KOURY
ENGINEERING
& TESTING, INC.

GEOTECHNICAL & SEISMIC ENGINEERING, CONSTRUCTION INSPECTION & MATERIALS TESTING SERVICES

BORROW SITE GEOTECHNICAL STUDY, PHASE I

OC PRADO - BORROW SITE
SOUTHEAST CORNER OF PINE AVENUE AND EUCLID AVENUE
CHINO, CALIFORNIA

PREPARED FOR:
COMMERCE CONSTRUCTION CO., L.P.
13191 CROSSROADS PARKWAY NORTH 6th FLOOR
CITY OF INDUSTRY, CALIFORNIA

PREPARED BY:
KOURY ENGINEERING & TESTING, INC.
14280 EUCLID AVENUE
CHINO, CALIFORNIA 91710

PROJECT NO. 16-0447
APRIL 24, 2017

TABLE OF CONTENTS

KOURY
ENGINEERING
& TESTING, INC.

April 24, 2017
Project No.16-0447

Mr. John R. Burroughs, LEED AP, President
Commerce Construction Co., L.P.
13191 Crossroads Parkway North 6th Floor
City of Industry, CA 91746

SUBJECT: Borrow Site Geotechnical Study, Phase I
Southeast Corner of Pine Avenue and Euclid Avenue
City of Chino, CA 91708

1. INTRODUCTION

This report presents the results of a preliminary Geotechnical Study performed by Koury Engineering & Testing, Inc., (Koury) for the proposed Borrow Site located at the southeast corner of Pine Avenue and Euclid Avenue in the City of Chino, California. The purpose of our study was to evaluate the surface and subsurface soil conditions for the proposed grading of the borrow site and to determine the suitability of the soils to be used as fill for a project located on the southeast corner of Bickmore Avenue and Mountain Avenue, in the City of Chino.

The recommendations provided within this submittal are based on the results of our field exploration, laboratory testing and engineering analyses. Our services were performed in general accordance with our Proposal No. 16-0447E dated February 13, 2017.

Our professional services have been performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared exclusively for Commerce Construction Co., L.P. and their consultants for the subject project. The report has not been prepared for use by other parties and may not contain sufficient information for the purposes of other parties or other uses.

2. SITE CONDITIONS

The subject borrow site is bounded by Pine Avenue on the north, Johnson Avenue on the east, Euclid Avenue on the west and Prado Regional Park on the south. The borrow site consists of three small parcels with sizes ranging from 150 to 1000 square feet, and six large parcels with sizes in the range of about 136,000 to 731,800 square feet. The legal standard use code description for these parcels are identified as being; industrial, agricultural, rural, residential, and waste land/marshes parcels.

The existing property is about 1230 to 1390 feet wide in the east-west direction and 1300 to 1690 feet long in the north-south direction. The main topographic feature of the site is a creek/drainage channel that flows southerly and divides the property in two parts. The jurisdictional boundary of the creek ranges in width from about 30 to 60 feet. A 25-foot buffer zone has been established on both sides of the jurisdictional boundary and all proposed grading will remain outside of that buffer zone.

The property contains several easements. There is a 10-foot wide and about 600-foot long SCE easement near the southwest end of the site. There is a 195-foot wide overhead power lines easement crossing the site obliquely in the northeast direction along with two towers adjacent to Euclid Avenue. In the northwest corner of the site, there is a 20-foot wide and about 530-foot-long easement connecting Pine Avenue and Euclid Avenue.

The topographic conditions are centered along the creek. On the west side of the creek, the ground surface generally slopes moderately toward the creek except for the area immediately adjacent to the creek that is relatively level and subject to flooding. There is also relatively level ground immediately adjacent to Euclid Avenue. The ground elevations hover around 560 feet along Euclid Avenue and range between about 530 and 540 feet (NAVD88) along the west side of the creek. On the east side of the creek, the highest area is located in the northeast corner portion of the site where there is relatively flat ground with elevations between about 559 and 560 feet. The ground surface generally slopes between elevations 560 and 550 feet, toward the south, along Johnson Avenue. Within the southern one-half of the site, west of Johnson Avenue, there is a relatively level area with elevations ranging from about 547 to 557 over a width of 280 to 330 feet. On the west side of this area, the ground surface slopes toward the creek. Within the northern portion of the site and east of the creek, the ground surface generally slopes west toward the creek within a distance of about 250 feet from the creek. The grades along the creek generally ranges from 530 to 540 feet.

The other features of the site include the above ground structures, which encompass the caretaker residence located within the northwest corner of the site. There is still a small area located in the vicinity of the caretaker residence being used for farming purpose. West and south of the small active farming area, there are vacant buildings. West of the creek and south of Pine Avenue, there is an abandoned former electric station and other buildings. Along Johnson Avenue, there are several slabs at grade that appear to be the remains of former buildings. Several corral fences are still remaining in place.

There is some evidence that prior grading has occurred at the site. There are four small retaining walls located in the northwest corner of the site along with a remaining driveway ramp. There is an access trail that begins along Pine Avenue, passes parallel to Euclid Avenue and loop down along the west side of the creek. A small retaining wall and a slope was built to support a portion of that loop road. On the east side of the creek, the main past grading appears to be near the south end of the site where up to about 15 feet of fill may have been placed to raise the grades in the vicinity of the creek. Some grading also appears to have been performed to bury the foundation of some buildings that have been removed.

Most of the vegetation, which consists of medium size trees, is located in the northern portion of the site along Pine Avenue and Johnston Avenue. There are concentrations of large shrubs along the east side of the creek within the southern portion of the site. At the time of our field exploration, there was heavy ground cover below and north of the SCE electrical overhead easement on the slope east of the creek.

3. PROPOSED BORROW SITE GRADING

As presently planned, we understand that approximately 694,038 cubic yards of soils will be excavated from the site, and out of this quantity about 24,023 cubic yards will be placed in low areas on the west side of the creek jurisdictional boundary buffer zone and 670,915 cubic yards will be exported off site. The Conceptual Grading Plan dated November 22, 2016, indicates that no grading will occur within 20 feet of the property lines on the south, east and west sides, and within 20 feet of the future right-of-way along Pine Avenue. Also, no grading will take place within the immediate vicinity of the two electric towers located along Euclid Avenue and within the Creek Jurisdictional Boundary and its buffer zone that extends 25 feet on both sides of the Jurisdictional Boundary.

Starting from the 20 feet setback from the property lines, the site will be graded at 4:1 (H:V) descending slopes toward the center of the property until the base level of the site is reached. The base level of the site will have a one percent gradient sloping toward the creek traversing the property. For the most part, the proposed cut slope adjacent to Johnson Avenue will have a height in the range of 15 to 21 feet. The slope along Pine Avenue, between Johnson Avenue and the creek will also be a 4:1 (H:V) cut with a height ranging between 3 and 18 feet. Along the buffer zone on the east side of the creek, there will be small 2 to 6-foot high slopes descending toward the graded area except for the southwest corner area where the slope may reach a height of up to about 15 feet in a localized area. Except within the vicinity of the buffer zone, the proposed borrow site cuts between the buffer zone and Johnson Avenue range predominantly between 5 and 20 feet. There is no proposed fill on the east side of the buffer zone. The base grade elevations on the east side of the creek will range between about 531 and 543 feet.

For the most part, the proposed 4:1 (H:V) cut slopes at the south end of the site and adjacent to Euclid Avenue will have a height in the range of 15 to 23 feet. The slope along Pine Avenue, between Euclid Avenue and the creek, will also be at an inclination of 4:1 (H:V), with partial cut and fill segments with a height ranging between about 3 and 15 feet. Along the buffer zone on the west side of the creek, there will be small slopes of about 1 to 4 feet in height descending toward the buffer zone. Except within the vicinity of the buffer zone and Pine Avenue, the proposed cuts between the buffer zone and Euclid Avenue are predominantly between 4 and 23 feet in height. There is a strip along the entire west side of the buffer zone that will be in fill with anticipated thickness in the range of 1 to 6 feet. The proposed width of the fill area is estimated to range predominantly between 100 and 150 feet. The finish base elevations on the west side of the creek will range between about 531 and 544 feet.

4. FIELD EXPLORATION

The field exploration program consisted of drilling twelve soil test borings on March 10 and 17, 2017, and excavating eighteen test pits on March 17, 2017. The borings were drilled to depths ranging between about 16 and 36½ feet and the test pits were excavated to depths between about 6 and 16 feet. The locations of the borings and the test pits are shown on the Boring Location Map, Figures A-2a and 2b, Appendix A. Standard penetration test samples, California ring samples and bulk samples were obtained from the borings for laboratory testing. The test pits were visually logged and bulk samples were obtained from representative strata. The depths, blow counts, and description of the samples are shown on the attached boring logs presented in Appendix B of this report. The contractor used a 140-lbs automatic hammer to drive the samplers 18 inches into the soils.

5. LABORATORY TESTING

Laboratory tests, including moisture content, #200 sieve wash, gradation, dry unit weight, maximum density and optimum moisture content, expansion index, plasticity index (Atterberg Limits) and pocket penetrometer were performed to aid in the classification of the materials encountered and to evaluate their engineering properties. Sulfates, chlorides, resistivity, and PH tests (corrosivity tests) were also performed on selected samples. The results of the laboratory tests are presented on the boring logs in Appendix B, and/or in Appendix C.

6. SOILS CONDITIONS

The subsurface soil profile consists of fill underlain by alluvial deposits. We encountered fill depths up to 15 feet during our field exploration.

The subsurface soils encountered in our borings and test pits consist predominantly of various mixtures of clay, which includes lean clay and fat clay with variable sand contents. Other soils encountered included sandy silt, elastic silt, poorly graded sand with silt, clayey sand and silty sand.

The clay soils were found to be generally very moist. With few exception, the laboratory testing indicated moisture contents of the clay and silt soils to be generally in the range of 11 and 30 percent with an average of about 24 percent. The moisture content of the sand generally range between about 7 and 19 percent with an average of about 13½ percent.

Our #200 sieve wash tests indicated that the sand generally has about 17 to 49 percent fines contents with an average of about 32 percent. The fines contents of the silt and clay vary between about 50 and 96 percent with an average of about 72 percent. The dry unit weights of sand generally vary between 106 and 115 with an average of about 111 pcf and the dry unit weights of silt and clay vary between 84 and 116 with an average of about 101 pcf. The pocket penetrometer test result shows the unconfined compression strength of the fine soils to be between 0.5 and 4.5 tsf. with an average of about 2.5 tsf. The maximum density test results of representative silt and clay samples are presented in the following table.

Table 1 – Maximum Density Test Results

Test Pit	**TP-4**	**TP-5**	**TP-11**	**TP-17**
Maximum Dry Density (pcf)	120.5	104.5	119.1	118.1
Optimum Moisture Content (%)	12.4	17.3	13.1	13.0

The plasticity index test results on one sample of Boring B-2 indicated a fat clay type of soil with Liquid Limit, Plastic Limit and Plasticity Index equal to 61, 22 and 39, respectively. The gradation test results indicate that the sand size is generally fine to medium.

The soil conditions described in this report are based on the soils observed in the test borings drilled for this investigation and the laboratory test results. Variations in the soil conditions as well as detailed descriptions are indicated on the logs attached in Appendix B. Variations between and beyond the borings and test pits should be anticipated.

7. SITE GEOLOGY

The site is located within the Upper Santa Ana River Valley, which consists of a series of coalescing alluvial fans formed by streams flowing out of the San Gabriel Mountains to the north. The valley lies within the Peninsular Ranges geomorphic province, which is characterized by alluviated basins, elevated erosion surfaces, and northwest-trending mountain ranges bounded by northwest trending faults. The site, which is located within the Chino Basin, is underlain by sediments deposited by the Santa Ana River and its tributaries such as the Chino Creek.

