194.14	0.00	-1.86	21.7	193.04	0.00	-1.96	22.6	
191.95	0.00	-2.05	23.5	190.85	0.00	-2.15	24.5	189.75	0.00	-2.25	25.4	
188.68	0.00	-2.32	26.3	187.60	0.00	-2.40	27.2	186.53	0.00	-2.47	28.0	
185.46	0.00	-2.54	28.9	184.40	0.00	-2.60	29.8	183.25	0.00	-2.75	30.8	
182.10	0.00	-2.90	31.7	180.93	0.00	-3.07	32.7	179.51	0.00	-3.49	33.9	
177.96	0.00	-4.04	35.2	176.27	0.00	-4.73	36.6	168.07	0.00	-11.93	43.8	
166.50	0.00	-12.50	45.2	165.05	0.00	-12.94	46.6	164.85	0.00	-12.14	46.8	
159.64	0.00	-16.35	52.1	159.39	-0.01	-15.61	52.3	159.18	0.00	-14.81	52.5	
159.08	0.00	-13.92	53.4	159.24	0.00	-12.76	54.8	159.65	0.00	-11.35	57.2	
162.37	0.00	-7.62	61.5	163.23	0.00	-5.77	63.8	164.57	0.00	-3.43	66.9	
165.32	0.00	-2.42	68.7	166.05	0.00	-1.44	70.4	168.50	0.00	0.75	75.3	
169.68	0.00	1.68	77.8	169.50	0.00	0.50	82.0	163.59	0.00	-5.61	86.9	
159.96	0.00	-9.18	91.6	158.90	0.00	-10.16	97.0	158.50	0.00	-10.50	101.8	
158.41	0.00	-10.34	105.3	158.34	0.00	-10.16	110.2	158.18	0.00	-10.07	114.6	
157.61	0.00	-10.39	120.4	156.57	0.00	-10.92	126.8	156.85	0.00	-10.15	133.9	
158.41	0.00	-8.19	144.2	159.43	0.00	-7.57	148.2	160.19	0.00	-7.31	149.9	
162.12	0.00	-5.88	151.6	165.80	0.00	-3.20	154.7	168.68	0.00	-1.32	157.3	
169.05	0.00	-1.95	157.6	172.29	0.00	0.29	161.0	172.52	0.00	-0.48	161.2	

172.76	0.00	-1.24	161.4	175.00	0.00	0.00	169.7	176.00	0.00	0.00	174.1
177.00	0.00	0.00	177.6	178.00	0.00	0.00	180.7	179.00	0.00	0.00	183.4
180.00	0.00	0.00	185.9	181.00	0.00	0.00	187.9	182.00	0.00	0.00	189.7
183.00	0.00	0.00	191.4	184.00	0.00	0.00	192.9	185.00	0.00	0.00	194.5
186.00	0.00	0.00	196.2	187.00	0.00	0.00	198.0	188.00	0.00	0.00	199.7
189.00	0.00	0.00	201.6	190.00	0.00	0.00	203.3	191.00	0.00	0.00	205.1
192.00	0.00	0.00	207.0	193.00	0.00	0.00	209.0	194.00	0.00	0.00	211.1
195.00	0.00	0.00	213.4	196.00	0.00	0.00	215.6	197.00	0.00	0.00	218.0
198.00	0.00	0.00	220.4	199.00	0.00	0.00	222.7	200.00	0.00	0.00	224.6
201.00	0.00	0.00	226.2	202.00	0.00	0.00	227.7	203.00	0.00	0.00	229.1
204.00	0.00	0.00	230.8	205.00	0.00	0.00	233.0	206.00	0.00	0.00	238.9
206.33	0.00	0.00	243.2	206.67	0.00	0.00	247.6	207.00	0.00	0.00	252.0
207.10	0.00	0.00	255.1	207.20	0.00	0.00	258.2	207.00	0.00	0.00	263.9
206.00	0.00	0.00	266.1	205.00	0.00	0.00	268.0	204.00	0.00	0.00	270.3
203.70	0.00	0.00	271.9	204.00	0.00	0.00	274.3	205.00	0.00	0.00	276.8
206.00	0.00	0.00	279.0	207.00	0.00	0.00	282.5	207.00	0.00	0.00	288.4
207.00	0.00	0.00	294.3	207.00	0.00	0.00	300.1	207.00	0.00	0.00	306.0
207.00	0.00	0.00	311.9	207.00	0.00	0.00	317.7	207.00	0.00	0.00	323.6
207.00	0.00	0.00	329.5	207.00	0.00	0.00	335.4	207.00	0.00	0.00	341.2
207.00	0.00	0.00	347.1	207.00	0.00	0.00	353.0	207.00	0.00	0.00	358.8
207.00	0.00	0.00	364.7	207.00	0.00	0.00	370.6				

ID

19 SECTION 2430.00 TIME = 500.00 HRS WS = 158.88 WIDTH = 33.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
207.00	0.00	0.00	0.0	206.00	0.00	0.00	2.2	205.00	0.00	0.00	3.8
204.00	0.00	0.00	5.2	203.00	0.00	0.00	6.3	202.00	0.00	0.00	7.6
201.00	0.00	0.00	8.8	200.00	0.00	0.00	10.1	199.00	0.00	0.00	11.5
198.00	0.00	0.00	12.8	197.00	0.00	0.00	14.2	196.00	0.00	0.00	15.7
194.92	0.00	-0.08	17.3	192.95	0.00	-1.05	18.9	190.91	0.00	-2.09	20.6
188.64	0.00	-3.36	22.5	186.25	0.00	-4.75	24.5	183.84	0.00	-6.16	26.6
181.44	0.00	-7.56	28.6	178.80	0.00	-9.20	30.8	176.36	0.00	-10.64	32.8
174.62	0.00	-11.38	34.3	173.17	0.00	-11.83	35.5	169.94	0.00	-14.06	38.4
169.58	0.00	-13.42	38.7	168.66	0.00	-13.34	39.6	168.47	0.00	-12.53	39.8
168.27	0.00	-11.73	40.0	168.06	0.00	-10.94	40.2	164.73	0.00	-13.27	43.5
164.53	0.00	-12.47	43.7	164.33	0.00	-11.67	43.9	162.77	0.00	-12.23	45.4
162.57	0.00	-11.43	45.6	160.45	0.00	-12.55	47.8	160.24	0.00	-11.76	48.0
159.91	0.00	-11.09	48.3	159.33	0.00	-10.66	48.9	155.95	0.00	-13.05	52.3
154.42	0.01	-13.58	56.1	154.42	0.01	-12.58	58.7	154.42	0.01	-11.58	60.7
154.42	0.01	-10.58	65.5	158.53	-0.01	-6.27	82.1	162.00	0.00	-2.60	87.2
162.35	0.00	-2.38	88.2	160.52	0.00	-4.34	89.7	161.75	0.00	-3.25	90.8
162.50	0.00	-3.50	91.4	162.73	0.00	-4.27	93.0	162.76	0.00	-5.24	95.8
161.89	0.00	-7.11	96.5	159.90	0.00	-9.60	98.7	160.90	0.00	-9.10	101.4
159.91	0.00	-10.20	102.7	159.90	0.00	-10.09	106.6	159.90	0.00	-9.90	107.3
159.91	0.00	-9.69	114.9	163.06	0.00	-6.34	126.5	163.06	0.00	-6.13	127.1
168.03	0.00	-0.97	134.7	169.40	0.00	0.50	139.7	169.85	0.00	0.85	143.9
171.43	0.00	1.93	147.0	171.73	0.00	1.73	150.0	173.09	0.00	2.09	153.8
173.72	0.00	1.72	157.0	173.71	0.00	0.71	159.0	174.00	0.00	0.00	161.4
175.00	0.00	0.00	163.8	176.00	0.00	0.00	166.8	177.00	0.00	0.00	171.9
177.33	0.00	0.00	176.0	177.67	0.00	0.00	180.1	178.00	0.00	0.00	184.1
178.50	0.00	0.00	187.8	179.00	0.00	0.00	191.5	180.00	0.00	0.00	196.3
181.00	0.00	0.00	199.9	182.00	0.00	0.00	203.8	183.00	0.00	0.00	207.8
184.00	0.00	0.00	210.9	185.00	0.00	0.00	213.3	186.00	0.00	0.00	215.4
187.00	0.00	0.00	217.8	188.00	0.00	0.00	221.2	188.41	0.00	0.00	224.6
188.00	0.00	0.00	229.0	187.00	0.00	0.00	232.2	186.00	0.00	0.00	234.7
185.00	0.00	0.00	237.8	184.73	0.00	0.00	241.2	185.00	0.00	0.00	243.7
186.00	0.00	0.00	247.6	187.00	0.00	0.00	250.3	188.00	0.00	0.00	252.6
189.00	0.00	0.00	254.9	190.00	0.00	0.00	257.1	191.00	0.00	0.00	259.4
192.00	0.00	0.00	261.6	193.00	0.00	0.00	263.8	194.00	0.00	0.00	266.0
195.00	0.00	0.00	268.1	196.00	0.00	0.00	269.9	197.00	0.00	0.00	271.4
198.00	0.00	0.00	272.7	199.00	0.00	0.00	273.8	200.00	0.00	0.00	275.0
201.00	0.00	0.00	276.0	202.00	0.00	0.00	277.1	203.00	0.00	0.00	278.3
204.00	0.00	0.00	279.6	205.00	0.00	0.00	281.3	206.00	0.00	0.00	283.5
206.16	0.00	0.00	288.6	206.31	0.00	0.00	293.8	206.47	0.00	0.00	299.0
206.63	0.00	0.00	304.1	206.78	0.00	0.00	309.3	206.94	0.00	0.00	314.4
206.96	0.00	0.00	319.7	206.98	0.00	0.00	325.0	207.00	0.00	0.00	330.4
207.10	0.00	0.00	335.7	207.00	0.00	0.00	341.2	206.96	0.00	0.00	346.1
206.93	0.00	0.00	351.0	206.89	0.00	0.00	356.0	206.91	0.00	0.00	361.7
206.93	0.00	0.00	367.4	206.96	0.00	0.00	373.1	206.98	0.00	0.00	378.9

207.00 0.00 0.00 384.6

ID

18 SECTION 2302.00 TIME = 500.00 HRS WS = 158.69 WIDTH = 37.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
207.00	0.00	0.00	0.0	206.00	0.00	0.00	2.2	205.00	0.00	0.00	3.6
204.00	0.00	0.00	4.7	202.96	0.00	-0.04	5.7	201.95	0.00	-0.05	6.5
200.97	0.00	-0.03	7.3	200.02	0.00	0.02	8.1	199.04	0.00	0.04	8.9
198.06	0.00	0.06	9.8	197.00	0.00	0.00	10.7	196.00	0.00	0.00	11.6
195.00	0.00	0.00	12.7	194.00	0.00	0.00	13.9	193.00	0.00	0.00	15.1
192.00	0.00	0.00	16.3	191.00	0.00	0.00	17.5	190.00	0.00	0.00	18.6
189.00	0.00	0.00	19.7	188.00	0.00	0.00	20.8	187.00	0.00	0.00	22.1
186.00	0.00	0.00	23.4	185.00	0.00	0.00	25.2	182.50	0.00	-1.50	27.5
179.93	0.00	-3.07	29.6	178.05	0.00	-3.95	31.2	176.60	0.00	-4.40	32.4
175.40	0.00	-4.60	33.4	174.33	0.00	-4.67	34.3	173.40	0.00	-4.60	35.1
172.73	0.00	-4.27	35.6	172.34	0.00	-3.66	36.0	171.89	0.00	-3.11	36.4
170.41	0.00	-3.59	38.0	169.87	0.00	-3.13	38.5	169.13	0.00	-2.87	39.1
166.56	0.00	-4.44	41.7	166.27	0.00	-3.73	42.0	165.43	0.00	-3.57	42.8
165.20	0.00	-2.80	43.0	165.00	0.00	-2.00	43.2	164.59	0.00	-1.40	43.7
159.42	0.00	-5.58	48.8	159.12	0.00	-4.88	49.1	155.01	0.00	-8.79	53.2
153.23	0.01	-10.77	58.0	153.23	0.01	-11.77	62.5	153.23	0.01	-12.27	65.6
153.43	0.00	-12.57	69.4	157.17	-0.01	-8.94	80.6	159.39	0.00	-6.84	87.3
158.74	0.00	-7.38	89.0	159.34	0.00	-6.67	90.0	159.38	0.00	-6.12	94.0
158.37	-0.01	-6.62	98.5	161.71	0.00	-2.29	105.3	161.71	0.00	-2.19	109.0
163.17	0.00	-0.63	115.0	163.09	0.00	-0.81	115.6	163.44	0.00	-0.56	123.7
163.49	0.00	-1.51	127.7	166.43	0.00	0.43	130.2	167.64	0.00	0.64	133.0
168.67	0.00	1.17	134.3	169.02	0.00	1.02	137.8	169.00	0.00	0.00	138.8
169.02	0.00	-0.98	140.2	169.02	0.00	-1.98	145.5	170.34	0.00	-1.66	148.9
172.44	0.00	0.11	150.9	172.82	0.00	0.15	155.8	173.00	0.00	0.00	160.8
173.50	0.00	0.00	164.1	174.00	0.00	0.00	167.4	175.00	0.00	0.00	171.3
176.00	0.00	0.00	175.3	177.00	0.00	0.00	179.9	178.00	0.00	0.00	184.9
178.38	0.00	0.00	188.1	178.76	0.00	0.00	191.3	178.69	0.00	0.00	196.1
178.63	0.00	0.00	200.8	178.56	0.00	0.00	205.6	179.00	0.00	0.00	210.3
180.00	0.00	0.00	213.8	181.00	0.00	0.00	215.9	182.00	0.00	0.00	218.2
183.00	0.00	0.00	220.9	184.00	0.00	0.00	224.5	185.00	0.00	0.00	228.9
186.00	0.00	0.00	232.8	187.00	0.00	0.00	235.9	188.00	0.00	0.00	238.9
189.00	0.00	0.00	242.2	190.00	0.00	0.00	246.0	191.00	0.00	0.00	249.0
192.00	0.00	0.00	251.6	193.00	0.00	0.00	254.6	193.50	0.00	0.00	260.4
194.00	0.00	0.00	266.2	195.00	0.00	0.00	270.0	196.00	0.00	0.00	272.7
197.00	0.00	0.00	274.8	198.00	0.00	0.00	276.6	199.00	0.00	0.00	278.1
200.00	0.00	0.00	279.5	201.00	0.00	0.00	280.9	202.00	0.00	0.00	282.1
203.00	0.00	0.00	283.4	204.00	0.00	0.00	285.0	205.00	0.00	0.00	286.8
206.00	0.00	0.00	289.9	206.10	0.00	0.00	294.5	206.20	0.00	0.00	299.0
206.13	0.00	0.00	303.4	206.07	0.00	0.00	307.8	206.00	0.00	0.00	312.2
205.90	0.00	0.00	317.9	205.80	0.00	0.00	323.7	205.70	0.00	0.00	329.4
205.60	0.00	0.00	335.1	205.50	0.00	0.00	340.9	205.40	0.00	0.00	346.6
205.30	0.00	0.00	352.3	205.48	0.00	0.00	357.6	205.65	0.00	0.00	362.9
205.83	0.00	0.00	368.2	206.00	0.00	0.00	373.5	206.25	0.00	0.00	378.5
206.50	0.00	0.00	383.6	206.75	0.00	0.00	388.6	207.00	0.00	0.00	393.6