Morton and Miller (2006) show the site to be underlain by two sedimentary units; namely young alluvial-valley deposits within the channel and very old alluvial-fan deposits outside the channel (See Figure A-4 in Appendix A). The sediments observed during drilling consisted predominantly of clay and silt.

8. GROUNDWATER

The creek bottom is near elevation 538 feet at the north end of the site and near elevation 528 feet (NAVD) at the south end. Based on extrapolation of groundwater monitoring north and west of the site, the groundwater level should be at approximately elevation 540 feet at the north end of the site and 530 feet at the south end. The groundwater elevations encountered in our borings/test pits near the creek correspond roughly to the elevations anticipated from extrapolation of the previous groundwater monitoring data. Further away from the creek such as along Johnson Avenue and 1/3 of the way between Euclid Avenue and the creek, the water level may be on the order of 5 feet higher than adjacent to the creek. Perched water was encountered in Borings B-9 and B-11 (these borings were drilled following prolonged rains).

We also noted that the creek overflows its west bank during prolonged heavy rainstorms. During some of our site visits immediately following heavy rains, we encountered standing water at the ground surface on the west side of the creek, where it is proposed to raise the grades.

The groundwater elevations encountered in the borings are plotted on Figures A-3a and A-3b presented in Appendix A. The groundwater depths and elevations encountered during the field exploration are summarized in the following Table 2. The groundwater elevations encountered in the exploration points range between about 528 and 542 feet.

Table 2 - Summary of Groundwater Data

Boring/Test Pit	Ground Elevation (feet)	Groundwater Depth (feet)	Groundwater Elevation (feet)
B-1	548.7	20.0	528.7
B-2	550.4	20.0	530.4
B-3	556.1	16.0	540.1
B-4	557.9	16.0	541.9
B-5	560.2	23.0	537.2
B-6	559.2	20.0	539.2
B-7	559.3	20.0	539.3
B-8	564.2	30.0	534.2
B-9	556.2	14.0	542.2
B-10	556.8	15.0	541.8
B-11	559.2	25.0	534.2
B-12	545.8	≃16.0	≃ 529.7
TP-13	539.4	6.0	533.4
TP-14	551.5	15.3	536.2
TP-15	549.0	14.5	534.5
TP-16	546.5	10.5	536.0
TP-17	547.0	11.5	535.5

9. SOIL EXPANSIVITY

Except for some of the fills in the southeast portion of the site, the subsurface soils encountered in the borings/test pits consist mostly of clay. This type of material generally has a high susceptibility to expansion when facing seasonal cycles of saturation/desiccation. Except for one test, the expansion index test indicated value of 80, 91 and 95. The majority of the clay soils appears to have an expansion potential near the high range.

10. SOIL CORROSIVITY

The corrosion potential of the onsite materials to steel and buried concrete was preliminarily evaluated. Laboratory testing was performed on selected soil samples to evaluate pH, minimum resistivity, chloride and soluble sulfate content. The test results are presented in the following table.

Table 3 - Corrosion Test Results

Test Pit	Depth (ft)	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
TP-4	6.5-7.0	427	9.4	1380	55
TP-5	3.5	2040	8.3	48	30
TP-11	12-12.5	222	8.9	725	1550
TP-17	8.5-9.5	1300	8.0	271	145

These tests are only an indicator of soil corrosivity for the samples tested. Other soils found on site may be more, less, or of a similar corrosive nature. Based on the minimum resistivity results from the soils tested, the near-surface site soils are considered to be corrosive to severely corrosive towards buried ferrous metals.

The concentrations of soluble sulfates indicate that the potential of sulfate attack on concrete in contact with the onsite soils is moderate based on ACI 318 Table 4.3.1. Cement Type II/V may be used in the concrete based on these test results; however, the water-cement ratio should not exceed 0.5 and the concrete strength should be at least 4,000 psi for these sulfate concentrations. Because of the high soluble chloride content and the severe corrosivity to metals, concrete with a water-cement ratio of 0.45 and a minimum strength of 4,500 psi is more appropriated for the soil tested. Further interpretation of the corrosivity test results, including the resistivity value, and providing corrosion design and construction recommendations are the purview of corrosion specialists/consultants. We recommend that additional corrosivity tests be performed following soil placement at the building site.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1. General

In our opinion, the planned borrow site grading is feasible with minor modifications provided the geotechnical recommendations presented in this report are followed.

The main concerns from a geotechnical standpoint are the proposed depths of excavation that may reach groundwater in localized areas, the presence of clay with a high expansion potential, the large quantity of very moist soils that cannot be compacted without dry back, and the presence of undocumented fill containing construction debris and oversize particles. The following sections contain geotechnical conclusions and recommendations for the borrow site grading, and discussions about the suitability of the borrow site soils to be used as engineered fill to balance the grade for the site development at the southeast corner of Bickmore Avenue and Mountain Avenue, in the City of Chino.

11.2. Design and Grading of the Borrow Site

On the east side of the creek buffer zone, the proposed grades are generally lower than along the buffer zone boundary. We recommend to raise the proposed design grades by at least 4 feet to maintain positive drainage toward the creek buffer zone for most of its length. This raise in grade should allow to maintain the finish grade surface above the localized zones of relatively high water levels encountered during the borrow site exploration.

On the west side of the buffer zone, in the vicinity of the SCE overhead electrical line easement and east of the electrical towers, perched water was encountered. We suggest to raise the design grades by about 6 feet in the area of Boring B-10 and 4 feet in the area of Boring B-9. This perched water is attributed to heavy rainfall and should drain itself over time.

The borrow site slopes are generally less than 22 feet in height and will be cut or filled at 4:1 (H:V) inclination. Based on our observation of some of the steeper existing slopes onsite and the types of soils, we expect the proposed slopes to perform as intended both from a gross stability standpoint and a surficial stability standpoint.

Most of the borrow site grading will consist of cuts except for a strip along the west side of the buffer zone that extends to the setback line along Pine Avenue where the existing grades will be raised by 1 to 6 feet, including some slope construction along Pine Avenue. We recommend that all organic materials and other debris be removed from the areas to be filled. Following the removal of unsuitable materials, these areas should be scarified, moisture conditioned and recompacted to at least 85 percent relative compaction except for the slope area and access roads which should be compacted to at least 90 percent relative compaction. The fill outside the slopes and access roads should be placed in 8 inch lifts, moisture conditioned and compacted to at least 85 percent relative compaction. For slope areas, a keyway (1 by 2 by 10'wide) should be excavated prior to filling. The slope fill should be placed in 8 inch lifts, moisture conditioned, and compacted to at least 90 percent relative compaction. Benching into the existing native material should be performed as the fill progress.

11.3. General Grading Requirements

Prior to grading, we recommend that the site be cleared of remaining structures, foundations, abandoned utilities and pavements. We recommend that all organic topsoil be stockpiled for placement at subgrade level once the site has been excavated to design grade.

1. All fills, unless otherwise specifically stated in the report, should be compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557 Method of Soil Compaction.

2. No fill should be placed until the area to receive the fill has been adequately prepared and approved by the Geotechnical Consultant or his representative.

3. Fill soils should be kept free of debris and organic material.

4. Rocks or hard fragments larger than 6 inches may not be placed in the fill without approval of the Geotechnical Consultant or his representative, and in a manner specified for each occurrence. All rock fragments in the 2 to 3-inch range should be dispersed and mixed within the sand matrix to avoid rock concentrations. Oversize materials should be disposed outside the structural fill and flatwork areas.

5. The fill material should be placed in lifts which, when loose, should not exceed 8 inches per lift. Each lift should be spread evenly and should be thoroughly mixed during the spreading to obtain uniformity of material and moisture.

6. When the moisture content of the fill material is too low to obtain adequate compaction or lower than the minimum recommended, water should be added and thoroughly dispersed until the soil has a moisture within 2½ percent of optimum moisture content for granular

soils and at least 125 percent of optimum or 3 percent above optimum, whichever is greater, for clay except as indicated otherwise by the Geotechnical Engineer at the time of construction.

7. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material should be aerated by blading or other satisfactory methods until the soil has a moisture content as specified herein.

It should be noted that some of the onsite soils have high moisture contents and these soils are subject to "pumping" (deflection). Remixing and drying back these soils will be required to achieve compaction. When weather and/or time does not allow drying back the excavation bottoms, "bridging" of bottom excavations for exterior flatwork may be performed by overexcavating some of the moist/wet soils and backfilling with ¾-inch crushed rock wrapped with geosynthetics. The contractor should select appropriate excavation and compaction equipment to avoid disturbing the subgrade and to be able to compact the fill to the project specifications above a relatively soft subgrade. Track-mounted excavators, track backhoes, and appropriate towed non-vibratory sheepsfoot combined with very thin backfill lifts should be used as necessary to reduce subgrade disturbance.

11.4. Fill Materials for Borrow Site

The onsite soils can be used for backfill within the borrow site following removals of all oversize particles, organic and other deleterious material and proper processing.

11.5. Excavations at the Borrow site

The shallow undisturbed site soils are expected to be temporarily stable when excavated vertically to a depth of 5 feet. For excavations between 5 and 8 feet, a gradient of ¾:1 (H:V) may be used. The top of slopes should be barricaded to prevent vehicles and storage loads within 5 feet of the tops of the slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes; we should be advised of such heavy vehicle loadings so that specific setback requirements can be established. When excavating adjacent to existing footings or building supports, proper means should be employed to prevent any possible damage to the existing structures. Un-shored excavations should not extend below a 1¼:1 (H:V) plane extending downward from the lower edge of adjacent footings and should start at least two feet away from the footing. Where there is insufficient space to slope back an excavation, shoring may be required. All regulations of State and Federal OSHA should be followed. Some sloughing and caving of excavations may occur.

Temporary excavations are assumed to be those that will remain un-shored for a period of time not exceeding one week. In dry weather, the excavation slopes should be kept moist, but not soaked. If excavations are made during the rainy season (normally from November through April), particular care should be taken to protect slopes against erosion. Mitigative measures, such as installation of berms, plastic sheeting, or other devices, may be warranted to prevent surface water from flowing over or ponding at the top of excavations.

12. SUITABILITY OF SOILS FOR EXPORT

The majority of the borrow site soils are fine, very moist, and have medium to high plasticity, which make them difficult to excavate, to process, to place and to compact. They will require significantly more effort and more time as compared to importing granular material to achieve an acceptable engineered fill.

Barring the workability constraints, the onsite soils can generally be used for export to the proposed development on Bickmore Avenue in Chino with some special consideration. The primary consideration from a geotechnical standpoint is the presence of clay soils with moderate to high expansion potential. We recommend that the clay soils with expansion index of 80 or greater be placed at least 2 feet below the finished pavement subgrade and at least four feet below the building foundations. The clay soils will have to be placed at moisture contents of at least 130 percent of optimum or 3 percent above optimum, whichever is greater.

The second consideration is the high moisture content of most of the clay soils. Based on the maximum density tests performed for this study, the optimum moisture contents on the clay range from about 12 to 17 percent with an average near 14 percent. On the other hand, the average moisture content of the clay tested from our field exploration indicated an average of about 24 percent with a range generally of up to the lows 30’s. The moisture contents get higher within about 6 to 7 feet of the groundwater level. Based on this limited data, the moisture contents of the clay soils are generally 10 to 15 percent above optimum. Therefore, dry back of the soils will be required to achieve the specified relative compaction. We recommend that most of the dry back be performed in the borrow site by opening large areas and disking and turning over the material several times. Depending upon the weather condition, the efficiency of the processing and the soil conditions, this drying back may take a few days or more for each lift. We recommend that the moisture content of the soils be monitored in the borrow site prior to exporting.

The third consideration is the presence of construction debris. The fill that was placed onsite appears to come from construction/demolition sites and contains some oversize material, concrete, rebars, wood etc. Personnel and equipment should be assigned to remove the deleterious material from these soils prior to export. All topsoil, organic material, manure from the corral areas, and other non-suitable material for structural fill should be stockpiled onsite and placed back at finish surface following grading completion.