ID

17 SECTION 2199.00 TIME = 500.00 HRS WS = 158.44 WIDTH = 42.6

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.67	0.00	0.00	4.3	204.67	0.00	-0.67	8.6
199.55	0.00	-5.45	12.9	196.87	0.00	-7.13	15.1	195.76	0.00	-7.24	16.0
194.87	0.00	-7.13	16.8	194.06	0.00	-6.94	17.5	193.26	0.00	-6.74	18.1
192.45	0.00	-6.55	18.8	191.81	0.00	-6.19	19.3	191.32	0.00	-5.68	19.7
190.81	0.00	-5.19	20.1	190.33	0.00	-4.67	20.5	189.86	0.00	-4.14	20.8
189.38	0.00	-3.62	21.2	188.90	0.00	-3.10	21.6	188.42	0.00	-2.58	22.0
187.93	0.00	-2.07	22.4	187.51	0.00	-1.49	22.7	187.10	0.00	-0.90	23.0
186.71	0.00	-0.29	23.3	186.32	0.00	0.32	23.6	185.93	0.00	0.94	23.9
185.53	0.00	1.53	24.2	185.15	0.00	2.15	24.5	184.76	0.00	2.76	24.8
184.37	0.00	3.37	25.1	183.99	0.00	3.99	25.4	183.60	0.00	4.60	25.7
183.16	0.00	5.16	26.0	182.72	0.00	5.72	26.4	182.27	0.00	6.27	26.8
181.84	0.00	6.84	27.1	181.38	0.00	7.38	27.5	180.93	0.00	7.93	27.8
180.46	0.00	8.46	28.2	179.99	0.00	8.99	28.6	179.48	0.00	9.48	29.0
178.86	0.00	9.86	29.5	178.14	0.00	10.14	30.1	177.32	0.00	10.32	30.8

176.40	0.00	10.40	31.6	175.25	0.00	10.25	32.5	172.69	0.00	8.69	34.7
169.49	0.00	5.99	37.7	168.89	0.00	5.89	40.8	166.54	0.00	3.64	43.4
161.38	0.00	-1.62	47.5	158.76	0.00	-4.74	51.2	155.89	0.00	-8.11	54.1
154.48	0.00	-9.83	59.9	154.49	0.00	-10.11	65.4	154.51	0.00	-9.89	71.6
154.53	0.00	-9.67	76.9	156.84	0.00	-7.16	83.0	157.63	0.00	-6.02	87.2
158.20	0.00	-5.10	91.8	158.43	0.00	-5.22	94.1	159.14	0.00	-4.86	102.8
159.45	0.00	-5.55	106.6	160.66	0.00	-5.34	109.9	160.66	0.00	-6.34	111.4
161.31	0.00	-6.69	114.4	161.32	0.00	-7.68	118.6	161.33	0.00	-8.67	124.3
161.36	0.00	-9.14	130.8	161.52	0.00	-9.48	136.1	163.58	0.00	-7.92	138.0
163.93	0.00	-8.07	140.1	163.93	0.00	-9.07	147.0	163.85	0.00	-10.15	147.5
165.52	0.00	-9.48	149.8	167.23	0.00	-8.77	151.2	168.62	0.00	-8.38	152.4
168.88	0.00	-9.12	152.6	169.13	0.00	-9.87	152.8	169.37	0.00	-10.63	153.0
170.71	0.00	-10.29	154.1	172.90	0.00	-9.10	156.0	175.56	0.00	-7.44	158.2
178.70	0.00	-5.30	160.8	181.93	0.00	-3.07	163.6	185.05	0.00	-0.95	166.2
187.00	0.00	0.00	169.0	188.00	0.00	0.00	172.0	189.00	0.00	0.00	175.2
190.00	0.00	0.00	178.2	191.00	0.00	0.00	181.2	192.00	0.00	0.00	184.1
193.00	0.00	0.00	187.8	193.50	0.00	0.00	193.3	194.00	0.00	0.00	198.8
195.00	0.00	0.00	202.9	196.00	0.00	0.00	205.8	197.00	0.00	0.00	208.7
198.00	0.00	0.00	211.8	199.00	0.00	0.00	215.7	199.22	0.00	0.00	219.6
199.00	0.00	0.00	224.1	198.77	0.00	0.00	228.1	199.00	0.00	0.00	231.1
200.00	0.00	0.00	233.3	201.00	0.00	0.00	234.8	202.00	0.00	0.00	236.1
203.00	0.00	0.00	237.3	204.00	0.00	0.00	238.7	205.00	0.00	0.00	240.4
206.00	0.00	0.00	243.1	206.11	0.00	0.00	248.8	206.22	0.00	0.00	254.5
206.33	0.00	0.00	260.2	206.44	0.00	0.00	265.8	206.56	0.00	0.00	271.5
206.67	0.00	0.00	277.2	206.78	0.00	0.00	282.9	206.89	0.00	0.00	288.5
207.00	0.00	0.00	294.2	207.14	0.00	0.00	299.6	207.29	0.00	0.00	304.9
207.43	0.00	0.00	310.3	207.57	0.00	0.00	315.7	207.71	0.00	0.00	321.0
207.86	0.00	0.00	326.4	208.00	0.00	0.00	331.8				

ID

16 SECTION 2120.00 TIME = 500.00 HRS WS = 158.18 WIDTH = 41.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	1.7	203.00	0.00	0.00	3.0
202.00	0.00	0.00	4.2	201.00	0.00	0.00	5.4	200.00	0.00	0.00	6.6
199.00	0.00	0.00	7.9	198.00	0.00	0.00	9.3	197.00	0.00	0.00	10.9
196.00	0.00	0.00	12.6	195.00	0.00	0.00	14.4	194.00	0.00	0.00	16.8
193.00	0.00	0.00	19.5	192.00	0.00	0.00	23.5	191.00	0.00	0.00	29.4
190.00	0.00	0.00	33.7	189.00	0.00	0.00	36.5	188.00	0.00	0.00	39.4
187.00	0.00	0.00	42.6	186.00	0.00	0.00	45.4	185.00	0.00	0.00	48.1
184.00	0.00	0.00	50.6	183.00	0.00	0.00	53.2	182.00	0.00	0.00	55.6
181.00	0.00	0.00	58.0	180.00	0.00	0.00	60.0	179.00	0.00	0.00	62.0
177.39	0.00	-0.61	63.9	175.44	0.00	-1.56	65.5	173.98	0.00	-2.02	66.8
172.67	0.00	-2.33	67.9	171.83	0.00	-2.17	69.4	171.81	0.00	-1.19	71.9
171.45	0.00	-0.55	72.2	171.26	0.00	0.26	72.4	171.08	0.00	1.08	72.7
170.72	0.00	1.72	73.1	169.45	0.00	1.45	74.7	165.51	0.00	-1.49	78.8
165.30	0.00	-0.70	79.0	165.16	0.00	0.16	79.2	162.66	0.00	-1.34	82.5
162.12	0.00	-1.58	83.0	159.76	0.00	-3.64	85.6	158.56	0.00	-5.14	95.7
156.35	0.00	-7.65	100.9	155.30	0.00	-9.70	104.5	154.87	0.00	-11.13	107.6
154.67	0.00	-11.48	111.0	154.71	0.00	-11.59	119.0	156.11	0.00	-10.04	132.2
160.13	0.00	-5.87	144.5	161.82	0.00	-3.18	147.6	162.80	0.00	-1.20	148.5
162.41	0.00	-1.09	148.9	162.33	0.00	-0.67	149.1	162.30	0.00	-0.20	149.3
162.51	0.00	0.51	149.5	162.22	0.00	0.29	150.3	162.92	0.00	1.06	154.4
164.72	0.00	2.92	158.6	167.57	0.00	5.67	161.4	169.29	0.00	7.29	166.8
168.87	0.00	5.87	170.5	168.25	0.00	4.25	175.9	167.63	0.00	2.63	180.4
167.37	0.00	1.37	182.8	166.57	0.00	-0.43	186.3	165.92	0.00	-2.08	189.8
165.58	0.00	-3.42	194.0	165.20	0.00	-4.80	198.5	164.66	0.00	-6.33	204.2
164.36	0.00	-7.64	207.0	164.18	0.00	-8.82	209.7	163.42	0.00	-10.58	218.1
162.80	0.00	-12.20	224.9	162.57	0.00	-13.44	228.1	162.33	0.00	-14.67	231.0
161.39	0.00	-16.61	240.7	161.17	0.00	-17.83	242.7	160.99	0.00	-19.01	244.5
160.25	0.00	-20.75	249.7	161.39	0.01	-20.61	252.1	163.33	0.01	-19.67	253.7
164.13	0.01	-19.87	254.3	164.64	0.01	-19.66	254.5	165.11	0.01	-19.04	254.7
165.59	0.01	-18.41	254.9	166.08	0.01	-17.71	255.1	166.58	0.01	-17.42	255.3
167.09	0.01	-17.91	255.5	167.60	0.01	-18.40	255.7	168.12	0.01	-18.88	255.9
168.65	0.01	-19.35	256.1	169.18	0.00	-19.82	256.3	169.71	0.00	-20.29	256.5
170.25	0.00	-20.75	256.7	170.79	0.00	-21.21	256.9	171.33	0.00	-21.67	257.1
171.88	0.00	-22.12	257.3	172.42	0.00	-22.58	257.5	172.96	0.00	-23.04	257.7
173.50	0.00	-23.50	257.9	173.77	0.00	-24.23	258.1	178.32	0.00	-20.68	262.0
182.32	0.00	-17.68	265.3	185.27	0.00	-15.73	267.8	187.81	0.00	-14.19	269.9
190.21	0.00	-12.79	271.9	192.72	0.00	-11.28	274.0	195.31	0.00	-9.69	276.1

198.19	0.00	-7.81	278.6	201.56	0.00	-5.44	281.4	207.25	0.00	0.00	287.2
207.50	0.00	0.00	293.0	207.75	0.00	0.00	298.7	208.00	0.00	0.00	304.5
208.20	0.00	0.00	310.3	208.40	0.00	0.00	316.1	208.60	0.00	0.00	321.9
208.80	0.00	0.00	327.7	209.00	0.00	0.00	333.5				

ID

15 SECTION 2047.00 TIME = 500.00 HRS WS = 157.89 WIDTH = 42.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.00	0.00	0.00	2.0	203.00	0.00	0.00	3.5
202.00	0.00	0.00	4.8	201.00	0.00	0.00	5.9	200.00	0.00	0.00	6.9
199.00	0.00	0.00	8.0	198.00	0.00	0.00	9.1	197.00	0.00	0.00	10.2
196.00	0.00	0.00	11.3	195.00	0.00	0.00	12.5	194.00	0.00	0.00	13.7
193.00	0.00	0.00	15.2	192.00	0.00	0.00	16.8	191.00	0.00	0.00	18.7
190.00	0.00	0.00	21.1	189.00	0.00	0.00	23.9	188.00	0.00	0.00	27.1
187.00	0.00	0.00	30.5	186.00	0.00	0.00	33.5	185.00	0.00	0.00	36.0
184.00	0.00	0.00	38.0	183.00	0.00	0.00	40.0	182.00	0.00	0.00	41.8
181.00	0.00	0.00	43.8	180.00	0.00	0.00	46.0	179.00	0.00	0.00	48.9
178.00	0.00	0.00	53.3	177.00	0.00	0.00	59.2	176.50	0.00	0.00	62.5
176.00	0.00	0.00	65.7	175.00	0.00	0.00	71.6	170.79	0.00	-3.71	75.4
167.23	0.00	-6.77	79.6	160.91	0.00	-12.59	87.9	160.77	0.00	-12.23	89.3
159.95	0.00	-12.55	93.4	159.39	0.00	-12.60	93.8	158.54	0.00	-12.46	94.6
155.38	0.00	-14.62	97.3	154.25	0.00	-14.75	104.5	154.07	0.00	-13.92	111.1
156.15	0.00	-10.85	119.2	163.17	0.00	-2.83	126.9	163.13	0.00	-1.87	128.8
163.92	0.00	-0.08	129.7	163.60	0.00	0.10	130.4	163.45	0.00	0.45	130.6
163.67	0.00	0.87	130.8	163.60	0.00	1.06	131.5	162.71	0.00	0.44	133.7
167.30	0.00	5.30	137.7	169.33	0.00	8.33	147.2	169.29	0.00	8.39	152.8
168.58	0.00	7.58	159.3	167.10	0.00	5.11	171.6	165.91	0.00	2.91	178.1
164.97	0.00	1.47	182.9	164.27	0.00	0.27	187.5	163.37	0.00	-1.63	192.2
161.76	0.00	-4.24	199.3	159.19	0.00	-7.81	207.5	158.32	0.00	-9.68	210.1
156.22	0.00	-12.77	215.8	155.27	0.00	-14.73	222.4	156.45	0.00	-14.55	226.1
162.26	0.00	-9.74	233.7	162.66	0.00	-10.34	234.0	162.92	0.00	-11.07	234.2
163.19	0.00	-11.81	234.4	163.50	0.00	-12.50	234.6	163.80	0.00	-13.20	234.9
164.08	0.00	-13.93	235.1	164.35	0.00	-14.65	235.3	164.63	0.00	-15.37	235.5
164.91	0.00	-16.09	235.7	165.19	0.00	-16.81	235.9	165.47	0.00	-17.53	236.1
165.77	0.00	-17.73	236.3	166.06	0.00	-17.94	236.5	166.34	0.00	-18.66	236.7
166.63	0.00	-19.37	236.9	166.92	0.00	-20.08	237.1	167.20	0.00	-20.80	237.3
167.49	0.00	-21.51	237.5	167.79	0.00	-22.21	237.7	168.08	0.00	-22.92	237.9
168.37	0.00	-23.63	238.1	168.66	0.00	-24.34	238.3	168.95	0.00	-25.05	238.5
169.25	0.00	-25.75	238.7	169.54	0.00	-26.46	238.9	169.84	0.00	-27.16	239.1
170.09	0.00	-27.91	239.3	172.04	0.00	-26.96	240.9	174.91	0.00	-25.09	243.3
177.04	0.00	-23.96	245.1	179.13	0.00	-22.87	246.9	181.16	0.00	-21.84	248.6
183.18	0.00	-20.82	250.2	185.49	0.00	-19.51	252.2	188.52	0.00	-17.48	254.7
194.39	0.00	-12.60	259.6	196.72	0.00	-10.41	261.6	198.65	0.00	-8.35	263.2
203.33	0.00	-3.57	267.1	206.92	0.00	-0.08	270.2	207.25	0.00	0.00	274.7
207.50	0.00	0.00	279.2	207.75	0.00	0.00	283.7	208.00	0.00	0.00	288.2

ID

14 SECTION 1944.00 TIME = 500.00 HRS WS = 157.40 WIDTH = 43.7

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.50	0.00	0.00	4.0	204.00	0.00	0.00	8.0
203.00	0.00	0.00	10.4	202.00	0.00	0.00	11.9	201.00	0.00	0.00	13.1
200.00	0.00	0.00	14.3	199.00	0.00	0.00	15.3	198.00	0.00	0.00	16.4
197.00	0.00	0.00	17.4	196.00	0.00	0.00	18.5	195.00	0.00	0.00	19.6
194.00	0.00	0.00	20.9	193.00	0.00	0.00	22.4	192.00	0.00	0.00	24.1
191.00	0.00	0.00	26.0	190.00	0.00	0.00	28.0	189.00	0.00	0.00	30.0
188.00	0.00	0.00	31.7	187.00	0.00	0.00	33.3	186.00	0.00	0.00	34.8
185.00	0.00	0.00	36.4	184.00	0.00	0.00	38.1	183.00	0.00	0.00	40.1
182.00	0.00	0.00	43.0	181.00	0.00	0.00	48.9	178.23	0.00	-1.77	54.2
172.80	0.00	-6.20	58.8	170.28	0.00	-7.72	60.9	170.01	0.00	-6.99	61.1
169.76	0.00	-6.24	61.3	166.97	0.00	-8.03	63.6	165.20	0.00	-8.80	65.1
167.10	0.00	-5.90	73.2	165.36	0.00	-6.63	75.3	165.05	0.00	-5.95	75.5
163.54	0.00	-6.46	77.3	163.03	0.00	-5.97	79.3	162.79	0.00	-5.21	79.5
164.91	0.00	-2.59	84.9	163.21	0.00	-3.78	86.4	162.77	0.00	-3.23	92.6
162.31	0.00	-2.69	93.0	162.85	0.00	-1.15	101.9	161.31	0.00	-1.69	103.2
161.01	0.00	-1.99	115.4	161.28	0.00	-1.72	117.5	160.98	0.00	-2.02	119.1
158.50	0.00	-4.60	121.2	157.64	0.00	-5.36	126.0	157.45	0.00	-4.55	126.2
157.07	0.00	-3.92	127.7	154.74	0.00	-5.76	138.2	153.73	0.00	-6.26	152.9

157.53	0.00	-2.47	170.6	164.05	0.00	3.05	177.1	165.92	0.00	3.92	178.7
166.17	0.00	3.17	178.9	166.63	0.00	2.63	179.2	166.98	0.00	1.98	179.5
167.25	0.00	1.24	179.7	167.51	0.00	0.51	179.9	167.78	0.00	-0.22	180.1
168.05	0.00	-0.95	180.3	168.32	0.00	-1.67	180.5	168.60	0.00	-2.40	180.7
168.87	0.00	-3.13	180.9	169.14	0.00	-3.86	181.1	169.42	0.00	-4.58	181.3
169.69	0.00	-5.31	181.5	169.97	0.00	-6.03	181.7	170.25	0.00	-6.75	181.9
170.52	0.00	-7.47	182.1	170.80	0.00	-8.20	182.3	171.08	0.00	-8.92	182.5
171.36	0.00	-9.64	182.7	171.65	0.00	-10.35	182.9	171.93	0.00	-11.07	183.1
172.21	0.00	-11.79	183.3	172.50	0.00	-12.50	183.5	172.78	0.00	-13.22	183.7
173.07	0.00	-13.93	183.9	173.35	0.00	-14.65	184.1	173.64	0.00	-15.36	184.3
173.93	0.00	-16.07	184.5	174.22	0.00	-16.78	184.7	174.50	0.00	-17.50	184.9
174.79	0.00	-18.21	185.1	175.08	0.00	-18.92	185.3	175.37	0.00	-19.63	185.5
175.62	0.00	-20.38	185.7	176.90	0.00	-20.10	186.8	181.01	0.00	-16.98	190.2
183.89	0.00	-15.11	192.6	186.54	0.00	-13.46	194.9	189.29	0.00	-11.71	197.2
192.69	0.00	-9.31	200.0	198.22	0.00	-4.78	204.7	203.48	0.00	-0.02	209.1
204.00	0.00	0.00	213.5	205.00	0.00	0.00	218.3	206.00	0.00	0.00	221.3
207.00	0.00	0.00	225.2								

ID

13 SECTION 1796.00 TIME = 500.00 HRS WS = 156.59 WIDTH = 39.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
205.00	0.00	0.00	0.0	204.50	0.00	0.00	3.8	204.00	0.00	0.00	7.5
203.00	0.00	0.00	9.9	202.00	0.00	0.00	11.6	201.00	0.00	0.00	13.1
200.00	0.00	0.00	14.3	199.00	0.00	0.00	15.5	198.00	0.00	0.00	16.7
197.00	0.00	0.00	17.8	196.00	0.00	0.00	19.0	195.00	0.00	0.00	20.2
194.00	0.00	0.00	21.5	193.00	0.00	0.00	22.7	192.00	0.00	0.00	24.0
191.00	0.00	0.00	25.3	190.00	0.00	0.00	26.5	189.00	0.00	0.00	27.8
188.00	0.00	0.00	29.1	187.00	0.00	0.00	30.3	186.00	0.00	0.00	31.6
185.00	0.00	0.00	32.9	184.00	0.00	0.00	34.2	182.98	0.00	-0.02	35.6
181.19	0.00	-0.81	37.1	179.18	0.00	-1.82	38.8	177.11	0.00	-2.89	40.5
175.02	0.00	-3.98	42.3	173.10	0.00	-4.90	43.9	171.30	0.00	-5.70	45.4
169.81	0.00	-6.19	46.7	169.57	0.00	-5.43	46.9	169.34	0.00	-4.66	47.1
166.03	0.00	-6.97	50.2	165.24	0.00	-6.76	55.2	164.52	0.00	-6.48	59.1
163.19	0.00	-6.80	66.1	162.96	0.00	-6.04	66.3	159.73	0.00	-8.27	72.5
161.31	0.00	-5.70	81.7	164.46	0.00	-1.55	86.8	163.43	0.00	-1.57	87.7
163.20	0.00	-0.80	87.9	163.50	0.00	0.50	88.5	163.37	0.00	1.37	88.8
162.68	0.00	1.68	89.4	162.17	0.00	2.16	89.9	160.93	0.00	1.13	90.9
159.60	0.00	0.00	92.0	158.93	0.00	-0.87	92.6	157.82	0.00	-2.18	94.5
152.23	0.00	-8.77	116.5	157.60	0.00	-3.90	144.6	160.71	0.00	-1.28	148.0
160.93	0.00	-2.07	148.3	166.36	0.00	2.36	153.1	166.69	0.00	1.69	153.3
166.94	0.00	0.94	153.5	167.19	0.00	0.19	153.7	167.44	0.00	-0.56	153.9
167.70	0.00	-1.30	154.1	167.95	0.00	-2.05	154.3	168.21	0.00	-2.79	154.5
168.46	0.00	-3.54	154.7	168.72	0.00	-4.28	154.9	168.98	0.00	-5.02	155.1
169.24	0.00	-5.76	155.3	169.50	0.00	-6.50	155.5	169.76	0.00	-7.25	155.7
170.02	0.00	-7.98	155.9	170.28	0.00	-8.72	156.1	170.54	0.00	-9.46	156.3
170.80	0.00	-10.20	156.5	171.06	0.00	-10.94	156.7	171.33	0.00	-11.67	156.9
171.59	0.00	-12.41	157.1	171.86	0.00	-13.14	157.3	172.13	0.00	-13.87	157.5
172.39	0.00	-14.61	157.7	172.66	0.00	-15.34	157.9	172.93	0.00	-16.07	158.1
173.20	0.00	-16.80	158.3	173.47	0.00	-17.53	158.5	173.74	0.00	-18.26	158.7
174.01	0.00	-18.99	158.9	174.26	0.00	-19.74	159.1	177.13	0.00	-17.87	161.6
180.21	0.00	-15.79	164.1	183.54	0.00	-13.46	166.9	188.51	0.00	-8.82	171.1
193.48	0.00	-4.19	175.3	198.00	0.00	0.00	179.4	199.00	0.00	0.00	184.2
200.00	0.00	0.00	185.9	201.00	0.00	0.00	187.3	202.00	0.00	0.00	188.5
203.00	0.00	0.00	189.7	204.00	0.00	0.00	190.9	205.00	0.00	0.00	192.3
206.00	0.00	0.00	194.1	207.00	0.00	0.00	197.0				

ID

12 SECTION 1665.00 TIME = 500.00 HRS WS = 156.00 WIDTH = 29.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.50	0.00	0.00	5.1	205.00	0.00	0.00	10.3
203.55	0.00	-0.95	14.3	198.80	0.00	-5.20	18.3	194.41	0.00	-8.59	22.0
191.80	0.00	-10.20	24.1	189.73	0.00	-11.27	25.9	188.00	0.00	-12.00	27.3
186.38	0.00	-12.62	28.7	184.88	0.00	-13.12	29.9	183.47	0.00	-13.53	31.1
182.11	0.00	-13.89	32.2	180.76	0.00	-14.24	33.3	179.44	0.00	-14.56	34.5
178.15	0.00	-14.85	35.5	176.84	0.00	-15.16	36.6	175.53	0.00	-15.47	37.7
174.12	0.00	-15.88	38.9	172.54	0.00	-16.46	40.2	170.56	0.00	-17.44	41.9
168.67	0.00	-18.33	43.5	167.29	0.00	-18.71	44.6	166.62	0.00	-18.38	45.2

166.27	0.00	-17.73	45.4	165.89	0.00	-17.10	45.7	165.64	0.00	-16.36	45.9
165.38	0.00	-15.62	46.1	165.12	0.00	-14.88	46.3	164.88	0.00	-14.12	46.5
158.28	0.00	-19.72	53.9	157.54	0.00	-19.46	57.1	157.37	0.00	-18.63	57.3
157.32	0.00	-17.68	57.5	157.30	0.00	-16.70	57.7	157.24	0.00	-15.76	57.9
157.21	0.00	-14.79	58.1	157.20	0.00	-13.80	58.3	157.19	0.00	-12.81	58.5
157.18	0.00	-11.82	58.7	157.18	0.00	-10.82	58.9	157.18	0.00	-9.82	59.1
157.17	0.00	-8.83	59.5	157.14	0.00	-7.86	60.1	157.14	0.00	-6.86	60.5
157.09	0.00	-5.90	62.4	156.85	0.00	-5.66	70.0	156.16	0.00	-5.84	76.0
154.51	-0.01	-6.99	80.6	152.28	0.01	-8.72	85.0	151.96	0.01	-8.04	89.0
151.96	0.01	-7.04	94.1	151.96	0.01	-7.04	96.9	152.35	0.00	-7.15	102.3
160.21	0.00	0.21	110.1	162.83	0.00	2.33	112.8	163.94	0.00	2.95	113.9
164.59	0.00	2.59	114.5	165.18	0.00	2.18	115.1	165.56	0.00	1.56	116.1
165.91	0.00	0.91	117.0	166.45	0.00	0.45	117.9	167.13	0.00	0.13	118.7
168.01	0.00	0.01	119.6	169.02	0.00	0.02	120.5	170.00	0.00	0.00	121.4
171.00	0.00	0.00	122.3	172.00	0.00	0.00	123.2	173.00	0.00	0.00	124.3
174.00	0.00	0.00	125.4	175.00	0.00	0.00	126.5	176.00	0.00	0.00	127.4
177.00	0.00	0.00	128.4	178.00	0.00	0.00	129.3	179.00	0.00	0.00	130.2
180.00	0.00	0.00	131.1	181.00	0.00	0.00	132.1	182.00	0.00	0.00	132.9
183.00	0.00	0.00	133.8	184.00	0.00	0.00	134.7	185.00	0.00	0.00	135.6
186.00	0.00	0.00	136.5	187.00	0.00	0.00	137.3	188.00	0.00	0.00	138.2
189.00	0.00	0.00	139.1	190.00	0.00	0.00	139.9	191.00	0.00	0.00	140.8
192.01	0.00	0.01	141.6	192.99	0.00	-0.01	142.4	194.00	0.00	0.00	143.3
195.00	0.00	0.00	144.1	196.00	0.00	0.00	145.0	197.00	0.00	0.00	145.9
198.00	0.00	0.00	146.8	199.00	0.00	0.00	147.7	200.00	0.00	0.00	148.6
201.00	0.00	0.00	149.6	202.00	0.00	0.00	150.6	203.00	0.00	0.00	151.6
204.00	0.00	0.00	152.7	205.00	0.00	0.00	153.9	206.00	0.00	0.00	155.3
207.00	0.00	0.00	156.9	208.00	0.00	0.00	159.4	209.00	0.00	0.00	164.0