A fourth consideration is to perform selective grading within the borrow site and to use another borrow site to complement the soils needed. The upper 10 feet of soil appears to have generally lower moisture contents than the deeper soils and may be more suitable than the deeper soils. Some areas of the borrow site may be more suitable than other areas, i.e. lower plastic soils. We recommend that additional test pits be excavated to further characterize the soils if selective grading is contemplated.

13. OBSERVATION AND TESTING

This report has been prepared assuming that Koury Engineering & Testing, Inc. will perform all geotechnical-related field observations and testing. If the recommendations presented in this report are utilized, and observation of the geotechnical work is performed by others, the party performing the observations must review this report and assume responsibility for the recommendations contained herein. That party would then assume the title of "Geotechnical Consultant of Record". A representative of the Geotechnical Consultant should be present to observe all grading operations as well as all footing excavations. A report presenting the results of these observations and related testing should be issued upon completion of these operations.

14. CLOSURE

The findings and recommendations presented in this report were based on the results of our field and laboratory investigations, combined with professional engineering experience and judgment.

The report was prepared in accordance with generally accepted engineering principles and practice. We make no other warranty, either expressed or implied. Subsurface variations between and beyond the borings/test pits should be anticipated. Koury should be notified if subsurface conditions are encountered, which differ from those described in this report. Samples obtained during this investigation will be retained in our laboratory for a period of 45 days from the date of this report and will be disposed after this period.

Should you have any questions concerning this submittal, or the recommendations contained herewith, please do not hesitate to call our office.

Respectfully submitted,

KOURY ENGINEERING & TESTING, INC.

Jacques Roy

Jacques B. Roy P.E. G.E.
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
JACQUES B. ROY
NO. 2077
Ex. Date 9/30/17
Geotechnical
STATE OF CALIFORNIA

Distribution: 1. Addressee (2 wet stamped copy + a pdf copy via e-mail)
2. File (B)

APPENDICES

Appendix A: Maps and Plans

Vicinity Map – Figure A-1
Field Exploration Map – Figures A-2a and A-2b
Water Elevation Map – Figure A-3a and A-3b
Geology Map – Figure A-4

Appendix B: Field Exploratory Boring Logs

Appendix C: Laboratory Test Results

REFERENCES

1. California Division of Mines and Geological, 1998, Seismic Hazard Zone Report 045 for the Prado Dam 7.5 Minute Quadrangle, California.

2. California Division of Mines and Geological Survey, 2003, Earthquake Fault Zones, Prado Dam Quadrangle, May 1, 2003.

3. City of Chino General Plan, Safety Element, 2010, Final Report.

4. http://geotracker.waterboards.ca.gov.

5. US Army Corps of Engineers, Geotechnical Investigations, Engineering Manual EM 1110-1-1804, dated 8/26/86.

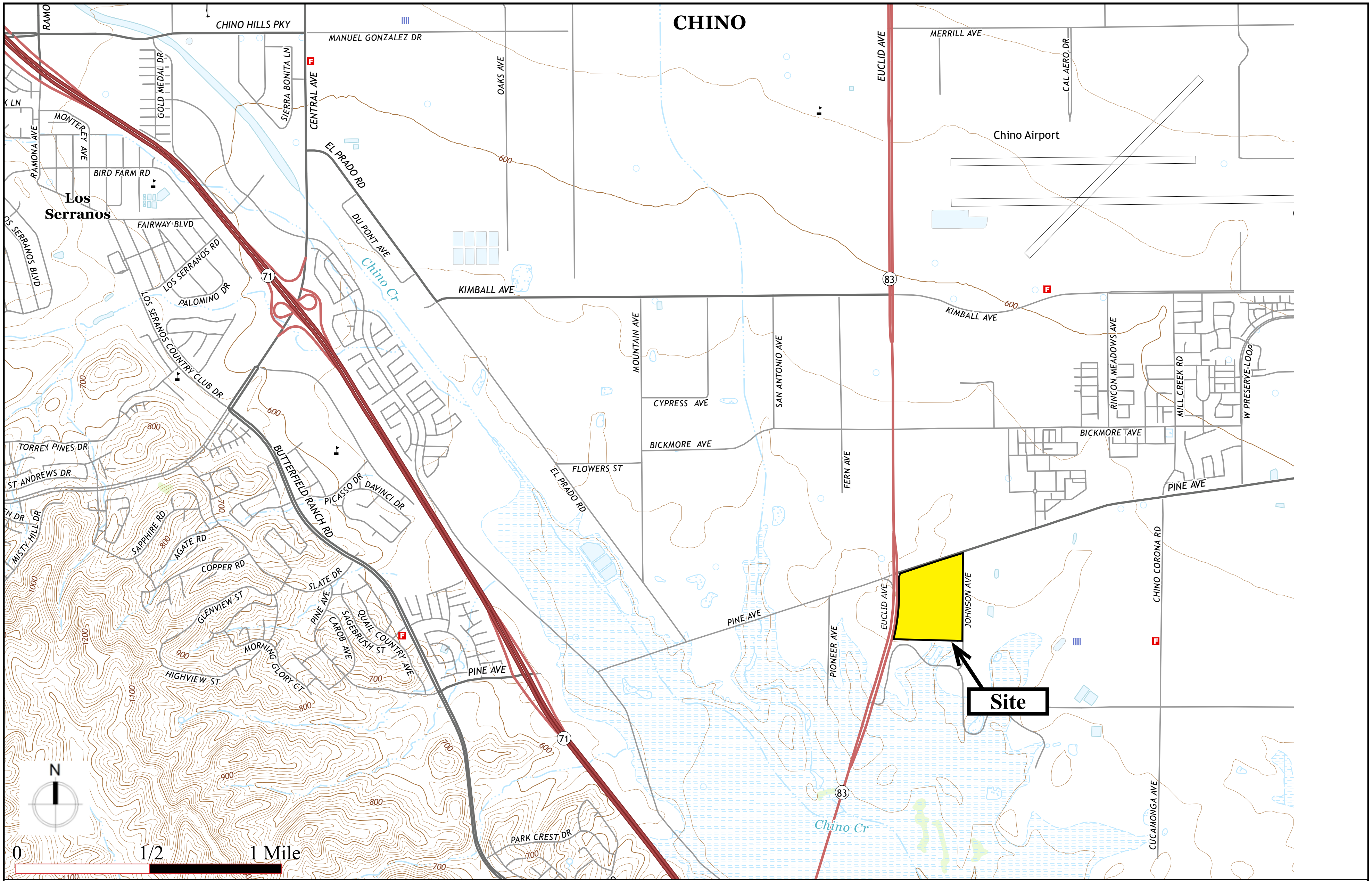
6. US Army Corps of Engineers, Laboratory Soils Testing, Engineering Manual EM 1110-2-1906, dated 8/26/86.

7. United States Geological Survey, 2006, Geology Map of the San Bernardino & Santa Ana 30’ X 60’ Quadrangles, California, Version 1.0, compiled by Douglas M. Morton et al, 2006.

8. United States Geological Survey, 2015, Prado Dam Quadrangle, 7.5-Minute Series (Topographic) Map Quadrangle, California.

APPENDIX A

Maps and Plans



Reference: USGS Topographic Map, Prado Dam Quadrangle, California, 7.5 Minute Series 2015 - Contour Interval 20 feet, NAVD of 1988

KOURY ENGINEERING & TESTING, INC.

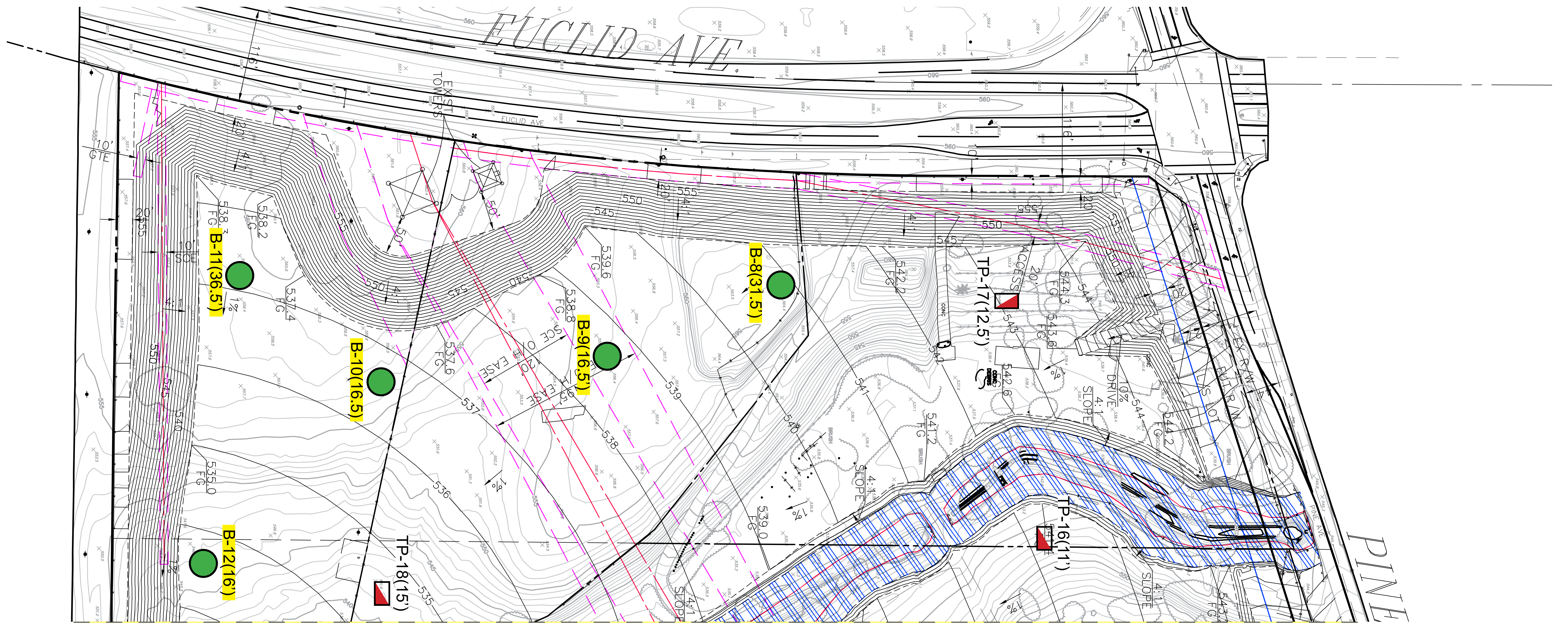
Project Name: **Borrow Site**

Project No.: **16-0447**

Date: **April 2017**

Drawing Title: **Vicinity Map**

Figure: **A-1**



MATCHLINE - SEE FIGURE A-1

Legend

TP-18 (15') 🟥 Test Pit Location, Number & Depth in feet

B-12 (12') ● Boring Location, Number & Depth in feet

0 120 240'

PREPARED BY:

PBLA ENGINEERING, INC.
Planning • Engineering • Surveying
4790 IRVINE BLVD,. STE 105-262
IRVINE, CALIF. 92620
(888) 714-9642 • (714)389-9191 FAX

COMMERCE CONSTRUCTION CO., L.P.
13191 Crossroads Parkway North
Sixth Floor
City of Industry, California 91746-3497
Telephone: (562) 699-0453
License No. 723302

REVISIONS:	
11-22-16	3rd RELEASE
10-25-16	2nd RELEASE
10-18-16	1st RELEASE

CONCEPT GRADING PLAN
SOUTH CHINO PARCEL STUDY
CHINO, CA
BORROW SITE GRADING

JOB NO.
100-28
SHEET
1 of 1

KOURY
ENGINEERING
& TESTING, INC.

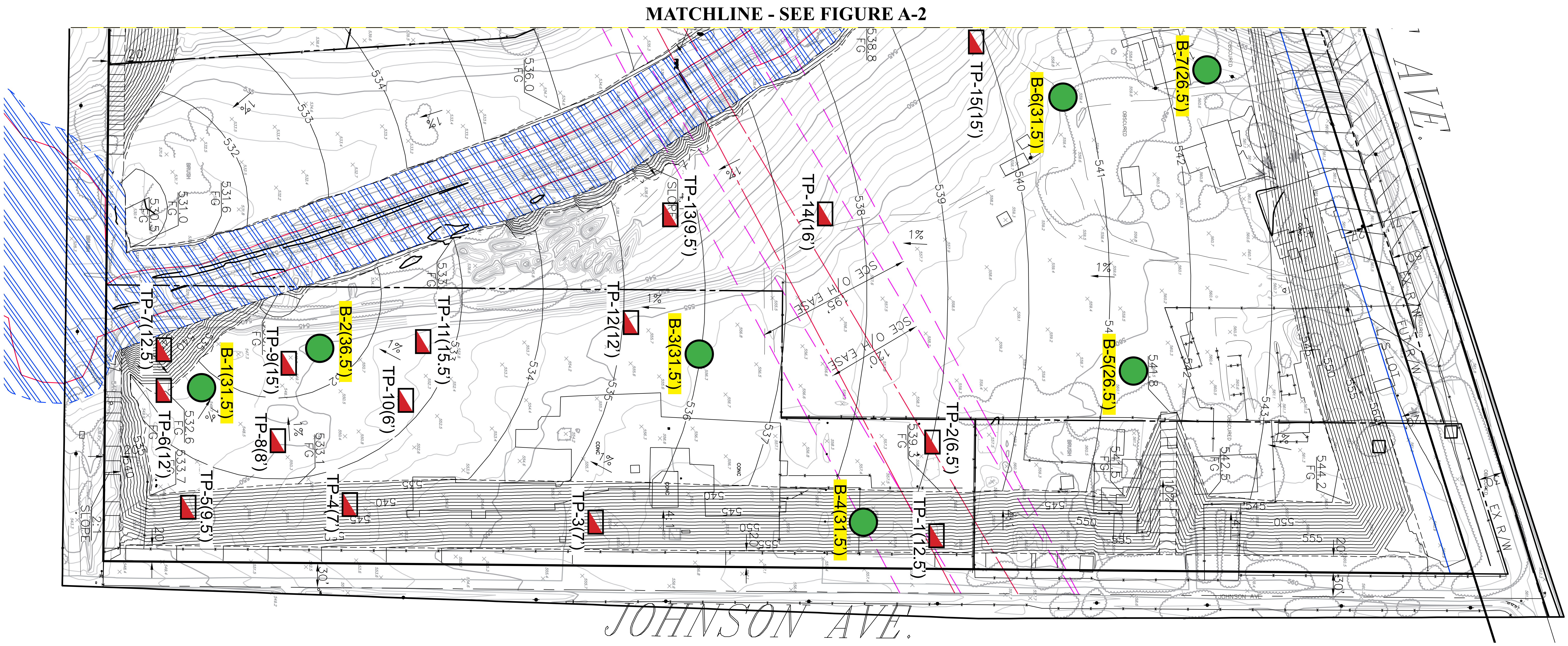
Project Name: Borrow Site

Project No.: 16-0447

Date: April 2017

Drawing Title: Field Exploration Map

Figure: A-2a



Legend

TP-18 (15') 🟥	Test Pit Location, Number & Depth in feet
B-12 (12') ●	Boring Location, Number & Depth in feet

0 120 240'

PREPARED BY:

PBLA ENGINEERING, INC.
Planning • Engineering • Surveying
4790 IRVINE BLVD., STE 105-262
IRVINE, CALIF. 92620
(888) 714-9642 • (714)389-9191 FAX

COMMERCE CONSTRUCTION CO., L.P.
13191 Crossroads Parkway North
Sixth Floor
City of Industry, California 91746-3497
Telephone: (562) 699-0453
License No. 723302

REVISIONS:

11-22-16	3rd RELEASE
10-25-16	2nd RELEASE
10-18-16	1st RELEASE

CONCEPT GRADING PLAN
SOUTH CHINO PARCEL STUDY
CHINO, CA
BORROW SITE GRADING

JOB NO. 100-28
SHEET 1 of 1

KOURY ENGINEERING & TESTING, INC.

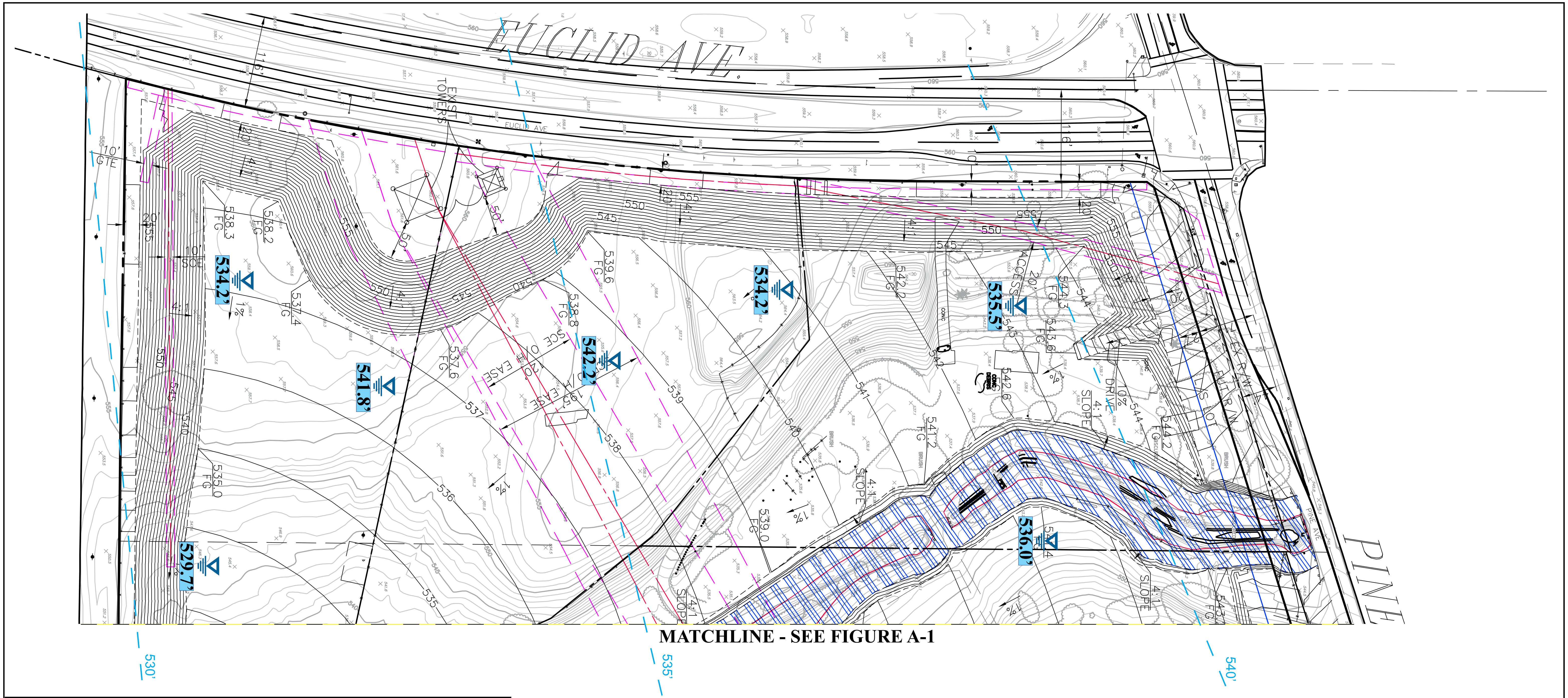
Project Name: Borrow Site

Project No.: 16-0447

Date: April 2017

Drawing Title: Field Exploration Map

Figure: A-2b



Legend

529.7' Ground Water Elevation (ft.) Measured During Field Exploration

540' Approximate Groundwater Contour Elevation Based on Information Provided by Others

0 120 240'

PREPARED BY:

PBLA ENGINEERING, INC.
Planning • Engineering • Surveying
4790 IRVINE BLVD,. STE 105-262
IRVINE, CALIF. 92620
(888) 714-9642 • (714)389-9191 FAX

COMMERCE CONSTRUCTION CO., L.P.
13191 Crossroads Parkway North
Sixth Floor
City of Industry, California 91746-3497
Telephone: (562) 699-0453
License No. 723302

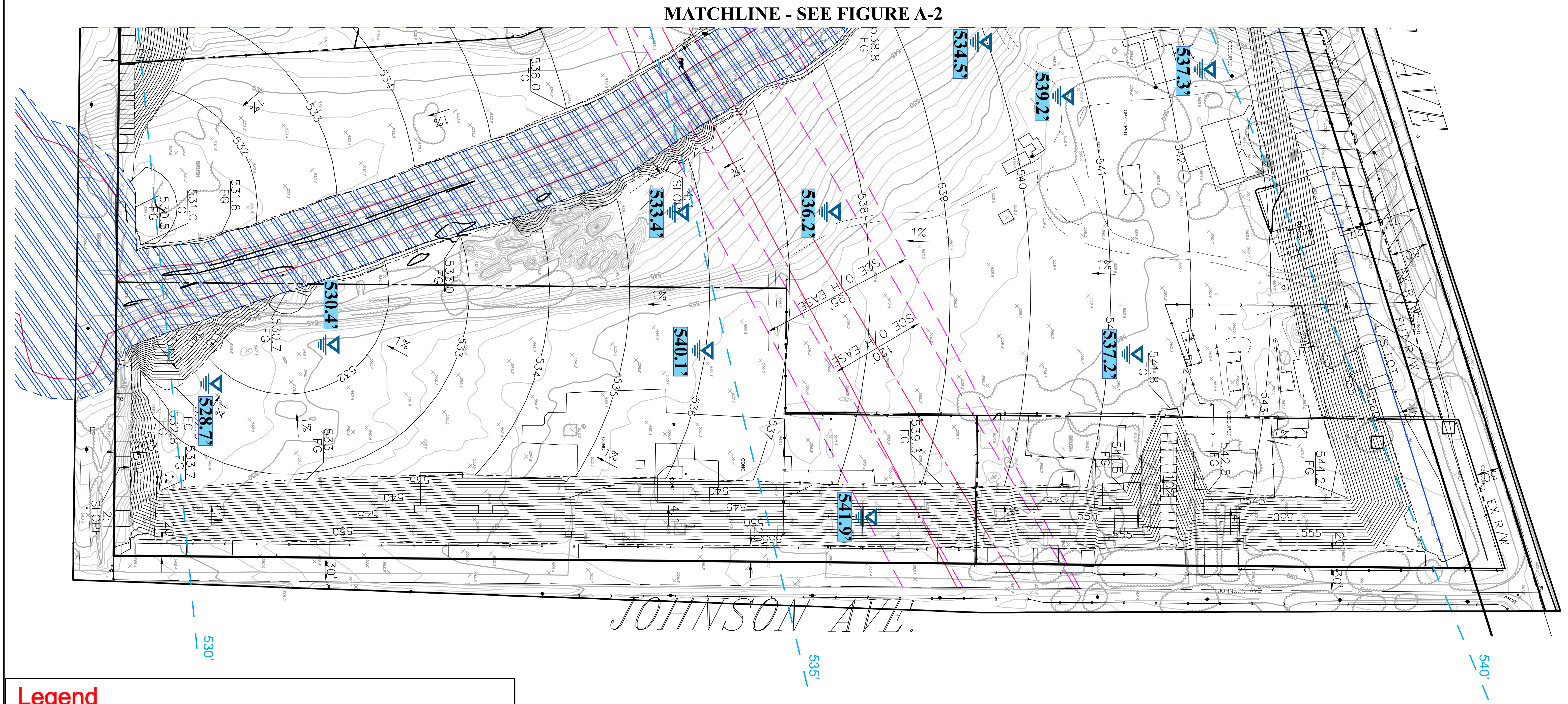
REVISIONS:	
11-22-16	3rd RELEASE
10-25-16	2nd RELEASE
10-18-16	1st RELEASE

CONCEPT GRADING PLAN
SOUTH CHINO PARCEL STUDY
CHINO, CA
BORROW SITE GRADING

JOB NO.
100-28
SHEET
1 of 1

KOURY ENGINEERING & TESTING, INC.