ID

11 SECTION 1510.00 TIME = 500.00 HRS WS = 155.59 WIDTH = 28.9

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	5.0	204.00	0.00	0.00	7.1
203.00	0.00	0.00	8.7	202.00	0.00	0.00	10.0	201.00	0.00	0.00	11.2
200.00	0.00	0.00	12.4	199.00	0.00	0.00	13.6	198.00	0.00	0.00	14.8
197.00	0.00	0.00	16.2	196.00	0.00	0.00	17.6	195.00	0.00	0.00	19.1
194.00	0.00	0.00	20.7	193.00	0.00	0.00	22.3	192.00	0.00	0.00	24.0
191.00	0.00	0.00	25.9	190.00	0.00	0.00	28.4	189.00	0.00	0.00	31.7
188.00	0.00	0.00	35.1	187.00	0.00	0.00	37.8	186.00	0.00	0.00	40.1
185.00	0.00	0.00	42.4	184.00	0.00	0.00	44.6	183.00	0.00	0.00	46.5
182.00	0.00	0.00	48.2	181.00	0.00	0.00	49.7	180.00	0.00	0.00	51.2
179.00	0.00	0.00	52.6	178.00	0.00	0.00	54.1	177.00	0.00	0.00	55.6
176.00	0.00	0.00	57.2	174.14	0.00	-0.86	58.9	172.14	0.00	-1.86	60.6
170.11	0.00	-2.89	62.3	168.09	0.00	-3.91	64.0	167.86	0.00	-3.14	64.2
167.62	0.00	-2.38	64.4	165.17	0.00	-3.83	66.6	163.11	0.00	-4.90	71.4
162.31	0.00	-4.69	72.4	162.11	0.00	-3.90	72.7	161.97	0.00	-3.03	79.8
161.71	0.00	-2.29	80.5	161.51	0.00	-1.49	81.5	161.17	0.00	-0.83	86.5
160.97	0.00	-0.03	86.7	158.97	0.00	-1.69	91.4	158.04	0.00	-2.30	96.1
156.09	0.00	-3.91	100.3	156.11	0.00	-3.69	107.5	154.46	-0.01	-5.44	109.0
152.38	0.00	-7.62	112.8	152.03	0.00	-8.07	114.9	151.11	0.01	-8.89	116.8
150.99	0.01	-8.91	119.6	150.99	0.01	-9.01	122.7	150.99	0.01	-9.01	126.6
150.99	0.01	-9.01	130.6	153.80	0.00	-5.70	134.5	155.47	-0.01	-3.53	136.7
160.91	0.00	2.40	142.0	160.97	0.00	2.97	147.4	162.42	0.00	4.42	148.7
163.67	0.00	4.67	151.0	164.34	0.00	4.34	152.0	164.43	0.00	3.43	153.5
164.87	0.00	2.87	154.6	165.13	0.00	2.13	155.9	165.46	0.00	1.46	156.9
165.67	0.00	0.67	158.0	166.39	0.00	0.39	158.7	167.22	0.00	0.22	159.4
168.09	0.00	0.09	160.0	169.04	0.00	0.04	160.6	170.00	0.00	0.00	161.1
171.00	0.00	0.00	161.7	172.00	0.00	0.00	162.3	173.00	0.00	0.00	162.9
174.00	0.00	0.00	163.4	175.00	0.00	0.00	164.0	176.00	0.00	0.00	164.6
177.00	0.00	0.00	165.2	178.00	0.00	0.00	165.9	179.00	0.00	0.00	166.5
180.00	0.00	0.00	167.1	181.00	0.00	0.00	167.7	182.00	0.00	0.00	168.3
183.00	0.00	0.00	168.9	184.00	0.00	0.00	169.5	185.00	0.00	0.00	170.1
189.60	0.00	3.60	170.8	190.33	0.00	3.33	171.4	191.04	0.00	3.04	172.0
191.74	0.00	2.74	172.5	192.42	0.00	2.42	173.1	193.07	0.00	2.07	173.7
193.73	0.00	1.73	174.2	194.37	0.00	1.37	174.8	195.02	0.00	1.02	175.3
195.66	0.00	0.66	175.8	196.33	0.00	0.33	176.4	197.00	0.00	0.00	176.9
197.71	0.00	-0.29	177.6	198.45	0.00	-0.55	178.2	199.23	0.00	-0.77	178.8
200.04	0.00	-0.96	179.5	200.88	0.00	-1.11	180.2	201.79	0.00	-1.21	181.0
202.76	0.00	-1.24	181.8	203.79	0.00	-1.21	182.6	204.97	0.00	-1.03	183.6
206.26	0.00	-0.74	184.7	207.86	0.00	-0.14	186.1	209.00	0.00	0.00	187.6

210.00	0.00	0.00	189.2	211.00	0.00	0.00	191.1	212.00	0.00	0.00	193.1
213.00	0.00	0.00	195.8	214.00	0.00	0.00	200.6				

ID

10 SECTION 1345.00 TIME = 500.00 HRS WS = 155.31 WIDTH = 32.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
202.00	0.00	0.00	0.0	201.00	0.00	0.00	5.2	200.00	0.00	0.00	9.6
199.00	0.00	0.00	14.3	195.62	0.00	-2.38	17.9	192.97	0.00	-4.03	20.2
191.03	0.00	-4.97	21.8	189.46	0.00	-5.54	23.1	188.05	0.00	-5.95	24.3
186.74	0.00	-6.26	25.4	185.49	0.00	-6.51	26.4	184.28	0.00	-6.72	27.4
183.06	0.00	-6.94	28.4	181.83	0.00	-7.17	29.5	180.62	0.00	-7.38	30.5
179.41	0.00	-7.59	31.5	178.28	0.00	-7.72	32.4	177.26	0.00	-7.74	33.3
176.32	0.00	-7.68	34.0	175.47	0.00	-7.53	34.8	174.69	0.00	-7.31	35.4
173.96	0.00	-7.04	36.0	173.25	0.00	-6.75	36.6	172.58	0.00	-6.42	37.2
171.94	0.00	-6.06	37.7	171.30	0.00	-5.70	38.2	170.68	0.00	-5.32	38.7
170.03	0.00	-4.97	39.3	169.78	0.00	-4.22	39.5	169.53	0.00	-3.47	39.7
169.27	0.00	-2.73	39.9	169.03	0.00	-1.97	40.1	168.33	0.00	-1.67	40.6
167.50	0.00	-1.50	41.3	166.93	0.00	-1.07	41.8	166.23	0.00	-0.76	42.4
165.71	0.00	-0.29	42.8	165.47	0.00	0.47	43.0	165.23	0.00	1.23	43.2
164.99	0.00	1.99	43.4	164.53	0.00	2.53	43.8	164.05	0.00	3.05	44.3
163.11	0.00	3.11	45.1	162.89	0.00	3.89	45.3	159.13	0.00	0.62	54.5
149.57	0.00	-8.43	65.7	149.57	0.00	-8.13	71.0	151.34	0.00	-6.06	76.0
151.34	0.00	-6.26	80.2	151.34	0.00	-6.46	83.0	154.14	0.00	-3.86	88.9
156.60	0.00	-1.65	93.9	159.72	0.00	1.22	97.7	161.08	0.00	2.33	102.5
161.47	0.00	2.47	108.8	161.67	0.00	1.67	113.8	161.80	0.00	0.80	114.1
161.94	0.00	-0.06	118.1	162.08	0.00	-0.92	120.5	162.21	0.00	-1.79	120.7
162.35	0.00	-2.65	121.0	162.53	0.00	-3.47	121.3	162.71	0.00	-4.28	121.5
162.92	0.00	-5.08	121.7	163.11	0.00	-5.89	123.6	165.25	0.00	-4.75	125.7
165.50	0.00	-5.50	125.9	165.74	0.00	-6.26	126.1	166.23	0.00	-6.77	126.5
166.66	0.00	-7.34	126.9	167.07	0.00	-7.93	127.2	167.32	0.00	-8.68	127.4
167.56	0.00	-9.44	127.6	169.09	0.00	-8.91	128.9	170.88	0.00	-8.12	130.4
172.81	0.00	-7.19	132.0	175.00	0.00	-6.00	133.8	177.97	0.00	-4.03	136.3
181.28	0.00	-1.72	139.1	184.00	0.00	0.00	142.0	185.00	0.00	0.00	144.6
186.00	0.00	0.00	146.9	187.00	0.00	0.00	149.2	188.00	0.00	0.00	151.3
189.00	0.00	0.00	153.4	190.00	0.00	0.00	155.3	191.00	0.00	0.00	157.1
192.00	0.00	0.00	158.8	193.00	0.00	0.00	160.6	194.00	0.00	0.00	162.5
195.00	0.00	0.00	164.4	196.00	0.00	0.00	166.1	197.00	0.00	0.00	167.7
198.00	0.00	0.00	169.2	199.00	0.00	0.00	171.1	200.00	0.00	0.00	173.3
201.00	0.00	0.00	178.1								

ID

9 SECTION 1193.00 TIME = 500.00 HRS WS = 155.13 WIDTH = 34.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
206.00	0.00	0.00	0.0	205.00	0.00	0.00	3.0	204.00	0.00	0.00	5.2
203.00	0.00	0.00	7.1	202.00	0.00	0.00	8.9	201.00	0.00	0.00	10.6
200.00	0.00	0.00	12.3	199.00	0.00	0.00	13.9	198.00	0.00	0.00	15.5
196.44	0.00	-0.56	17.2	194.02	0.00	-1.98	19.2	191.54	0.00	-3.46	21.3
189.14	0.00	-4.86	23.3	186.96	0.00	-6.04	25.1	184.70	0.00	-7.30	27.0
182.22	0.00	-8.78	29.1	178.35	0.00	-11.65	32.4	172.80	0.00	-16.20	37.0
169.17	0.00	-18.83	40.1	155.76	0.00	-31.24	52.2	155.28	0.00	-31.23	52.7
151.23	0.00	-34.78	56.8	148.28	0.00	-36.72	65.1	148.31	0.00	-35.69	66.7
149.33	0.00	-33.67	70.8	150.51	0.00	-31.50	74.2	152.32	0.00	-28.69	79.0
154.49	0.00	-25.51	84.8	154.87	0.00	-24.99	86.0	154.87	0.00	-25.13	86.4
155.64	0.00	-24.62	89.1	156.17	0.00	-24.34	92.5	155.64	0.00	-24.36	92.9
159.86	0.00	-19.14	100.2	160.56	0.00	-17.44	103.9	162.08	0.00	-14.92	108.9
163.08	0.00	-12.92	112.5	163.73	0.00	-11.27	115.6	164.30	0.00	-9.70	117.8
164.68	0.00	-8.31	120.0	165.39	0.00	-6.61	123.2	165.74	0.00	-5.26	124.5
166.29	0.00	-3.71	125.9	166.78	0.00	-2.22	126.9	167.56	0.00	-0.44	127.8
168.23	0.00	1.23	128.7	168.50	0.00	2.51	129.3	168.36	0.00	3.36	129.6
168.46	0.00	4.46	130.5	168.87	0.00	5.87	131.2	168.90	0.00	6.90	132.2
168.59	0.00	7.59	132.7	168.89	0.00	8.89	134.9	168.58	0.00	9.58	135.4
168.70	0.00	10.70	135.6	168.81	0.00	11.81	136.0	168.83	0.00	12.83	136.7
167.04	0.00	12.04	138.4	164.84	0.00	10.84	143.4	164.67	0.00	10.82	146.1
165.09	0.00	11.39	150.0	164.16	0.00	10.36	154.0	163.87	0.00	9.97	157.8
164.16	0.00	10.16	161.8	164.09	0.00	9.09	163.6	164.19	0.00	8.19	168.6
164.14	0.00	7.14	168.8	164.19	0.00	6.19	171.9	164.40	0.00	5.95	174.9
164.91	0.00	6.00	181.1	165.29	0.00	7.29	188.0	165.51	0.00	8.51	193.6

165.65	0.00	8.65	193.9	166.41	0.00	9.41	200.0	166.67	0.00	8.67	205.6
166.77	0.00	7.77	205.9	166.98	0.00	6.98	209.0	167.12	0.00	6.12	209.3
167.14	0.00	5.14	209.5	167.14	0.00	4.14	209.8	167.15	0.00	3.15	210.0
167.14	0.00	2.14	210.2	167.17	0.00	1.17	210.4	167.51	0.00	0.51	210.9
169.45	0.00	1.45	214.2	169.46	0.00	0.46	214.6	169.46	0.00	-0.54	214.8
169.64	0.00	-1.36	216.4	169.88	0.00	-2.12	216.6	170.37	0.00	-2.63	217.0
171.00	0.00	-3.00	217.5	171.64	0.00	-3.36	218.0	172.28	0.00	-3.72	218.6
172.94	0.00	-4.06	219.1	173.60	0.00	-4.40	219.7	174.30	0.00	-4.70	220.2
175.03	0.00	-4.97	220.9	175.78	0.00	-5.22	221.5	176.56	0.00	-5.44	222.1
177.36	0.00	-5.64	222.8	178.24	0.00	-5.76	223.5	179.21	0.00	-5.79	224.3
180.28	0.00	-5.72	225.2	181.51	0.00	-5.49	226.3	182.94	0.00	-5.06	227.5
184.69	0.00	-4.31	228.9	186.93	0.00	-3.07	230.8	189.55	0.00	-1.45	233.0
192.00	0.00	0.00	235.3	193.00	0.00	0.00	237.6	194.00	0.00	0.00	240.2
195.00	0.00	0.00	243.2	196.00	0.00	0.00	246.8	197.00	0.00	0.00	252.4
197.50	0.00	0.00	256.5	198.00	0.00	0.00	260.6				