Project Name: **Borrow Site**	Project No.: **16-0447** Date: **April 2017**	Drawing Title: **Water Elevation Map**	Figure: **A-3a**



Legend

529.7' Ground Water Elevation (ft.) Measured During Field Exploration

540' Approximate Groundwater Contour Elevation Based on Information Provided by Others

0 120 240'

PREPARED BY:
PBLA ENGINEERING, INC.
Planning • Engineering • Surveying
4790 IRVINE BLVD., STE 105-262
IRVINE, CALIF. 92620
(888) 714-9642 • (714)389-9191 FAX

COMMERCE CONSTRUCTION CO., L.P.
13191 Crossroads Parkway North
Sixth Floor
City of Industry, California 91746-3497
Telephone: (562) 699-0453
License No. 723302

REVISIONS:

11-22-16	3rd RELEASE
10-25-16	2nd RELEASE
10-18-16	1st RELEASE

CONCEPT GRADING PLAN
SOUTH CHINO PARCEL STUDY
CHINO, CA
BORROW SITE GRADING

JOB NO.
100-28
SHEET
1 of 1

KOURY
ENGINEERING
& TESTING, INC.

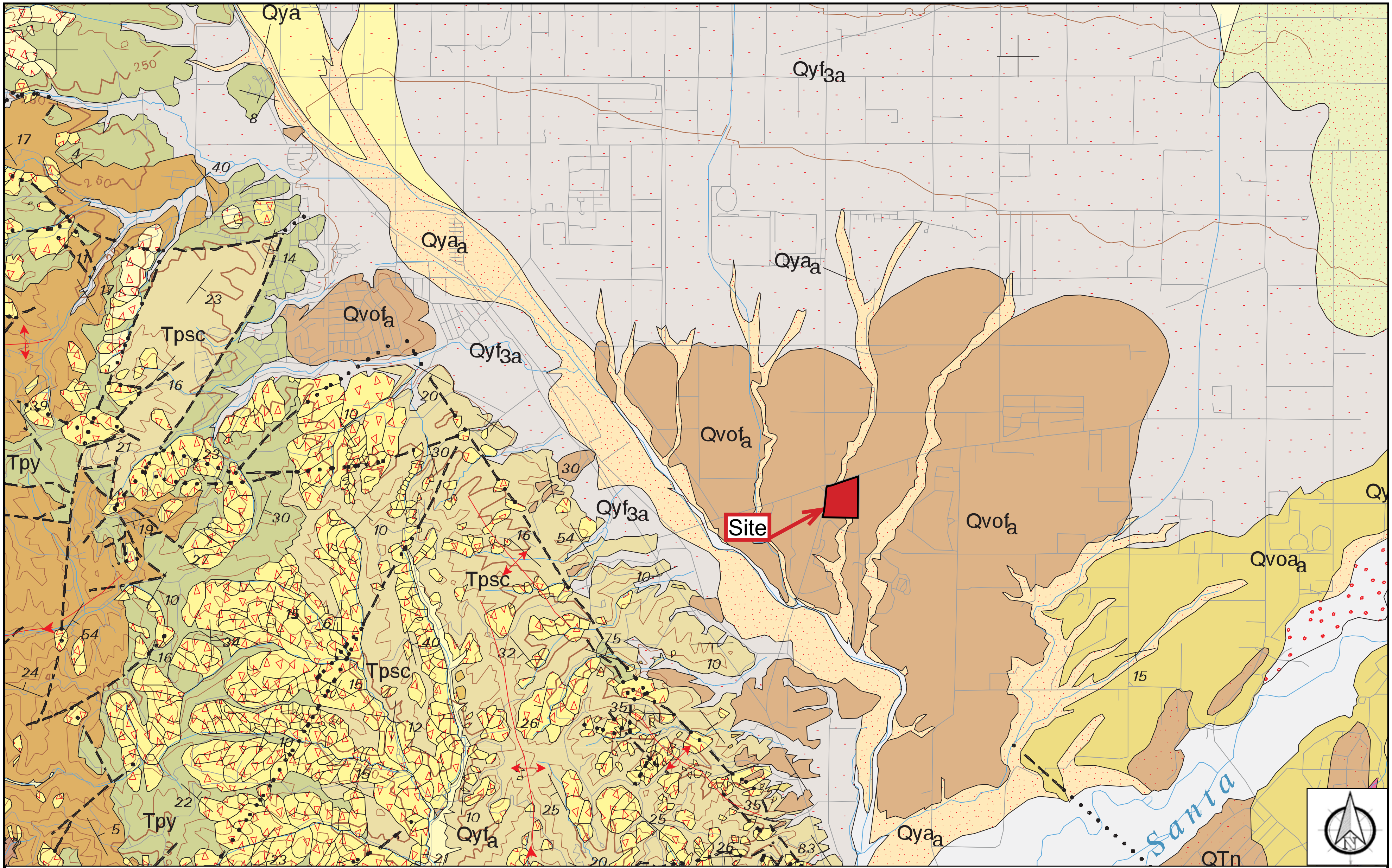
Project Name: Borrow Site

Project No.: 16-0447

Date: April 2017

Drawing Title: Water Elevation Map

Figure: A-3b



LEGEND

0 1 2 Mile

Qya	Young alluvial-valley deposits
Qvof	Very old alluvial-fan deposits

Reference: Geologic Map of the San Bernardino & Santa Ana 30´x60´ Quadrangle California-Version 1.0 Compiled by Douglas M. Morton and Fred K. Miller, 2006

KOURY ENGINEERING & TESTING, INC.

Project Name: **Borrow Site**	Project No.: **16-0447** Date: **April 2017**	Drawing Title: **Geology Map**	Figure: **A-4**

APPENDIX B

Field Exploratory Boring Logs

KEY TO LOGS

SOILS CLASSIFICATION					
MAJOR DIVISIONS			GRAPHIC LOG	USCS SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	**GRAVELS** MORE THAN 50% OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	**CLEAN GRAVELS** LESS THAN 5% FINES	░	**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			░	**GP**	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES MORE THAN 12% FINES	▥	**GM**	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			▤	**GC**	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS 50% OR MORE OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	**CLEAN SANDS** LESS THAN 5% FINES	▩	**SW**	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			░	**SP**	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES MORE THAN 12% FINES	▦	**SM**	SILTY SANDS, SAND-SILT MIXTURES
			▦	**SC**	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS 50% OR MORE OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	**SILTS AND CLAYS** LIQUID LIMIT IS LESS THAN 50		▥	**ML**	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			▧	**CL**	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▦	**OL**	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS 50 OR MORE		▨	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR GRAVELLY ELASTIC SILTS
			▧	**CH**	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			▩	**OH**	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			▤	**PT**	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES							
SILT AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
SIEVE SIZES	#200	#40	#10	#4	3/4"	3"	12"

KEY TO LOGS (continued)

SPT/CD BLOW COUNTS VS. CONSISTENCY/DENSITY					
FINE-GRAINED SOILS (SILTS, CLAYS, etc.)			**GRANULAR SOILS (SANDS, GRAVELS, etc.)**		
CONSISTENCY	***BLOWS/FOOT**		**RELATIVE DENSITY**	***BLOWS/FOOT**	
	SPT	**CD**		**SPT**	**CD**
SOFT	0-4	0-4	VERY LOOSE	0-4	0-8
FIRM	5-8	5-9	LOOSE	5-10	9-18
STIFF	9-15	10-18	MEDIUM DENSE	11-30	19-54
VERY STIFF	16-30	19-39	DENSE	31-50	55-90
HARD	over 30	over 39	VERY DENSE	over 50	over 90

* CONVERSION BETWEEN CALIFORNIA DRIVE SAMPLERS (CD) AND STANDARD PENETRATION TEST (SPT) BLOW COUNT HAS BEEN CALCULATED USING "FOUNDATION ENGINEERING HAND BOOK" BY H.Y. FANG. (**VALUES ARE FOR 140 Lbs HAMMER WEIGHT ONLY**)

DESCRIPTIVE ADJECTIVE VS. PERCENTAGE	
DESCRIPTIVE ADJECTIVE	**PERCENTAGE REQUIREMENT**
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%

*THE FOLLOWING "DESCRIPTIVE TERMINOLOGY/ RANGES OF MOISTURE CONTENTS" HAVE BEEN USED FOR MOISTURE CLASSIFICATION IN THE LOGS.

APPROXIMATE MOISTURE CONTENT DEFINITION	
DEFINITION	**DESCRIPTION**
DRY	Dry to the touch; no observable moisture
SLIGHTLY MOIST	Some moisture but still a dry appearance
MOIST	Damp, but no visible water
VERY MOIST	Enough moisture to wet the hands
WET	Almost saturated; visible free water

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-1
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 03/10/17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Soil Type (USCS)	Description	Additional Tests
				0		CL	**FILL:**	
1	19.2		2 3 5		☒		**Sandy Lean CLAY;** trace of gravel, firm, very moist, upper portion dark brown and lower portion yellowish brown	#200 Wash Fines = 67% PP = 2.0 tsf
2	18.4		3 3 5	5	☒		wood and asphalt, organic smell, dark brown	#200 Wash Fines = 56% PP=3-4.5 tsf
3			8 3 6		☒			
4	24.6		3 3 3	10	☒		wood debris, firm, dark brown	#200 Wash Fines = 52%
						CL/CH	**ALLUVIUM:**	
5	27.6	95	2 4 6	15	■		**Lean to Fat CLAY with SAND;** slightly organic smell, stiff, very moist, very dark brown	#200 Wash Fines = 78% PP=1.5-2 tsf
6	21.3	106	3 6 8	20	■	▽	wood specks, dark gray	#200 Wash Fines = 76% PP=2.2-2.7 tsf
7	22.7		1 3 8	25	☒		wood specks, dark yellowish brown with dark gray zones	#200 Wash Fines = 77% PP=0.5-2 tsf
8	26.7	108	3 6 8	30	■			#200 Wash Fines = 75% PP=0.5-2.2 tsf
				35 40			End of boring @ 31' 6" Groundwater encountered @ 20'	

Groundwater ▽ Bulk ⊠ CD ■ SPT ☒

Boring Log

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-2
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Cascade
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0				**FILL:**	
1	19.8				⊠			**Sandy Lean CLAY:** trace of gravel, moist to very moist, stiff, brown with yellowish brown	#200 Wash Fines = 67%
2	17.6				⊠		CL		#200 Wash Fines = 63% PP = 3 tsf
3	18.7	102	3 4 6	5	■			trace of organic, stiff, very moist, brown and dark brown	#200 Wash Fines = 67% PP = 4 tsf
4	27.6		0 0 1		⧗			**Lean to Fat CLAY with SAND;** very soft, very moist, dark brown	#200 Wash Fines = 77%
							CL/CH		
5	25.2	87	42 22 10	10	■			very stiff, very moist, dark brown, layer of gravel	#200 Wash Fines = 78% PP = 0.7 tsf
								ALLUVIUM: **Fat CLAY;** firm to stiff, caliche and concretions, very moist, dark yellowish brown	
6	29.9		2 4 5	15	⧗		CH		#200 Wash Fines = 85% Atterberg LL = 61 PL = 22
7	28.6	99	4 6 10	20	■	▽	CH	**Sandy Fat CLAY;** caliche, layer of silty sand, 50% clay and 50% sand, stiff, very moist, light yellowish brown	#200 Wash Fines = 67% PP=1.5-2 tsf
8	28.4		5 7 8	25	⧗		CH	**Fat CLAY with SAND;** layers of silty sand and sandy silt, stiff, very moist, olive yellow	#200 Wash Fines = 81%
9	19.3	115	14 28 22	30	■		SM	**Silty SAND;** fine, medium dense, moist to very moist, mottled grayish brown and yellowish brown	Gradation Fines = 15%
10	29.0		8 11 12	35	⧗		CL	**Sandy Lean CLAY;** layers of silty sand and poorly graded sand, medium dense sand and soft clay, wet, pale yellow	#200 Wash Fines = 51%
								End of boring @ 36' 6" Groundwater encountered @ 20'	
				40					

Groundwater ▽ Bulk ⊠ CD ■ SPT ⧗

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-3
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	16.3			0	☒	▨	CL	**FILL:** **Sandy Lean CLAY;** layers of silty sand,trace of gravel, stiff, moist to very moist, dark yellowish brown	#200 Wash Fines = 69% PP = 1.7 tsf
2			7 8 2		☒	▨	CL	**Sandy Lean CLAY with GRAVEL;** trace of glass and concrete, moist, dark brown with gray	
3	23.6		1 1 2	5	☒	▨	CL	**ALLUVIUM:** **Sandy Lean CLAY;** trace of rounded gravel, soft, very moist, yellowish brown and very dark brown	#200 Wash Fines = 71% PP=1-1.7 tsf
4	18.3		2 3 5		☒	▨		abundant concretions, firm to stiff, very moist	#200 Wash Fines = 65% PP=2-2.5 tsf
5	28.2		2 2 3	10	☒	▨	ML	**Sandy SILT;** layer of lean clay, firm to stiff, very moist, olive	#200 Wash Fines = 63% PP=3.2-4.2 tsf
6	28.5		3 5 6	15	☒	▨ ▽	CH	**Sandy Fat CLAY;** layers of sandy silt and fine silty sand, concretions, stiff, very moist, olive and olive brown	#200 Wash Fines = 70% PP=2-3.5 tsf
7	34.3	89	2 2 3	20	■	▨	CH	**Fat CLAY;** firm, very moist, mottled white with yellowish brown	#200 Wash Fines = 87% PP=0.5-1.5 tsf
8	29.1	97	5 9 14	25	■	▨	CL/CH	**Sandy Lean to Fat CLAY;** very stiff, very moist, pale yellow	#200 Wash Fines = 72% PP=2.5-3.5 tsf
9	20.2	112	8 14 22	30	■	▨		light yellowish brown	#200 Wash Fines = 71% PP = 4.5 tsf
				35 40				End of boring @ 31' 6" Groundwater encountered @ 16'	

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-4
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Cascade
Date Drilled : 3-17-17

Sample No.	**Moisture Content (%)**	**Dry Unit Weight (pcf)**	**Blows per 6"**	**Depth (ft)**	**Sample Location**	**Graphic Log**	**Soil Type (USCS)**	**Description**	**Additional Tests**
				0				**FILL:**	
1	17.9				☒		CL	**Lean CLAY with SAND;** stiff, moist to very moist, dark brown	#200 Wash Fines = 80% PP=1.7-2.7 tsf
2	21.9	107	8 14 11	5	■		CL	**ALLUVIUM:** **Sandy Lean CLAY;** caliche and concretions, firm to stiff, very moist, dark yellowish brown	#200 Wash Fines = 74 % PP=1.2-1.5 tsf
3	21.0				☒				#200 Wash Fines = 70 % PP=1.5-2.5 tsf
4	11.3			10	☒				
5	19.4	116	12 28 19	15	■	▽	ML	**Sandy SILT;** very stiff, very moist, light olive brown	#200 Wash Fines = 57% PP = 4.5 tsf
6	44.5		3 4 5	20	☒		CH	**Fat CLAY with SAND;** stiff, very moist, mottled yellowish brown with abundant white stringers (caliche)	#200 Wash Fines = 83% PP = 1.2-1.5 tsf
7	23.9		5 8 9	25	☒		CH	**Sandy Fat CLAY;** very stiff, very moist, yellowish brown	#200 Wash Fines = 58% PP = 2.5-3 tsf
5	24.1	106	6 14 26	30	■		CH	**Fat CLAY with SAND;** very stiff, very moist, light brown mottled yellowish brown	#200 Wash Fines = 76% PP=4-4.5 tsf
								End of boring @ 31' 6" Groundwater encountered @ 16'	
				35					
				40					

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY
ENGINEERING
& TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-5
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0				**FILL:** **Sandy Lean Clay;** soft, moist, dark yellowish brown	
1	19.2		1 1 1		☒		CL	**ALLUVIUM:** **Sandy Lean CLAY;** concretions and caliche, very soft, moist to very moist, dark yellowish brown	#200 Wash Fines = 70% PP = 1.6 tsf
2	19.3		1/10"	5	☒		CL	**ALLUVIUM:** **Lean CLAY;** concretions and caliche, very soft, moist to very moist, dark yellowish brown	#200 Wash Fines = 87% PP=2-3.5 tsf
3 4	17.0 19.3		8 4 7 4 7 10	10	☒ ☒		CL	**ALLUVIUM:** **Sandy Lean CLAY;** caliche stringers and concretions, stiff, moist to very moist, olive brown with white very stiff	#200 Wash Fines = 60% PP = 4.5 tsf #200 Wash Fines = 62% PP = 4.5 tsf
5	18.8	112	4 9 15	15	■		ML	**Sandy SILT;** very stiff, moist, olive brown with white specs	#200 Wash Fines = 50% PP=2.7-3.5 tsf
6	26.8	94	8 15 15	20	■	▽	CH	**Fat CLAY with SAND;** very stiff, very moist, dark yellowish brown	#200 Wash Fines = 77% PP = 4.5 tsf
7	27.7	112	3 3 4	25	☒		CH	**Sandy Fat CLAY;** caliche stringers and concretions, firm, very moist, dark yellowish brown w/ white, some brown	#200 Wash Fines = 60% PP=1-1.5 tsf
				30 35 40				End of boring @ 26' 6" Groundwater encountered at 23'	

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. : 16-0447
Project Name : Borrow Site

Boring No. : B-6
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0			CL	**FILL:** **Lean CLAY with SAND;** trace of organic, moist, brown	
1	18.3		2 3 3		☒		CL	**ALLUVIUM:** **Lean CLAY with SAND;** trace of organics, concretions, firm, moist to very moist, olive brown with white specs	#200 Wash Fines = 79% PP=1.5-2.5 tsf
2	18.9		3 8 14	5	☒		CL	**Sandy Lean CLAY;** abundant caliche and concretions, very stiff, very moist, light olive brown with white	#200 Wash Fines = 69% PP = 4.5 tsf
3	21.5		2 4 6		☒			stiff, pale yellow mottled with olive brown	#200 Wash Fines = 62% PP=2.7-3 tsf
4	28.0		3 5 8	10	☒		CH	**Fat CLAY with SAND;** layers of sandy silt, stiff, very moist, light olive brown	#200 Wash Fines = 84% PP=4-4.5 tsf
5	26.0		3 5 7	15	☒			trace of gravel, caliche stringers	#200 Wash Fines = 77% PP = 4.5 tsf
6	36.9	84	5 8 14	20	■	▽	CH	**Sandy FAT CLAY;** caliche, very stiff, very moist, light olive brown	#200 Wash Fines = 70% PP = 4.5 tsf
7	25.5	104	6 11 14	25	■				#200 Wash Fines = 60% PP=1.5-2 tsf
8	23.7	107		30	■				#200 Wash Fines = 74% PP=4-4.5 tsf
				35 40				End of boring @ 31' 6" Groundwater encountered @ 20'	

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-7
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	8.6			0	☒		SM	**FILL:** **Silty SAND;** fine to medium, trace of gravel, moist, dark yellowish brown	Gradation Fines = 32%
2	18.8		3 4 7		☒		CL	**Lean CLAY with SAND;** concretions, stiff, very moist, dark yellowish brown	#200 Wash Fines = 81% PP = 4.5 tsf
3	15.3		7 14 12	5	☒		CL	**ALLUVIUM:** **Sandy Lean CLAY;** concretions, very stiff, moist, pale yellow with white	#200 Wash Fines = 50% PP = 4.5 tsf
4	16.8		6 8 8		☒			Caliche, olive brown with white inclusions	#200 Wash Fines = 58% PP = 4.5 tsf
5	18.9		3 5 10	10	☒			abundant concretions and caliche, very moist	#200 Wash Fines = 68% PP=3-4.5 tsf
6	32.2		1 3 4	15	☒		CH	**Sandy Fat CLAY;** layer of sandy silt, firm to stiff, very moist, yellowish brown	#200 Wash Fines = 58% PP=1.5-2 tsf
7	29.3	94	9 10 15	20	■	▽		abundant concretions and caliche, very stiff, very moist, white with olive brown inclusions	#200 Wash Fines = 50% PP = 4.5 tsf
8	36.3	90	5 7 8	25	■		CH	**Fat CLAY with SAND;** concretions and caliche, firm to stiff, very moist, yellowish brown	#200 Wash Fines = 76% PP=1.5-4 tsf
								End of boring @ 26' 6" Groundwater encountered @ 20'	
				30					
				35					
				40					

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447

Project Name : Borrow Site

Boring No. : B-8

Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger

Sampling Method : Bulk - CD - SPT

Ground Elevation:

Hammer Weight : 140 lbs **Drop Height :** 30"

Drilling Co. : Discovery

Location : See Figure A-2

Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	17.4		2 2 3	0	☒	▨	**CL**	**FILL:** **Lean CLAY with SAND;** trace of gravel and asphalt, firm, moist, dark brown	#200 Wash Fines = 80%
2	17.3		1 2 4	5	☒	▨	**CL**	**Sandy Lean CLAY;** layers of fine silty sand, firm, moist, dark brown with yellowish brown silty sand	#200 Wash Fines = 58% PP = 4.5 tsf
3	13.4		4 7 7		☒	▨	**CL**	**ALLUVIUM:** **Lean CLAY;** stiff, moist, dark yellowish brown	#200 Wash Fines = 85% PP = 4.5 tsf
4	21.5	99	6 12 14	10	■	▨	**CL**	**Lean CLAY with SAND;** pinhole porosity, very stiff, veri moist, dark yellowish brown (top) and light bluish brown (bottom)	#200 Wash Fines = 80% PP = 4.5 tsf
5	17.9	114	7 17 25	15	■	▨	**CL**	**Sandy Lean CLAY;** caliche stringers and concretions, hard, moist, light yellowish brown with white inclusions	#200 Wash Fines = 67% PP = 4.5 tsf
6	35.1	87	5 7 12	20	■	▨	**CH**	**Fat CLAY with SAND**; very stiff, very moist, thin silty sand layers, light yellowish brown with white inclusions	#200 Wash Fines = 80% PP=2-2.7 tsf
7	22.0	107	6 12 12	25	■	▨		olive brown with white inclusions	#200 Wash Fines = 81% PP = 4.5 tsf
8	38.0	95	9 15 21	30	■	▨ ▽	**CH**	**Fat CLAY**; very stiff, moist to very moist, dark brown	#200 Wash Fines = 93% PP = 4.5 tsf
				35 40				End of boring @ 31' 6" Groundwater encountered @ 30'	