ID

8 SECTION 1048.00 TIME = 500.00 HRS WS = 155.06 WIDTH = 34.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
204.00	0.00	0.00	0.0	203.50	0.00	0.00	3.4	203.00	0.00	0.00	6.7
202.00	0.00	0.00	10.1	199.91	0.00	-1.09	12.7	197.11	0.00	-2.89	15.0
194.31	0.00	-4.69	17.4	191.15	0.00	-6.85	20.0	188.06	0.00	-8.94	22.6
184.87	0.00	-11.13	25.3	181.50	0.00	-13.50	28.1	177.70	0.00	-16.30	31.3
173.58	0.00	-19.42	34.8	169.15	0.00	-22.85	38.5	164.71	0.00	-26.29	43.1
163.90	0.00	-26.11	43.8	158.35	0.00	-30.66	48.5	156.89	0.00	-31.13	50.0
152.51	0.00	-34.48	54.3	151.49	0.00	-34.51	55.4	151.29	0.00	-33.73	55.6
150.67	0.00	-33.36	56.2	149.66	0.00	-33.36	57.2	149.45	0.00	-32.58	57.4
148.97	0.00	-32.04	57.9	148.28	0.00	-31.72	58.6	148.04	0.00	-30.95	58.8
147.49	0.00	-30.51	59.4	147.07	0.00	-29.93	59.8	146.57	0.00	-29.43	60.3
146.06	0.00	-28.95	60.8	145.67	0.00	-28.33	61.2	145.67	0.00	-27.34	61.7
145.67	0.00	-26.33	62.3	145.67	0.00	-25.33	62.8	145.68	0.00	-24.33	63.9
145.68	0.00	-23.32	65.4	145.68	0.00	-22.32	65.6	145.69	0.00	-21.32	65.8
145.70	0.00	-20.30	66.1	145.73	0.00	-19.27	66.7	145.75	0.00	-18.25	66.9
145.79	0.00	-17.21	67.1	145.91	0.00	-16.09	67.8	146.19	0.00	-14.82	68.4
146.50	0.00	-13.50	68.9	146.74	0.00	-12.26	69.3	147.14	0.00	-10.86	69.9
147.48	0.00	-9.52	70.4	148.18	0.00	-7.82	71.4	150.83	0.00	-4.18	77.9
158.32	0.00	4.32	92.8	159.29	0.00	6.29	95.3	159.54	0.00	7.53	96.1
159.62	0.00	8.61	96.8	159.68	0.00	8.73	97.6	160.02	0.00	9.12	99.9
160.38	0.00	9.43	102.0	160.66	0.00	9.66	103.7	161.19	0.00	9.69	106.7
162.62	0.00	10.62	108.2	162.20	0.00	9.20	109.6	163.38	0.00	9.38	110.6
163.59	0.00	8.59	110.8	163.90	0.00	7.90	112.3	161.49	0.00	4.49	119.6
162.20	0.00	4.70	121.1	163.58	0.00	5.57	122.3	164.40	0.00	5.90	132.3
164.71	0.00	5.71	137.5	164.82	0.00	4.82	140.5	164.88	0.00	3.88	140.9
164.98	0.00	2.98	141.3	165.26	0.00	2.26	141.6	165.68	0.00	1.68	143.8
166.18	0.00	1.68	151.7	166.63	0.00	1.63	155.9	167.19	0.00	1.69	159.6
167.99	0.00	1.99	162.7	168.53	0.00	1.53	166.4	168.76	0.00	0.76	169.7
169.00	0.00	0.00	172.4	170.00	0.00	0.00	174.9	171.00	0.00	0.00	178.0
172.00	0.00	0.00	181.2	173.00	0.00	0.00	184.5	174.00	0.00	0.00	187.8
175.00	0.00	0.00	191.2	176.00	0.00	0.00	194.5	177.00	0.00	0.00	198.1
178.00	0.00	0.00	202.3	179.00	0.00	0.00	206.5	180.00	0.00	0.00	210.1
181.00	0.00	0.00	213.2	182.00	0.00	0.00	216.1	183.00	0.00	0.00	218.8
184.00	0.00	0.00	221.4	185.00	0.00	0.00	224.1	186.00	0.00	0.00	226.6
187.00	0.00	0.00	228.9	188.00	0.00	0.00	231.1	189.00	0.00	0.00	233.1
190.00	0.00	0.00	235.1	191.00	0.00	0.00	237.1	192.00	0.00	0.00	238.9
193.00	0.00	0.00	240.6	194.00	0.00	0.00	242.0	195.00	0.00	0.00	243.2
196.00	0.00	0.00	244.5	197.00	0.00	0.00	245.8	198.00	0.00	0.00	247.1
199.00	0.00	0.00	248.4	200.00	0.00	0.00	249.7	201.00	0.00	0.00	251.6
202.00	0.00	0.00	253.8	203.00	0.00	0.00	257.2				

ID

7 SECTION 921.00 TIME = 500.00 HRS WS = 154.87 WIDTH = 45.4

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
204.00	0.00	0.00	0.0	203.00	0.00	0.00	3.2	202.00	0.00	0.00	5.5
201.00	0.00	0.00	7.5	200.00	0.00	0.00	9.1	199.00	0.00	0.00	10.6
198.00	0.00	0.00	12.1	197.00	0.00	0.00	13.7	196.00	0.00	0.00	15.4
195.00	0.00	0.00	17.4	194.00	0.00	0.00	19.8	193.00	0.00	0.00	22.4
192.00	0.00	0.00	25.1	191.00	0.00	0.00	28.0	190.00	0.00	0.00	30.8

189.00	0.00	0.00	33.2	188.00	0.00	0.00	35.5	187.00	0.00	0.00	37.6
186.00	0.00	0.00	39.7	185.00	0.00	0.00	41.8	184.00	0.00	0.00	44.2
183.00	0.00	0.00	46.9	182.00	0.00	0.00	51.2	181.50	0.00	0.00	54.5
181.00	0.00	0.00	57.8	180.50	0.00	0.00	62.5	180.00	0.00	0.00	67.3
179.50	0.00	0.00	70.7	179.00	0.00	0.00	74.2	178.00	0.00	0.00	79.7
177.00	0.00	0.00	84.1	176.00	0.00	0.00	88.1	172.57	0.00	-2.43	91.9
169.68	0.00	-4.32	94.3	168.03	0.00	-4.97	95.7	167.59	0.00	-4.41	96.1
167.19	0.00	-3.81	96.4	166.71	0.00	-3.29	96.8	164.85	0.00	-4.15	99.1
164.31	0.00	-3.69	100.3	163.29	0.00	-3.71	101.5	162.52	0.00	-3.48	102.4
162.22	0.00	-2.78	102.6	161.51	0.00	-2.49	103.2	160.80	0.00	-2.20	103.8
158.82	0.00	-3.18	105.5	158.44	0.00	-2.56	105.8	157.48	0.00	-2.52	106.6
156.80	0.00	-2.20	107.2	156.54	0.00	-1.46	107.4	156.28	0.00	-0.72	107.6
156.03	0.00	0.03	107.8	152.66	0.00	-2.34	110.6	151.49	0.00	-2.51	111.6
151.30	0.00	-1.69	112.1	151.28	0.00	-0.72	116.0	151.26	0.00	0.26	118.9
151.25	0.00	0.75	120.9	151.26	0.00	0.26	123.3	151.29	0.00	-0.21	127.6
151.32	0.00	-0.68	131.9	151.37	0.00	-0.93	137.5	151.61	0.00	-0.99	144.7
153.83	0.00	1.53	148.1	154.02	0.00	2.02	150.5	154.80	0.00	3.00	153.9
155.81	0.00	3.81	157.6	156.05	0.00	3.04	159.2	158.40	0.00	4.40	161.5
159.43	0.00	4.43	163.3	160.28	0.00	4.28	166.9	160.54	0.00	3.54	168.1
160.72	0.00	2.72	168.8	161.10	0.00	2.10	169.6	161.40	0.00	1.40	172.6
161.51	0.00	0.51	173.7	161.90	0.00	-0.10	174.9	162.41	0.00	-0.59	177.2
162.78	0.00	-1.22	180.6	163.19	0.00	-1.81	182.7	163.33	0.00	-2.67	182.9
163.72	0.00	-3.28	186.0	163.81	0.00	-4.19	187.8	165.15	0.00	-3.85	189.4
166.19	0.00	-3.81	192.1	167.15	0.00	-3.85	193.0	167.56	0.00	-4.44	193.3
168.00	0.00	-5.00	193.7	169.62	0.00	-4.38	195.0	171.73	0.00	-3.27	196.8
173.91	0.00	-2.09	198.6	176.20	0.00	-0.80	200.5	178.00	0.00	0.00	202.7
179.00	0.00	0.00	205.6	179.50	0.00	0.00	209.7	180.00	0.00	0.00	213.8
180.50	0.00	0.00	218.5	181.00	0.00	0.00	223.2	182.00	0.00	0.00	225.4
183.00	0.00	0.00	226.9	184.00	0.00	0.00	228.3	185.00	0.00	0.00	229.6
186.00	0.00	0.00	230.9	187.00	0.00	0.00	232.2	188.00	0.00	0.00	233.5
189.00	0.00	0.00	234.9	190.00	0.00	0.00	236.1	191.00	0.00	0.00	237.4
192.00	0.00	0.00	238.6	193.00	0.00	0.00	239.9	194.00	0.00	0.00	241.4
195.00	0.00	0.00	242.9	196.00	0.00	0.00	244.7	197.00	0.00	0.00	246.6
198.00	0.00	0.00	248.4	199.00	0.00	0.00	250.3	200.00	0.00	0.00	252.4
201.00	0.00	0.00	254.8	202.00	0.00	0.00	258.0	203.00	0.00	0.00	261.8
204.00	0.00	0.00	264.8	205.00	0.00	0.00	267.6	206.00	0.00	0.00	271.2

ID

6 SECTION 790.00 TIME = 500.00 HRS WS = 154.52 WIDTH = 48.1

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
203.00	0.00	0.00	0.0	202.00	0.00	0.00	1.9	201.00	0.00	0.00	3.3
200.00	0.00	0.00	4.4	199.00	0.00	0.00	5.5	198.00	0.00	0.00	6.5
197.00	0.00	0.00	7.5	196.00	0.00	0.00	8.4	195.00	0.00	0.00	9.4
194.00	0.00	0.00	10.4	193.00	0.00	0.00	11.5	192.00	0.00	0.00	12.6
191.00	0.00	0.00	13.8	190.00	0.00	0.00	15.1	189.00	0.00	0.00	16.6
188.00	0.00	0.00	18.4	187.00	0.00	0.00	20.5	186.00	0.00	0.00	23.3
185.00	0.00	0.00	26.8	184.00	0.00	0.00	31.1	183.00	0.00	0.00	36.5
182.50	0.00	0.00	40.2	182.00	0.00	0.00	43.9	181.00	0.00	0.00	48.1
180.00	0.00	0.00	50.9	179.00	0.00	0.00	54.2	178.50	0.00	0.00	58.4
178.00	0.00	0.00	62.5	177.50	0.00	0.00	68.0	177.00	0.00	0.00	73.5
176.67	0.00	0.00	77.6	176.33	0.00	0.00	81.6	176.00	0.00	0.00	85.7
175.00	0.00	0.00	90.0	174.00	0.00	0.00	92.8	173.00	0.00	0.00	94.9
172.00	0.00	0.00	96.8	171.00	0.00	0.00	98.9	170.00	0.00	0.00	101.6
169.00	0.00	0.00	105.1	168.00	0.00	0.00	108.2	167.11	0.00	0.11	111.1
166.20	0.00	0.20	114.5	165.31	0.00	0.31	118.1	165.34	0.00	1.35	121.3
164.99	0.00	1.99	125.3	164.34	0.00	2.34	128.8	163.16	0.00	2.16	129.8
163.10	0.00	3.10	131.8	162.39	0.00	3.39	133.5	162.14	0.00	4.14	135.1
161.77	0.00	4.77	136.6	161.67	0.00	5.67	137.8	161.60	0.00	6.60	138.5
161.26	0.00	7.26	139.4	160.67	0.00	7.67	140.7	160.38	0.00	8.38	141.9
159.22	0.00	8.22	143.7	154.35	0.00	3.85	150.4	152.41	0.00	2.40	157.1
152.36	0.00	1.86	157.4	150.90	0.00	-0.10	181.0	153.77	0.00	1.77	196.7
160.65	0.00	7.65	211.0	163.17	0.00	9.17	213.6	163.75	0.00	8.75	214.2
164.17	0.00	8.17	214.6	164.54	0.00	7.54	215.0	164.88	0.00	6.88	215.3
165.27	0.00	6.27	215.7	165.77	0.00	5.77	216.2	166.23	0.00	5.23	216.7
166.88	0.00	4.88	217.3	167.66	0.00	4.66	217.9	168.13	0.00	4.13	218.3
168.46	0.00	3.46	218.6	168.71	0.00	2.71	218.8	168.95	0.00	1.95	219.0
169.20	0.00	1.20	219.2	169.44	0.00	0.44	219.4	169.69	0.00	-0.31	219.6
169.93	0.00	-1.07	219.8	170.18	0.00	-1.82	220.0	170.43	0.00	-2.57	220.2
170.68	0.00	-3.32	220.4	170.92	0.00	-4.08	220.6	173.67	0.00	-2.33	222.9