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-9
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	17.8			0	☒	▨	CL	**FILL:** **Lean CLAY with SAND;** trace of gravel, soft, moist, dark yellowish brown	#200 Wash Fines = 75%
2	20.9		1 1 2		☒	▨	CL	**ALLUVIUM:** **Lean CLAY;** soft, moist, dark yellow and brown with white concretions	#200 Wash Fines = 85% PP=1.5-2.2 tsf
3	16.0		7 35 50/1"	5	☒	▨	CL	**Sandy Lean CLAY;** abundant concretions, hard, moist, white and very pale brown	#200 Wash Fines = 50%
4	23.6		4 3 2		☒	▨		firm, very moist	#200 Wash Fines = 57% PP=3-4.5 tsf
5	22.3	109	3 9 9	10	■	▨	CL	**Lean CLAY;** caliche stringers, stiff, very moist, light olive brown	#200 Wash Fines = 85% PP=1.5-2.2 tsf
6	17.6	107	3 10 11	15	■	▽ ▨	CL	**Sandy Lean CLAY;** layer of fine clayey sand, very stiff, moist, light olive brown	#200 Wash Fines = 50% PP=2-2.5 tsf
				20 25 30 35 40				End of boring @ 16' 6" Groundwater encountered @ 14'	

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-10
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Date Drilled : Discovery
Date Drilled : 3-10-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨			
1	45.2		2 2 4		☒	▨	CL	**FILL:** **Sandy Lean CLAY;** pockets of grayish brown clay, organic material, topsoil, lome material, firm, wet, very dark brown	#200 Wash Fines = 50%
2	18.4		2 3 5	5	☒	▨	CL	**ALLUVIUM:** **Lean CLAY;** rootlet inclusions, firm, moist to very moist, dark brown	#200 Wash Fines = 87% PP=2-3.5 tsf
3	18.2		2 4 6		☒	▨	CL	**Lean CLAY with SAND;** caliche, stiff, moist to very moist, dark yellowish brown	#200 Wash Fines = 76% PP=4.2-4.5 tsf
4	19.8		2 4 6	10	☒	▽ ▨			#200 Wash Fines = 81% PP=2.5-3.7 tsf
5	17.4	112	1 10 20	15	■	▽ ▨	SP-SM	**Poorly Graded SAND with SILT;** lumps of clay and trace of gravel, very stiff, wet, light olive brown	Gradation Fines = 11%
								End of boring @ 16' 6" Groundwater encountered @ 15' then it raised up to 10'	
				20					
				25					
				30					
				35					
				40					

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-11
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk - CD - SPT
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Cascade
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	15.2			0	☒		CL	**FILL:** **Lean CLAY with SAND;** abundant concretions, very stiff to hard, moist, dark brown	#200 Wash Fines = 75 %
2	19.7	99	6 17 22	5	■		CL	**ALLUVIUM:** **Sandy Lean CLAY;** abundant concretions**,** very stiff, very moist, very dark brown	#200 Wash Fines = 65% PP = >4.5 tsf
3	22.3				☒			very moist, light yellowish brown with dark brown	
4	23.4			10	☒		CL	**Lean CLAY;** stiff, very moist, dark brown	#200 Wash Fines = 85%
5	27.8	103	8 18 32	15	■		CH	**Fat CLAY;** layers of sandy silt, hard, moist, mottled olive brown and yellowish brown	#200 Wash Fines = 92% PP = 4.5 tsf
3	29.3		8 10 15	20	☒		MH	**Elastic SILT with SAND;** layers of clay and silty sand, moist, very stiff, mottled gray and yellowish brown	#200 Wash Fines = 85% PP = 2 - 2.5 tsf
4	32.1		5 10 13	25	☒	▽			#200 Wash Fines = 81%
5	26.2	104	3 14 29	30	■		MH	**Sandy Elastic SILT;** layer of fine silty sand, moist, very stiff, mottled bluish gray and yellowish brown	#200 Wash Fines = 72% PP=3.5-4.5 tsf
6	26.2		12 19 25	35	☒		CL	**Sandy Lean CLAY**; hard, moist, dark bluish gray	#200 Wash Fines = 72%
								End of boring @ 36' 6" Groundwater encountered @ 25'	
				40					

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Boring No. : B-12
Sheet : 1 **Of :** 1

Drilling Method : Hollow Stem 6" Auger
Sampling Method : Bulk, CD
Hammer Weight : 140 lbs **Drop Height :** 30"
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Cascade
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	14.1			0	☒	▨	CL	**FILL:** **Sandy Lean CLAY with GRAVEL;** trace of wood and asphalt, dark brown	#200 wash Fines + 57%
2	28.1	89	2 4 6	5	■	▨	CH	**ALLUVIUM:** **Fat CLAY;** stiff, very moist,	#200 Wash Fines = 96% PP = 1.5 tsf
3	24.8				☒	▨			
				10		▨	SP-SM	**SAND with SILT and GRAVEL;** fine to coarse, cobbles	
						▨	CL	**Sandy Lean CLAY with GRAVEL;** 75% of the sample has large gravel to 3", stiff, very moist, yellowish brown	
4	22.3			15	☒	▨			#200 Wash Fines = 67%
								End of boring @ 16', Auger refusal on cobbles Near groundwater	
				20					
				25					
				30					
				35					
				40					

Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 1
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight : **Drop Height :**
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	CL	**FILL:** **Sandy Lean CLAY**	
1	19.0				☒	▨	CL	**ALLUVIUM:** **Lean** **CLAY;** stiff, moist to very moist, dark olive brown	#200 Wash Fines = 85%
				5		▨			
2	23.0				☒	▨	CL	**Sandy Lean CLAY;** stiff, very moist, mottled brown and gray	Fines = 68% PP=2-2.5 tsf
3	20.2				☒	▨		greenish gray with brown inclusions	Fines = 60% PP=1.5-2.5 tsf
4	20.4			10	☒	▨			Fines = 51% PP=1.5-2.5 tsf
5	21.4				☒	▨			Fines = 57% PP=1-1.5 tsf
								End of test pit @ 12' 6" No groundwater encountered	
				15					
				20					
				25					
				30					
				35					
				40					

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 2
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	CL	**Fill: Sandy Lean CLAY**; stiff, very moist, yellowish brown	
1	30.4				☒	▨	CH	**ALLUVIUM:** **Fat CLAY;** abundant calcium carbonate, stiff, very moist, mottled yellowish brown and white	#200 Wash Fines = 87% PP=1.5-2.5 tsf
2	21.1			5	☒	▨	CL	**Sandy Lean CLAY;** abundant caliche, abundant calcium carbonate, stiff to very stiff, very moist, mottled green with white	#200 Wash Fines = 67% PP=1.5-4.0 tsf
								End of test pit @ 6' 6" No groundwater encountered	
				10					
				15					
				20					
				25					
				30					
				35					
				40					

▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 3

Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨		**FILL:** Coarse sand at surface **Silty SAND;** fine to coarse, slightly moist, olive	
1	7.5				☒	▨	SM		Gradation Fines = 17%
				5		▨			
2	6.8				☒	▨			#200 Wash Fines = 16%
								End of test pit @ 7' No groundwater encountered Hole caving	
				10					
				15					
				20					
				25					
				30					
				35					
				40					

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 4
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	CL	**FILL:** **Sandy Lean CLAY**	
1	19.7				☒	▨		**ALLUVIUM:** **Sandy Lean CLAY;** stiff, very moist, dark brown	Fines = 68% PP = 2 tsf
2	20.8				☒	▨	CL	greenish gray with brown inclusions	Fines = 68% PP = 2 tsf Corrosivity EI = 94
				5		▨			
						▨		at 6.5' max density = 120.5	
3	24.3				☒	▨		caliche optimum 12.4 %	Fines = 60% PP=1-1.75 tsf
								End of test pit @ 7' No groundwater encountered	
				10					
				15					
				20					
				25					
				30					
				35					
				40					

▽ Bulk ☒ CD ■ SPT ☒

Boring Log

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 5
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	25.8			0	☒	▨	CL	**FILL:** **Lean CLAY;** stiff, very moist, black at 3.5' max density = 104.5 optimum 17.3%	Fines = 85% PP = 1.5 tsf Corrosivity EI = 35
2	50.2				☒	▨	CL	**Lean CLAY with SAND;** stiff, wet, dark yellow brown, some organic, manure smell	Fines = 84% PP = 1.5 tsf
3	24.2			5	☒	▨	CH	**ALLUVIUM:** **Fat CLAY;** stiff, very moist, gray	#200 Wash Fines = 88% PP = 2.5 tsf
4	26.0			10	☒	▨		caliche, greenish gray with white and dark bands	#200 Wash Fines = 87% PP=1.75-2.5 tsf
				15 20 25 30 35 40				End of test pit @ 9' 6" No groundwater encountered	

▽ Bulk☒ CD■ SPT☒

Boring Log

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 6
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight : **Drop Height :**
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	**SC**	**FILL: Clayey SAND;** fine to coarse, asphalt and concrete slab 8" thick by 2x3 ft, wood and concrete debris, mixture of silty sand and sandy clay	
1	17.7			5	☒	▨	**CL**	**Sandy Lean CLAY;** firm, very moist, dark yellowish brown	#200 Wash Fines = 73% PP=1.5-2 tsf
2	16.8			10	☒	▨	**SC**	**Clayey SAND; minor** wood and concrete, trace to little gravel, very moist, olive brown	#200 Wash Fines = 36%
				15 20 25 30 35 40				End of test pit @ 12' No groundwater encountered	

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 7
Sheet : 1 **Of :** 1

Drilling Method : Backhoe, John Deere 310SL
Sampling Method : Bulk
Ground Elevation:
Hammer Weight :
Drop Height :
Drilling Co. : Gilstrap
Location : See Figure A-2
Date Drilled :

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0				**FILL:** Construction debris	
1	14.2				☒	▨	SC	**Clayey SAND;** trace of gravel, debris, moist to very moist, dark yellowish brown	#200 Wash Fines = 43%
2	27.0			5	☒	▨	CL	**Sandy Lean CLAY;** trace of gravel and concrete, cobbles and boulder sized material, stiff, moist, dark brown	#200 Wash Fines = 73% PP=1-1.5 tsf
3	13.6			10	☒	▨	SC	**Clayey SAND;** trace of wood and concrete, moist, dark yellowish brown	#200 Wash Fines = 49%
4	15.0				☒	▨	CL	**Sandy Lean CLAY;** coarse, little gravel, moist, brown	#200 Wash Fines = 55%
				15				End of test pit @ 12' 6" No groundwater encountered About 30% of the material is oversize	
				20					
				25					
				30					
				35					
				40					

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY
ENGINEERING
& TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 8
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	24.8			0	☒	▨	CL/CH	**FILL:** **Sandy Lean to Fat CLAY;** concrete debris to 3 feet size, rebars (about 15% not usable), old foundation burried at a depth of 5' to 6', firm to stiff, very moist, dark brownish yellow	#200 Wash Fines = 61%
2 3	23.9 28.3			5	☒ ☒	▨	CH	**ALLUVIUM:** **Fat CLAY with SAND;** firm to stiff, very moist, greenish gray with dark brown inclusions	Fines = 78% PP=0.8-1.2 tsf Fines = 67% PP=0.75-1.5 tsf
				10 15 20 25 30 35 40				End of test pit @ 8' No groundwater encountered	

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 9
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled :

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	16.6			0	☒	▨	SC	**FILL: Clayey SAND;** trace of gravel, layers of silty sand, stiff, moist, yellowish brown	Fines = 46% PP=2.5-3 tsf
2	21.0				☒	▨	CL	**Sandy Lean CLAY;** stiff, very moist, olive brown (35% of material not usable)	Fines = 73% PP=1.5-3 tsf
3	21.6				☒			trace of wood, some debris, firm, very moist, black	Fines = 50%
4	12.9			5	☒	▨	SM	**Silty SAND;** fine, trace of wood, dry to very moist, dark gray	#200 Wash Fines = 36%
				10		▨	CL/CH	**Lean to Fat CLAY with SAND;** stiff to very stiff, very moist, black	
5	27.7				☒				#200 Wash Fines = 83% PP=1.5-2.5 tsf
6	24.4				☒			dark brown with gray	Fines = 78% PP=1.5-2 tsf
				15				End of test pit @ 15' No groundwater encountered	
				20					
				25					
				30					
				35					
				40					