176.26	0.00	-0.74	225.1	178.00	0.00	0.00	226.9	179.00	0.00	0.00	228.5
180.00	0.00	0.00	229.9	181.00	0.00	0.00	231.0	182.15	0.00	0.15	232.0
183.24	0.00	0.24	233.0	184.28	0.00	0.28	233.8	185.24	0.00	0.24	234.6
186.14	0.00	0.14	235.4	187.00	0.00	0.00	236.1	187.87	0.00	-0.13	236.8
188.80	0.00	-0.20	237.6	189.77	0.00	-0.23	238.4	190.78	0.00	-0.22	239.3
191.85	0.00	-0.15	240.2	192.98	0.00	-0.02	241.1	194.00	0.00	0.00	242.1
195.00	0.00	0.00	243.1	196.00	0.00	0.00	244.1	197.00	0.00	0.00	245.1
198.00	0.00	0.00	246.2	199.00	0.00	0.00	247.2	200.00	0.00	0.00	248.3
201.00	0.00	0.00	249.4	202.00	0.00	0.00	250.7	203.00	0.00	0.00	252.1
204.00	0.00	0.00	253.6	205.00	0.00	0.00	255.5	206.00	0.00	0.00	257.8
207.00	0.00	0.00	261.6								

ID

5 SECTION 692.00 TIME = 500.00 HRS WS = 154.22 WIDTH = 41.3

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	2.6	199.00	0.00	0.00	4.3
198.00	0.00	0.00	5.7	197.00	0.00	0.00	7.0	196.00	0.00	0.00	8.2
195.00	0.00	0.00	9.4	194.00	0.00	0.00	10.5	193.00	0.00	0.00	11.6
192.00	0.00	0.00	12.7	191.00	0.00	0.00	13.9	190.00	0.00	0.00	15.1
189.00	0.00	0.00	16.4	188.00	0.00	0.00	17.7	187.00	0.00	0.00	19.0
186.00	0.00	0.00	20.4	185.00	0.00	0.00	21.8	184.00	0.00	0.00	23.2
183.00	0.00	0.00	24.6	182.00	0.00	0.00	26.1	181.00	0.00	0.00	27.7
179.82	0.00	-0.18	29.5	177.77	0.00	-1.23	31.2	176.00	0.00	-2.00	32.7
174.41	0.00	-2.59	34.0	172.95	0.00	-3.05	35.3	171.61	0.00	-3.39	36.4
170.32	0.00	-3.68	37.5	169.07	0.00	-3.93	38.5	167.79	0.00	-4.21	39.6
166.94	0.00	-4.06	40.3	166.69	0.00	-3.31	40.5	166.24	0.00	-2.76	40.9
164.93	0.00	-3.07	42.0	164.39	0.00	-2.61	42.4	164.15	0.00	-1.85	42.6
163.64	0.00	-1.36	43.0	161.52	0.00	-2.48	44.8	160.30	0.00	-2.70	46.8
159.46	0.00	-2.54	47.8	158.17	0.00	-2.83	49.1	156.45	0.00	-3.55	50.7
156.29	0.00	-2.71	50.9	156.07	0.00	-1.93	51.1	155.84	0.00	-1.16	51.4
153.05	0.00	-2.95	56.3	152.28	0.00	-2.72	56.9	151.26	0.00	-2.74	58.5
151.26	0.00	-1.74	60.5	151.26	0.00	-0.74	62.0	151.25	0.00	0.25	63.8
151.24	0.00	1.25	66.8	151.24	0.00	1.34	70.0	151.23	0.00	1.43	73.1
151.24	0.00	1.34	76.2	151.24	0.00	1.25	79.2	151.25	0.00	0.25	82.3
151.26	0.00	-0.74	84.3	151.26	0.00	-1.74	85.8	151.26	0.00	-2.74	87.9
151.27	0.00	-3.73	89.8	151.48	0.00	-4.52	92.0	152.62	0.00	-4.38	92.9
153.07	0.00	-4.93	93.3	155.83	0.00	-3.17	98.8	156.06	0.00	-3.94	99.1
156.83	0.00	-4.17	99.8	157.23	0.00	-4.77	102.7	158.77	0.00	-4.23	105.1
159.20	0.00	-4.80	107.0	159.35	0.00	-5.65	109.8	160.46	0.00	-5.54	112.8
160.97	0.00	-6.03	118.2	161.18	0.00	-6.82	121.2	163.94	0.00	-5.06	124.0
165.49	0.00	-4.51	129.3	167.04	0.00	-3.96	130.6	169.44	0.00	-2.56	132.6
173.00	0.00	0.00	137.0	174.00	0.00	0.00	141.9	174.50	0.00	0.00	144.9
175.00	0.00	0.00	148.0	176.00	0.00	0.00	152.7	177.00	0.00	0.00	156.6
178.00	0.00	0.00	160.4	179.00	0.00	0.00	165.9	180.00	0.00	0.00	171.3
181.00	0.00	0.00	175.0	182.00	0.00	0.00	177.9	183.00	0.00	0.00	181.0
184.00	0.00	0.00	184.9	185.00	0.00	0.00	189.4	186.00	0.00	0.00	194.4
187.00	0.00	0.00	198.0	188.00	0.00	0.00	200.0	189.00	0.00	0.00	201.4
190.00	0.00	0.00	202.6	191.00	0.00	0.00	203.6	192.00	0.00	0.00	204.6
193.00	0.00	0.00	205.6	194.00	0.00	0.00	206.4	195.00	0.00	0.00	207.3
196.00	0.00	0.00	208.1	197.00	0.00	0.00	208.8	198.00	0.00	0.00	209.5
199.00	0.00	0.00	210.2	200.00	0.00	0.00	210.9	201.00	0.00	0.00	211.6
202.00	0.00	0.00	212.3	203.00	0.00	0.00	213.0	204.00	0.00	0.00	213.7
205.00	0.00	0.00	214.5	206.00	0.00	0.00	215.3	207.00	0.00	0.00	216.3
208.00	0.00	0.00	217.4	209.00	0.00	0.00	219.2				

ID

4 SECTION 582.00 TIME = 500.00 HRS WS = 153.93 WIDTH = 43.5

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	2.4	199.00	0.00	0.00	3.8
198.00	0.00	0.00	4.9	197.00	0.00	0.00	5.8	196.00	0.00	0.00	6.8
194.99	0.00	-0.01	7.6	193.99	0.00	-0.01	8.4	193.00	0.00	0.00	9.3
192.00	0.00	0.00	10.1	191.00	0.00	0.00	10.9	190.00	0.00	0.00	11.7
189.00	0.00	0.00	12.5	188.00	0.00	0.00	13.3	187.00	0.00	0.00	14.1
186.00	0.00	0.00	14.9	185.00	0.00	0.00	15.7	184.00	0.00	0.00	16.5
183.00	0.00	0.00	17.3	182.02	0.00	0.02	18.1	181.00	0.00	0.00	19.0
180.00	0.00	0.00	19.9	179.00	0.00	0.00	20.8	178.00	0.00	0.00	21.8
177.00	0.00	0.00	22.9	176.00	0.00	0.00	24.1	175.00	0.00	0.00	25.4

174.00	0.00	0.00	26.8	173.00	0.00	0.00	28.3	172.00	0.00	0.00	29.9
171.00	0.00	0.00	31.5	170.00	0.00	0.00	33.3	169.00	0.00	0.00	35.5
168.00	0.00	0.00	38.6	167.00	0.00	0.00	42.1	165.99	0.00	-0.01	45.1
164.82	0.00	-0.18	48.6	164.11	0.00	-0.39	52.3	163.07	0.00	-0.93	55.8
161.56	0.00	-1.94	59.6	158.64	0.00	-4.36	63.5	158.63	0.00	-3.37	66.4
156.12	0.00	-4.88	68.5	154.87	0.00	-5.13	70.4	154.87	0.00	-4.13	71.0
154.67	0.00	-3.32	71.2	153.97	0.00	-3.03	71.8	153.31	0.00	-2.69	72.6
151.40	0.00	-3.60	74.3	151.11	0.00	-2.89	75.9	151.11	0.00	-1.89	77.0
151.11	0.00	-0.89	78.8	151.11	0.00	0.11	80.4	151.11	0.00	1.11	83.5
151.11	0.00	1.21	87.4	151.11	0.00	1.31	91.2	151.11	0.00	1.21	95.2
151.11	0.00	1.11	99.1	151.11	0.00	0.11	102.9	151.11	0.00	-0.89	105.1
151.11	0.00	-1.89	107.1	151.11	0.00	-2.89	109.4	151.11	0.00	-3.89	109.7
151.11	0.00	-4.89	112.2	154.03	0.00	-2.98	115.5	154.79	0.00	-3.21	116.1
155.03	0.00	-3.97	116.3	155.45	0.00	-4.55	116.7	156.15	0.00	-4.85	120.4
158.81	0.00	-3.19	123.0	160.25	0.00	-2.75	126.4	161.64	0.00	-2.36	131.4
163.84	0.00	-1.16	133.2	165.99	0.00	-0.01	136.8	167.00	0.00	0.00	139.9
168.00	0.00	0.00	143.2	169.00	0.00	0.00	146.7	170.00	0.00	0.00	149.5
171.00	0.00	0.00	151.9	172.00	0.00	0.00	153.7	173.00	0.00	0.00	155.4
174.00	0.00	0.00	157.2	175.00	0.00	0.00	159.0	176.00	0.00	0.00	160.9
177.00	0.00	0.00	163.6	178.00	0.00	0.00	167.6	179.00	0.00	0.00	172.5
180.00	0.00	0.00	176.7	181.00	0.00	0.00	180.8	182.00	0.00	0.00	185.6
183.00	0.00	0.00	191.2	184.00	0.00	0.00	195.7	185.00	0.00	0.00	199.7
186.00	0.00	0.00	202.5	187.00	0.00	0.00	204.2	188.00	0.00	0.00	205.5
189.00	0.00	0.00	206.6	190.00	0.00	0.00	207.6	191.00	0.00	0.00	208.6
192.00	0.00	0.00	209.5	193.00	0.00	0.00	210.4	194.00	0.00	0.00	211.4
195.00	0.00	0.00	212.3	196.00	0.00	0.00	213.3	197.00	0.00	0.00	214.2
198.00	0.00	0.00	215.2	199.00	0.00	0.00	216.2	200.00	0.00	0.00	217.2
201.00	0.00	0.00	218.2	202.00	0.00	0.00	219.3	203.00	0.00	0.00	220.3
204.00	0.00	0.00	221.4	205.00	0.00	0.00	222.6	206.00	0.00	0.00	224.1
207.00	0.00	0.00	225.8	208.00	0.00	0.00	228.7				

ID

3 SECTION 455.00 TIME = 500.00 HRS WS = 153.61 WIDTH = 44.5

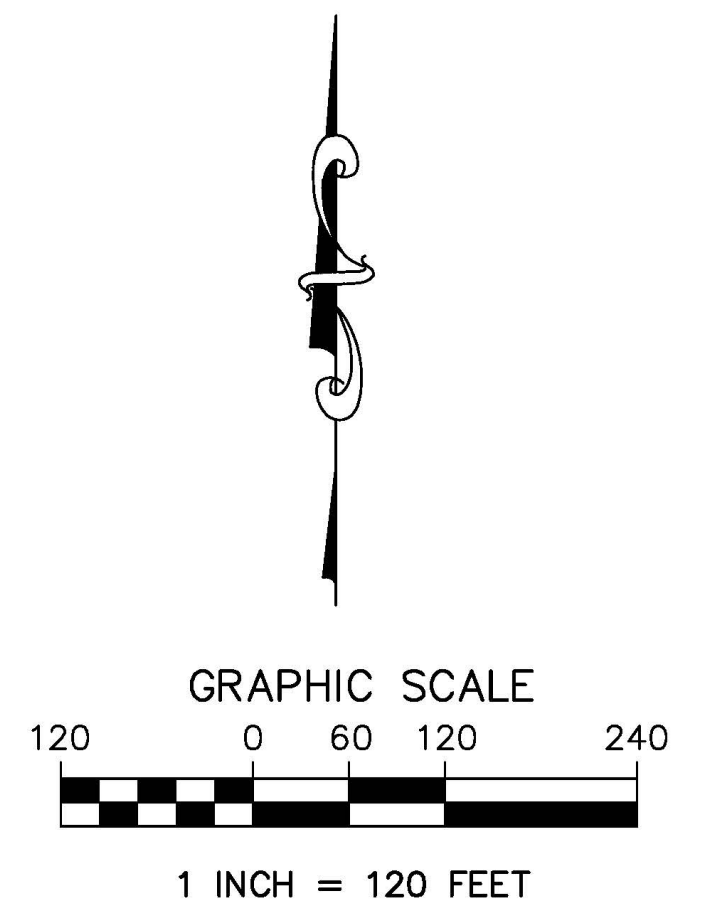
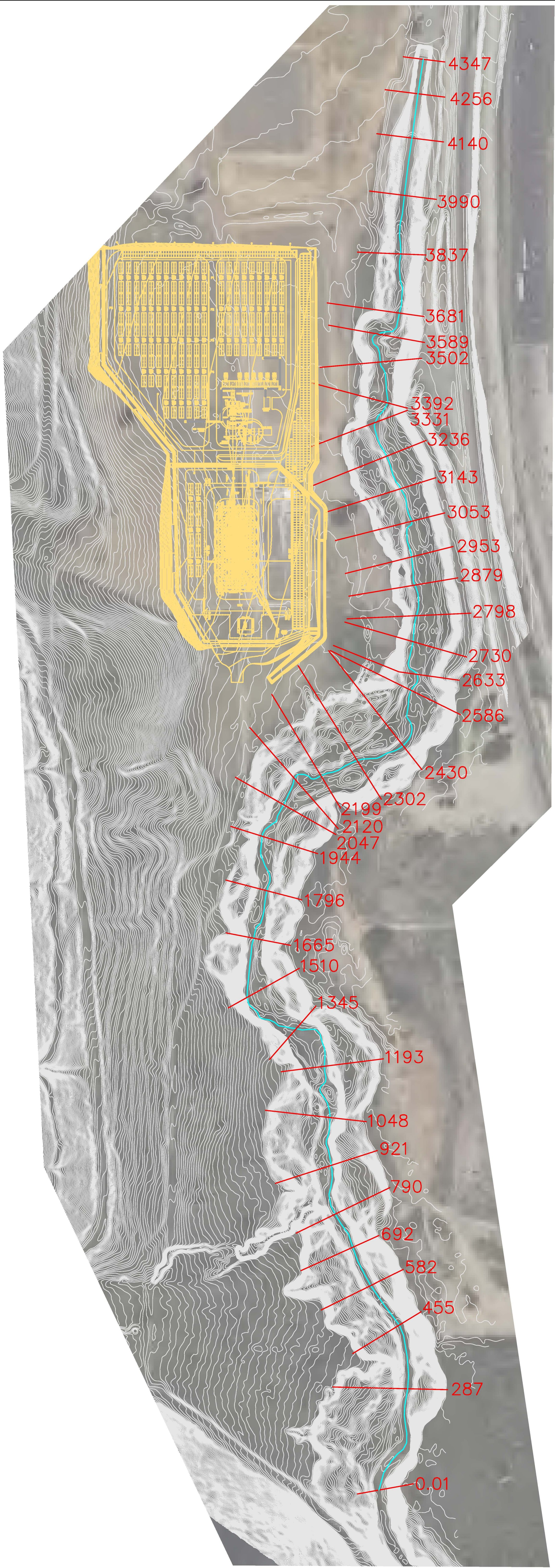
Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
201.00	0.00	0.00	0.0	200.00	0.00	0.00	1.6	199.00	0.00	0.00	2.8
198.00	0.00	0.00	3.8	196.99	0.00	-0.01	4.7	196.00	0.00	0.00	5.5
195.00	0.00	0.00	6.3	194.01	0.00	0.01	7.2	193.00	0.00	0.00	8.0
192.00	0.00	0.00	8.9	191.00	0.00	0.00	9.8	190.00	0.00	0.00	10.8
189.00	0.00	0.00	11.8	188.00	0.00	0.00	12.9	187.00	0.00	0.00	13.9
186.00	0.00	0.00	15.0	185.00	0.00	0.00	16.1	184.00	0.00	0.00	17.2
183.00	0.00	0.00	18.3	182.00	0.00	0.00	19.4	181.00	0.00	0.00	20.5
180.00	0.00	0.00	21.6	179.00	0.00	0.00	22.7	178.00	0.00	0.00	23.8
177.00	0.00	0.00	25.0	176.00	0.00	0.00	26.1	175.00	0.00	0.00	27.2
174.00	0.00	0.00	28.4	173.00	0.00	0.00	29.5	172.00	0.00	0.00	30.5
170.93	0.00	-0.07	31.5	169.84	0.00	-0.16	32.4	168.80	0.00	-0.20	33.3
167.77	0.00	-0.23	34.1	166.96	0.00	-0.04	34.8	165.98	0.00	-0.02	35.6
165.01	0.00	0.01	36.6	164.01	0.00	0.01	37.3	163.09	0.00	0.09	38.1
162.17	0.00	0.17	39.0	161.25	0.00	0.25	39.8	160.36	0.00	0.36	40.6
159.52	0.00	0.52	41.5	158.73	0.00	0.73	42.4	158.09	0.00	1.09	43.3
157.43	0.00	1.43	44.2	156.55	0.00	1.55	45.1	155.69	0.00	1.69	45.9
154.89	0.00	1.89	46.7	153.67	0.00	1.67	48.0	152.94	0.00	1.94	48.8
150.60	0.00	0.60	51.7	150.60	0.00	0.65	57.9	150.60	0.00	0.70	63.8
150.60	0.00	0.65	67.6	150.60	0.00	0.60	71.3	150.60	0.00	-0.40	76.2
150.60	0.00	-1.40	78.7	150.75	0.00	-2.25	80.8	150.93	0.00	-3.07	82.3
151.18	0.00	-3.82	84.8	151.63	0.00	-4.37	88.6	152.18	0.00	-4.82	89.1
152.44	0.00	-5.56	91.1	154.53	0.00	-4.47	93.8	155.03	0.00	-4.97	94.2
155.17	0.00	-5.83	94.6	155.17	0.00	-6.83	96.9	157.95	0.00	-5.05	99.5
159.71	0.00	-4.30	101.0	160.20	0.00	-4.30	105.0	162.05	0.00	-2.95	108.9
163.70	0.00	-1.80	110.3	164.18	0.00	-1.82	115.0	166.67	0.00	-0.33	118.4
168.00	0.00	0.00	121.4	169.00	0.00	0.00	124.2	170.00	0.00	0.00	127.4
171.00	0.00	0.00	131.9	172.00	0.00	0.00	135.2	173.00	0.00	0.00	137.7
174.00	0.00	0.00	140.2	175.00	0.00	0.00	143.2	176.00	0.00	0.00	147.1
177.00	0.00	0.00	150.8	178.00	0.00	0.00	154.7	179.00	0.00	0.00	158.9
180.00	0.00	0.00	164.7	180.50	0.00	0.00	168.3	181.00	0.00	0.00	171.8
182.00	0.00	0.00	175.5	183.00	0.00	0.00	177.4	184.00	0.00	0.00	178.8
185.00	0.00	0.00	179.9	186.00	0.00	0.00	180.9	187.00	0.00	0.00	181.9
188.00	0.00	0.00	182.8	189.00	0.00	0.00	183.6	190.00	0.00	0.00	184.5
191.00	0.00	0.00	185.3	192.00	0.00	0.00	186.1	193.00	0.00	0.00	186.9
194.00	0.00	0.00	187.8	195.00	0.00	0.00	188.6	196.00	0.00	0.00	189.4

197.00	0.00	0.00	190.2	198.00	0.00	0.00	191.0	199.00	0.00	0.00	191.9
200.00	0.00	0.00	192.8	201.00	0.00	0.00	193.7	202.00	0.00	0.00	194.9
203.00	0.00	0.00	196.3	204.00	0.00	0.00	199.5				

ID

2 SECTION 287.00 TIME = 500.00 HRS WS = 153.18 WIDTH = 43.2

Z	DZ	TDZ	Y	Z	DZ	TDZ	Y	Z	DZ	TDZ	Y
200.00	0.00	0.00	0.0	199.00	0.00	0.00	1.7	198.00	0.00	0.00	2.8
196.95	0.00	-0.05	3.9	196.00	0.00	0.00	4.7	195.00	0.00	0.00	5.4
194.00	0.00	0.00	6.2	193.00	0.00	0.00	6.9	192.00	0.00	0.00	7.6
191.00	0.00	0.00	8.2	190.00	0.00	0.00	8.9	189.04	0.00	0.04	9.5
188.01	0.00	0.01	10.4	187.00	0.00	0.00	11.3	186.00	0.00	0.00	12.3
185.00	0.00	0.00	13.3	184.00	0.00	0.00	14.4	183.00	0.00	0.00	15.5
182.00	0.00	0.00	16.8	181.00	0.00	0.00	18.1	180.00	0.00	0.00	19.4
179.00	0.00	0.00	20.6	178.00	0.00	0.00	21.9	177.00	0.00	0.00	23.1
176.00	0.00	0.00	24.4	175.00	0.00	0.00	25.6	174.00	0.00	0.00	26.8
173.00	0.00	0.00	28.1	172.00	0.00	0.00	29.3	171.00	0.00	0.00	30.6
170.00	0.00	0.00	32.4	169.00	0.00	0.00	34.3	168.00	0.00	0.00	36.8
167.00	0.00	0.00	39.9	166.08	0.00	0.08	42.6	165.35	0.00	0.35	45.3
164.26	0.00	0.26	48.0	163.96	0.00	0.96	52.4	162.91	0.00	0.41	58.0
161.28	0.00	-0.72	63.1	159.59	0.00	-1.41	68.7	156.78	0.00	-3.22	71.1
155.76	0.00	-3.24	73.9	155.45	0.00	-2.55	74.2	153.66	0.00	-3.34	76.4
153.65	0.00	-2.35	77.5	153.20	0.00	-1.80	78.2	152.61	0.00	-1.39	79.0
151.65	0.00	-1.35	81.4	151.28	0.00	-0.71	84.5	150.16	0.00	-0.84	85.8
149.94	0.00	-0.06	89.3	149.88	0.00	0.13	94.6	149.86	0.00	0.36	99.8
149.88	0.00	0.13	105.0	149.93	0.00	-0.07	110.2	150.14	0.00	-0.86	113.0
150.86	0.00	-1.14	114.8	151.46	0.00	-1.54	116.4	151.47	0.00	-2.53	119.1
153.52	0.00	-1.48	121.9	154.25	0.00	-1.75	123.4	155.76	0.00	-1.24	124.6
156.60	0.00	-1.40	125.4	158.28	0.00	-0.72	126.8	159.11	0.00	-0.89	127.5
159.79	0.00	-1.21	128.1	160.19	0.00	-1.81	128.4	161.13	0.00	-1.87	129.2
162.98	0.00	-1.02	130.7	164.40	0.00	-0.60	131.9	166.07	0.00	0.07	133.8
167.00	0.00	0.00	136.4	167.50	0.00	0.00	140.8	168.00	0.00	0.00	145.2
168.50	0.00	0.00	150.1	169.00	0.00	0.00	155.0	170.00	0.00	0.00	160.9
170.50	0.00	0.00	164.0	171.00	0.00	0.00	167.1	172.00	0.00	0.00	172.2
173.00	0.00	0.00	175.4	174.00	0.00	0.00	177.9	175.00	0.00	0.00	180.1
176.00	0.00	0.00	182.5	177.00	0.00	0.00	185.4	178.00	0.00	0.00	189.4
178.50	0.00	0.00	192.4	179.00	0.00	0.00	195.5	179.50	0.00	0.00	200.2
180.00	0.00	0.00	204.9	180.33	0.00	0.00	209.2	180.67	0.00	0.00	213.6
181.00	0.00	0.00	217.9	182.00	0.00	0.00	223.8	183.00	0.00	0.00	228.4
184.00	0.00	0.00	234.1	185.00	0.00	0.00	238.8	186.00	0.00	0.00	243.5
187.00	0.00	0.00	248.4	188.00	0.00	0.00	254.2	188.50	0.00	0.00	258.7
189.00	0.00	0.00	263.2	190.00	0.00	0.00	267.0	191.00	0.00	0.00	269.5
192.00	0.00	0.00	271.4	193.00	0.00	0.00	273.2	194.00	0.00	0.00	274.9
195.00	0.00	0.00	276.6	196.00	0.00	0.00	278.4	197.00	0.00	0.00	280.1
198.00	0.00	0.00	281.8	199.00	0.00	0.00	283.4	200.00	0.00	0.00	285.0
201.00	0.00	0.00	286.5	202.00	0.00	0.00	288.1	203.00	0.00	0.00	290.1
204.00	0.00	0.00	292.8								



LEGEND:

- FLUVIAL-12 CROSS-SECTION
- OSO CREEK FLOW LINE
- PROPOSED PROJECT



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March 7, 2023

LGC

131 Calle Iglesia, Suite 200
San Clemente, CA 92672
Attn: Ryan Douglas, P.E., GE

**Re: Thermal Analysis of Native Soil Samples
San Juan Capistrano, CA – San Juan Capistrano, CA (PO No. 22011-01)**

The following is the report of thermal dryout characterization tests conducted on four (4) samples of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The samples were tested at the 'in-situ' moisture content and 85% and 95% of the modified Proctor dry density ***provided by LGC***. The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 4**.

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Effort (%)	Description (LGC)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft³)
			Wet	Dry		
B-1	85	Dark gray Sandy silt (ML)	79	201	17	99
	95		73	164		111
B-2	85	Brown silty sand (SM)	75	192	17	100
	95		68	154		112
B-3	85	Brown silty clay (CL/ML)	76	182	24	96
	95		71	168		107
B-4	85	Dark gray silty / clay (CL/ML)	91	226	26	95
	95		85	180		106

Please contact us if you have any questions or if we can be of further assistance.

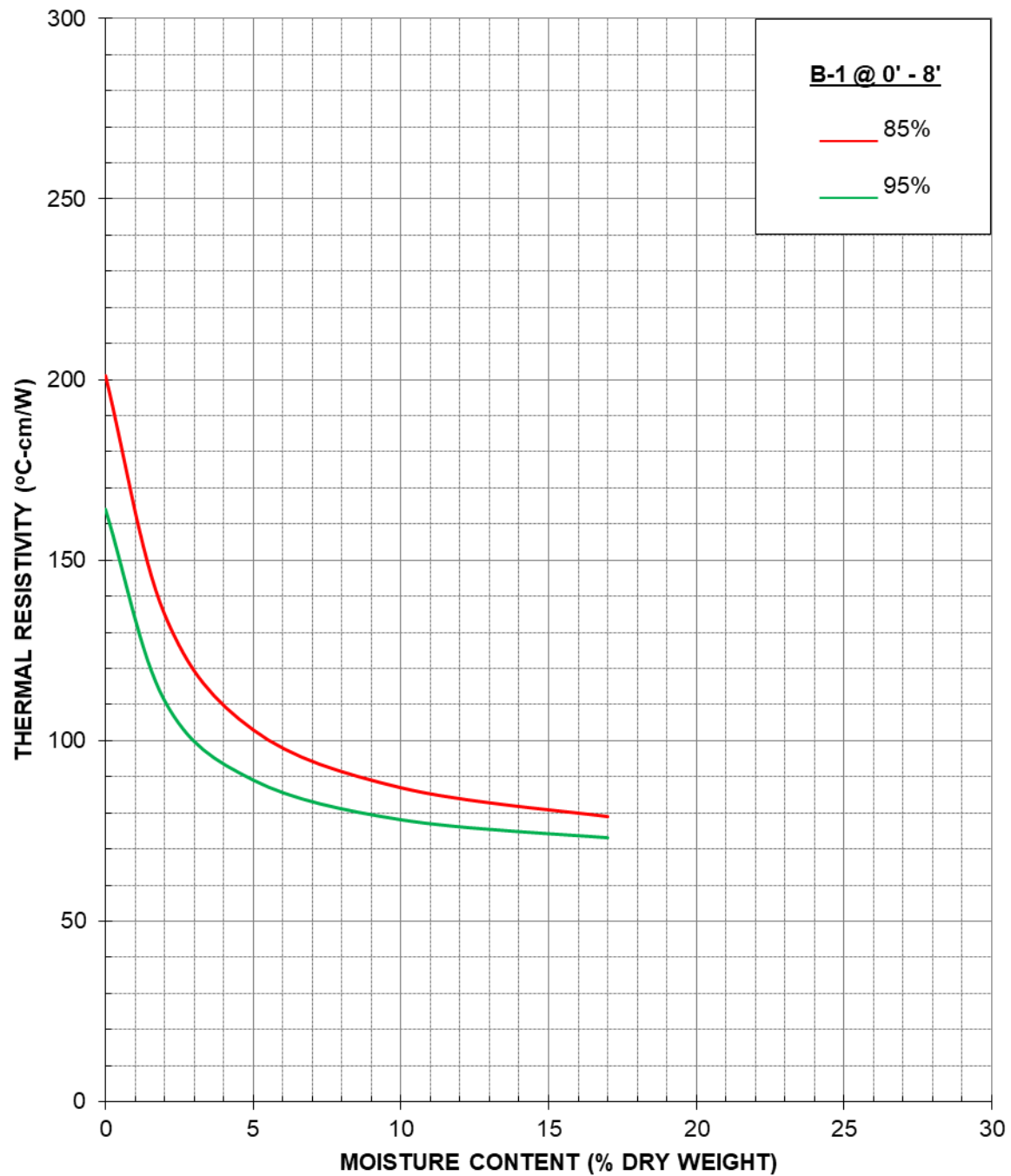
Geotherm USA

Nimesh Patel

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THERMAL DRYOUT CURVES



LGC (PO No. 22011-01)

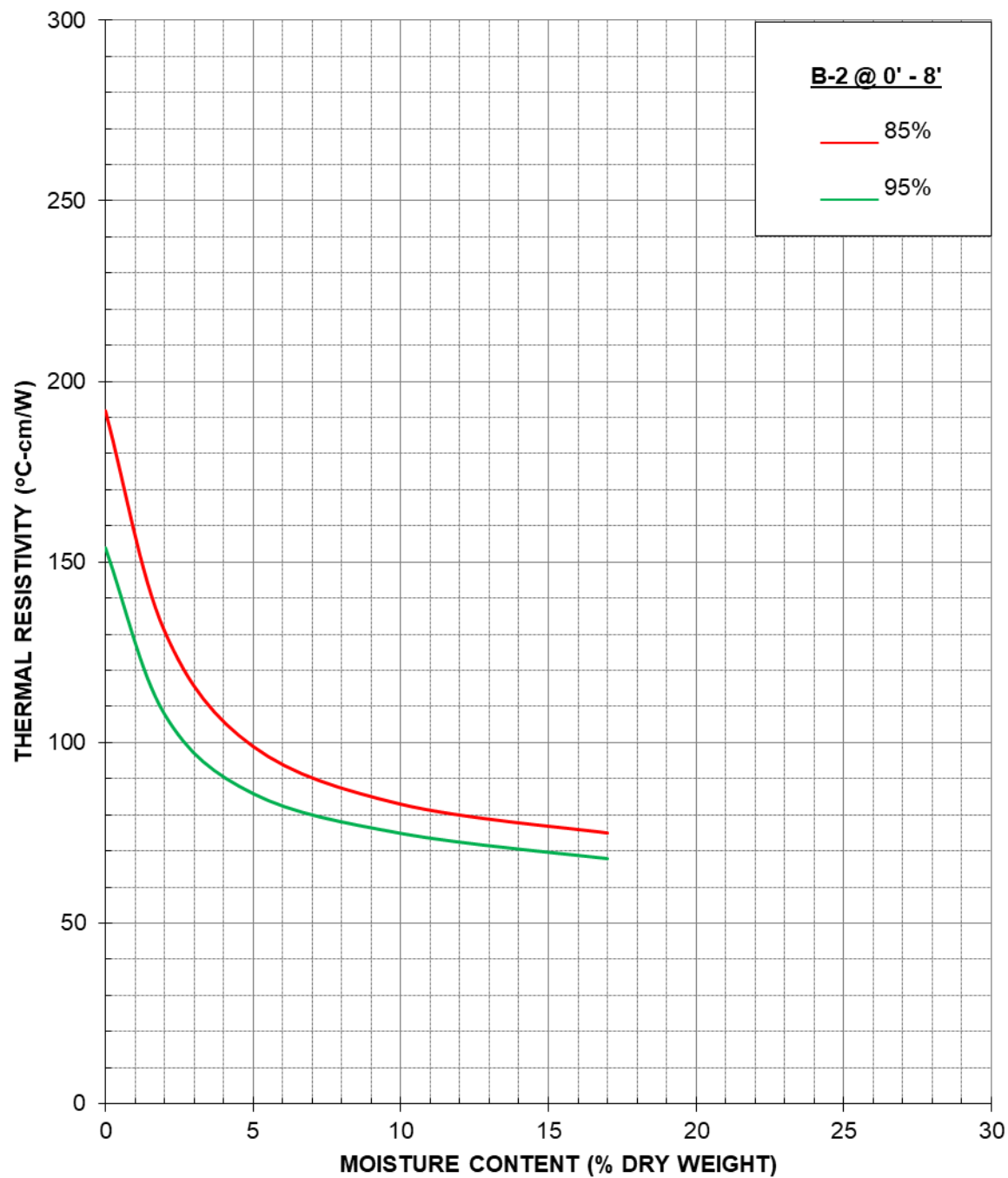
San Juan Capistrano, CA – San Juan Capistrano, CA

Thermal Analysis of Native Soil Samples

March 2023

Figure 1

THERMAL DRYOUT CURVES



LGC (PO No. 22011-01)

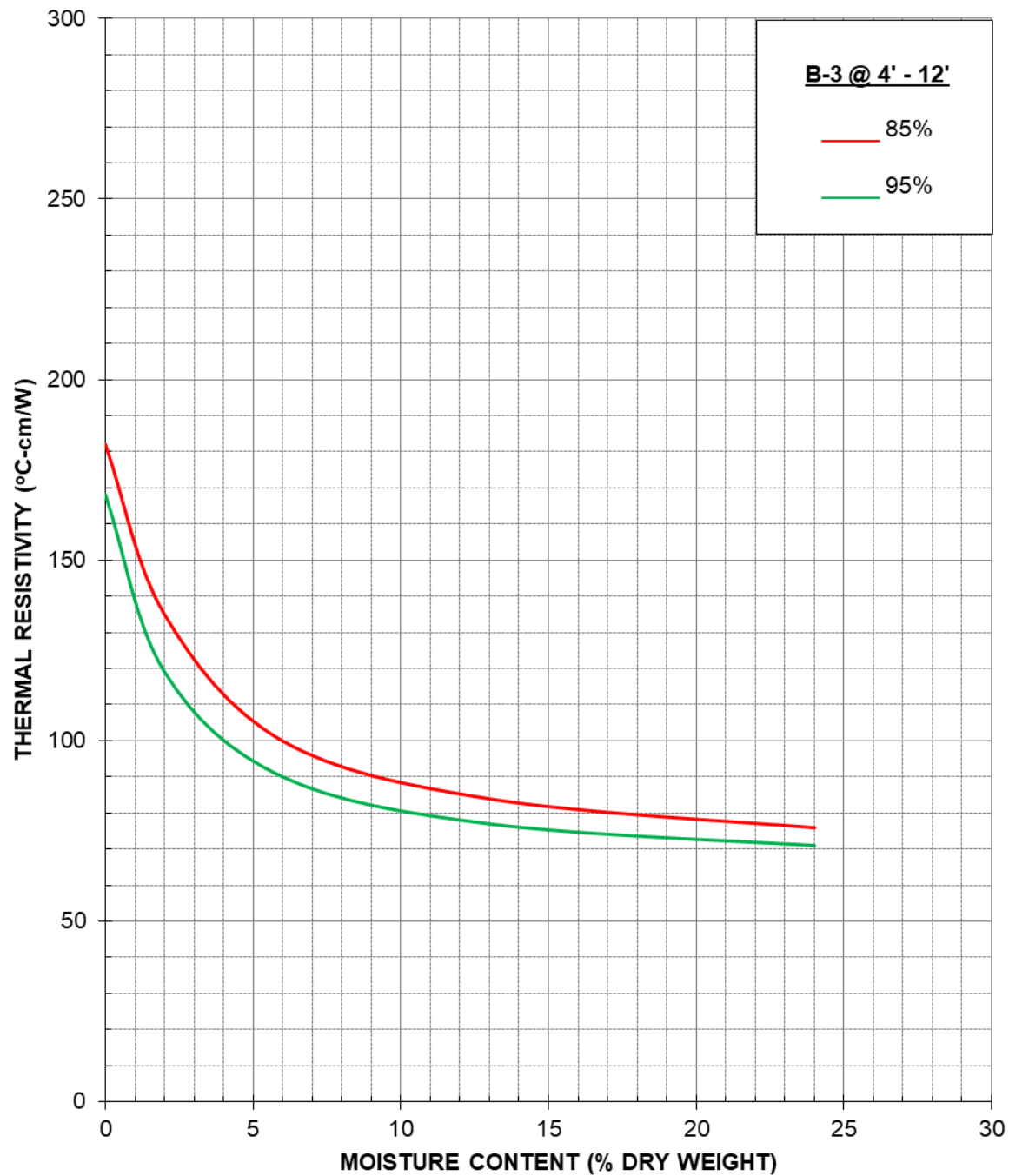
San Juan Capistrano, CA – San Juan Capistrano, CA

Thermal Analysis of Native Soil Samples

March 2023

Figure 2

THERMAL DRYOUT CURVES



LGC (PO No. 22011-01)

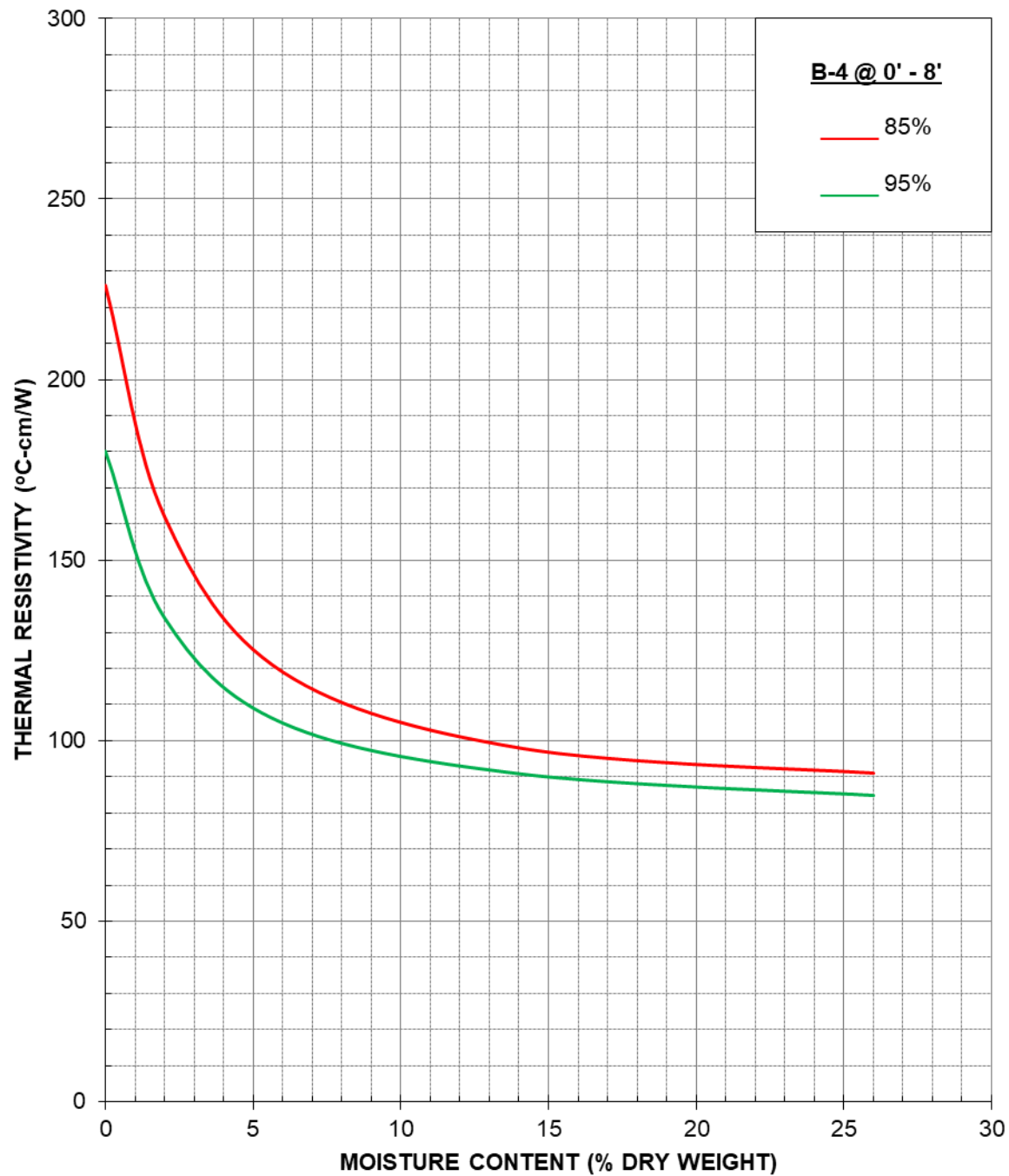
San Juan Capistrano, CA – San Juan Capistrano, CA

Thermal Analysis of Native Soil Samples

March 2023

Figure 3

THERMAL DRYOUT CURVES



LGC (PO No. 22011-01)

San Juan Capistrano, CA – San Juan Capistrano, CA

Thermal Analysis of Native Soil Samples

March 2023

Figure 4