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 10
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Ground Elevation:
Hammer Weight : **Drop Height :**
Drilling Co. : Gilstrap
Location : See Figure A-2
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	23.8			0	☒	▨	CL	**FILL:** **Sandy Lean CLAY;** concretions, firm, very moist, dark yellowish with white	#200 Wash Fines = 71% PP=1-1.25 tsf
2	23.0			5	☒	▨	CL	**Sandy Lean CLAY;** firm, very moist, dark brown	#200 Wash Fines = 72% PP=1.2-1.5 tsf
								End of test pit @ 6' No groundwater encountered	
				10					
				15					
				20					
				25					
				30					
				35					
				40					

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 11
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	SC	**FILL:** **Clayey SAND;** trace to little gravel, some cobble, asphalt, and boulders, very moist, dark yellowish brown	
1	15.5				☒	▨			#200 Wash Fines = 47%
				5		▨	CL	**Sandy Lean CLAY;** trace of wood, firm, wet, dark brown to black	
2	43.7				☒	▨			#200 Wash Fines = 72% PP=0.7-1 tsf
				10		▨	CL	**ALLUVIUM:** **Lean CLAY with SAND;** stiff, very moist, black	
3	18.2				☒	▨			EI = 80 Fines = 82% PP=1.5-2.5 tsf
4	22.5				☒	▨		very dark grayish brown at 12.5' max density = 119.1 pcf optimum 13.1%	Fines = 77% PP = 1.5 tsf
5	20.5			15	☒	▨		dark gray	Fines = 77% PP=1.5-2.5 tsf
								End of test pit @ 15' 6" No groundwater encountered	
				20					
				25					
				30					
				35					
				40					

▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 12
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	25.0			0	☒	▨	CL/CH	**FILL:** **Lean to Fat CLAY with SAND;** firm to stiff, very moist, very dark brown	#200 Wash Fines = 78%
2	25.9			5	☒	▨	CL/CH	**Sandy Lean to Fat CLAY;** soft, very moist, mottled brown with white	#200 Wash Fines = 74% PP=0.5-1tsf
3	23.3			10	☒	▨	CL/CH	**Lean to Fat CLAY with SAND;** very stiff, very moist, very dark brown	#200 Wash Fines = 84%
								End of test pit @ 12' No groundwater encountered	
				15					
				20					
				25					
				30					
				35					
				40					

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 13
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
1	32.0			0	☒	▨	CL	**ALLUVIUM:** **Lean CLAY with SAND;** firm to stiff, very moist, dark brown	#200 Wash Fines = 81% PP = 2.5 tsf
2	24.4			5	☒	▨	CL	**Sandy Lean CLAY;** soft to firm, very moist, dark greenish gray	#200 Wash Fines = 73% PP=0.7-1.5 tsf
3	20.9				☒	▨		very stiff, dark yellowish brown	#200 Wash Fines = 71% PP=0.7-1.5 tsf
				10 15 20 25 30 35 40				End of test pit @ 9' 6" Groundwater encountered at 6'	

Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 14
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0			CL	**FILL:** **Sandy Lean CLAY;** moist, grayish brown	
							CL	**ALLUVIUM:** **Sandy Lean CLAY;** stiff, very moist, grayish brown	
1	18.4			5	☒				#200 Wash Fines = 71% PP=2-2.5 tsf
2	19.8			10	☒				#200 Wash Fines = 62% PP = 2 tsf
3	18.3			15	☒	▽	ML	**Sandy SILT;** fine, very moist, grayish brown	Fines = 50%
4	25.0				☒			wet	Fines = 70%
				20				End of test pit @ 16' Groundwater encountered @ 15' 3"	
				25					
				30					
				35					
				40					

▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 15
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	CL	**FILL:** **Sandy Lean CLAY**	
1	24.7				☒	▨	CL	**ALLUVIUM:** **Sandy Lean CLAY;** very moist, very dark brown	#200 Wash Fines = 69%
2	24.1			5	☒	▨	CL	**Lean CLAY with SAND;** very stiff, very moist, very dark brown	#200 Wash Fines = 77% PP = 4 tsf
3	18.2			10	☒	▥	ML	**Sandy SILT;** very stiff, moist to very moist, yellowish red	#200 Wash Fines = 62% PP = 4.5 tsf
4	23.3				☒	▨ ▽	CL	**Sandy Lean CLAY;** soft, very moist to wet, yellowish brown	#200 Wash Fines = 73%
				15				End of test pit @ 15' Groundwater encountered @ 14' 6"	
				20					
				25					
				30					
				35					
				40					

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 16
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2
Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨		**FILL:** **Lean CLAY with SAND;** moist, dark brown	
1 2	23.6 19.5			5	☒ ☒	▨	CL	**ALLUVIUM:** **Lean Clay with SAND;** stiff to very stiff, very moist, strong brown	Fines = 83% PP=3.5-4.5 tsf Fines = 76%
3	20.9				☒	▨	ML	**Sandy SILT;** layer of sandy clay, stiff, very moist, grayish brown	#200 Wash Fines = 66% PP=2.5-3 tsf
4	20.9			10	☒	▽	CL	**Sandy Lean CLAY;** layer of sandy silt, firm to stiff, very moist, dark yellowish brown	#200 Wash Fines = 66% PP=1-1.5 tsf
				15 20 25 30 35 40				End of test pit @ 11' Groundwater encountered @ 10' 6"	

Groundwater ▽ Bulk☒ CD■ SPT☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 17
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight : **Drop Height :**
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0		▨	CL	**FILL: Lean CLAY with SAND;** stiff, very moist, very dark brown	
1	17.6				☒				#200 Wash Fines = 78%
2	20.3				☒	▨	CL	**Sandy Lean CLAY;** concretions, very stiff, very moist, brownish yelow	#200 Wash Fines = 63% PP=2-4.5 tsf
				5					
						▨	CH	**Sandy Fat CLAY;** stiff to very stif, very moist, yellowish brown at 8.5' max density = 118.1 optimum 13.0%	
3	24.3				☒				EI = 91 Fines = 71% PP=1.5-3 tsf
				10					
						▽			
4	48.0				☒			soft, wet, yellowish brown	#200 Wash Fines = 86%
								End of test pit @ 12' 6" Groundwater encountered @ 11' 6"	
				15					
				20					
				25					
				30					
				35					
				40					

Groundwater ▽ Bulk ☒ CD ■ SPT ☒

Boring Log

KOURY ENGINEERING & TESTING, INC.

Project No. :16-0447
Project Name : Borrow Site

Test Pit No. : 18
Sheet : 1 **Of :** 1

Drilling Method : Backhoe
Sampling Method : Bulk
Hammer Weight :
Drop Height :
Location : See Figure A-2

Ground Elevation:
Drilling Co. : Gilstrap
Date Drilled : 3-17-17

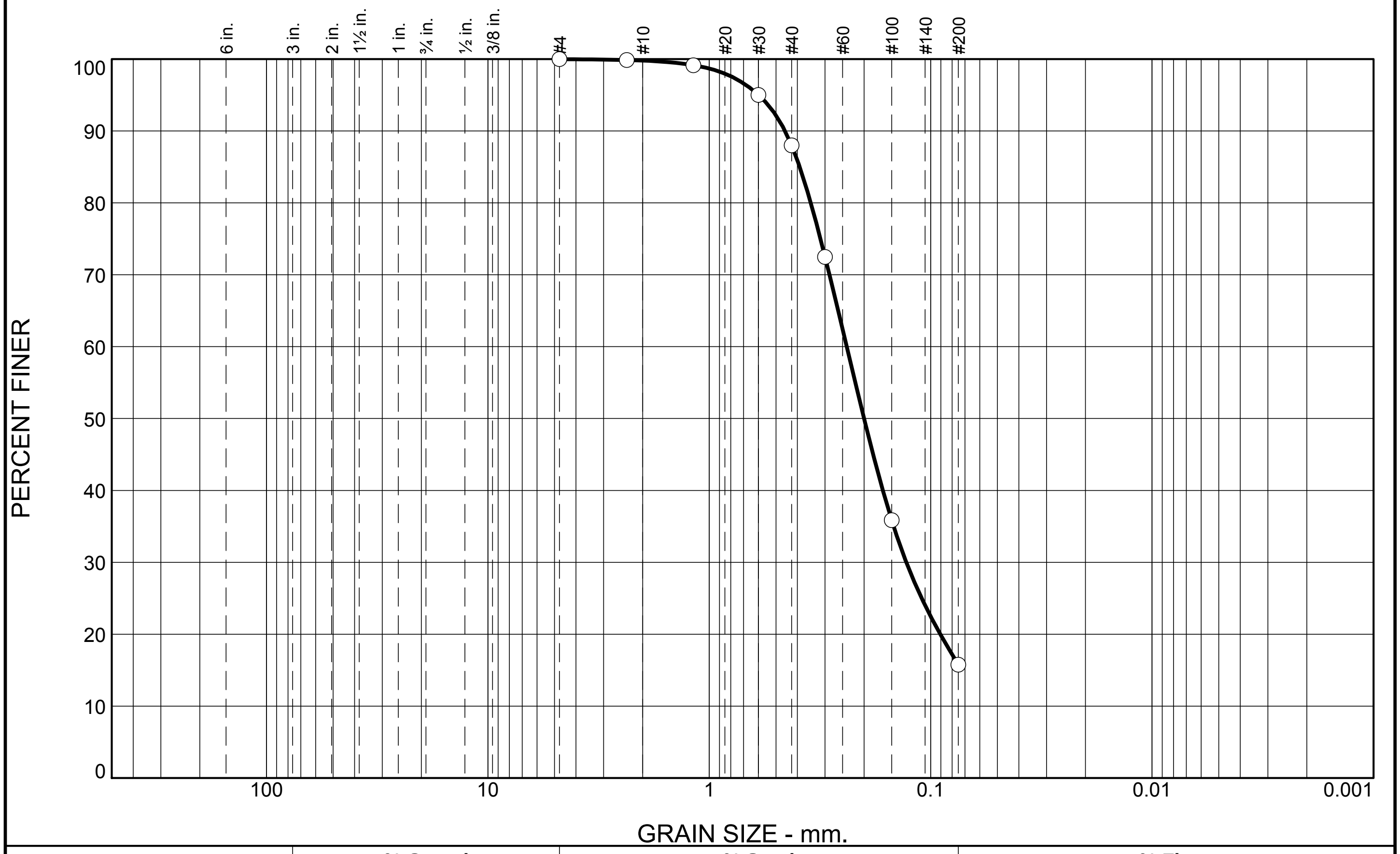
Sample No.	Moisture Content (%)	Dry Unit Weight (pcf)	Blows per 6"	Depth (ft)	Sample Location	Graphic Log	Soil Type (USCS)	Description	Additional Tests
				0					
1	20.8				☒	▨	CL	**ALLUVIUM:** **Sandy Lean CLAY;** very moist, dark brown	#200 Wash Fines = 67%
2	23.2			5	☒	▨	CL	**Lean CLAY;** soft, very moist, brown	#200 Wash Fines = 88% PP = 0.75 tsf
3	29.0				☒	▨	CH	**Fat CLAY;** stiff to very stiff, very moist, yellowish brown	#200 Wash Fines = 85% PP=1.5-1.75 tsf
				10		▨			
4	35.8				☒	▨		very moist, grayish brown	#200 Wash Fines = 93% PP=1.75-2 tsf
				15				End of test pit @ 15' No groundwater encountered	
				20					
				25					
				30					
				35					
				40					

Bulk ☒ CD ■ SPT ☒

APPENDIX C

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	11.8	72.3	15.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.2		
#30	95.0		
#40	88.0		
#50	72.5		
#100	35.9		
#200	15.7		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4547 D_{85}= 0.3908 D_{60}= 0.2394

D_{50}= 0.2000 D_{30}= 0.1288 D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Lab #4385 Series.

Location: B2 @ 30'

Sample Number: 4385 Series

Date: 4/10/17

Koury Engineering & Testing, Inc.

Chino, CA

Client:

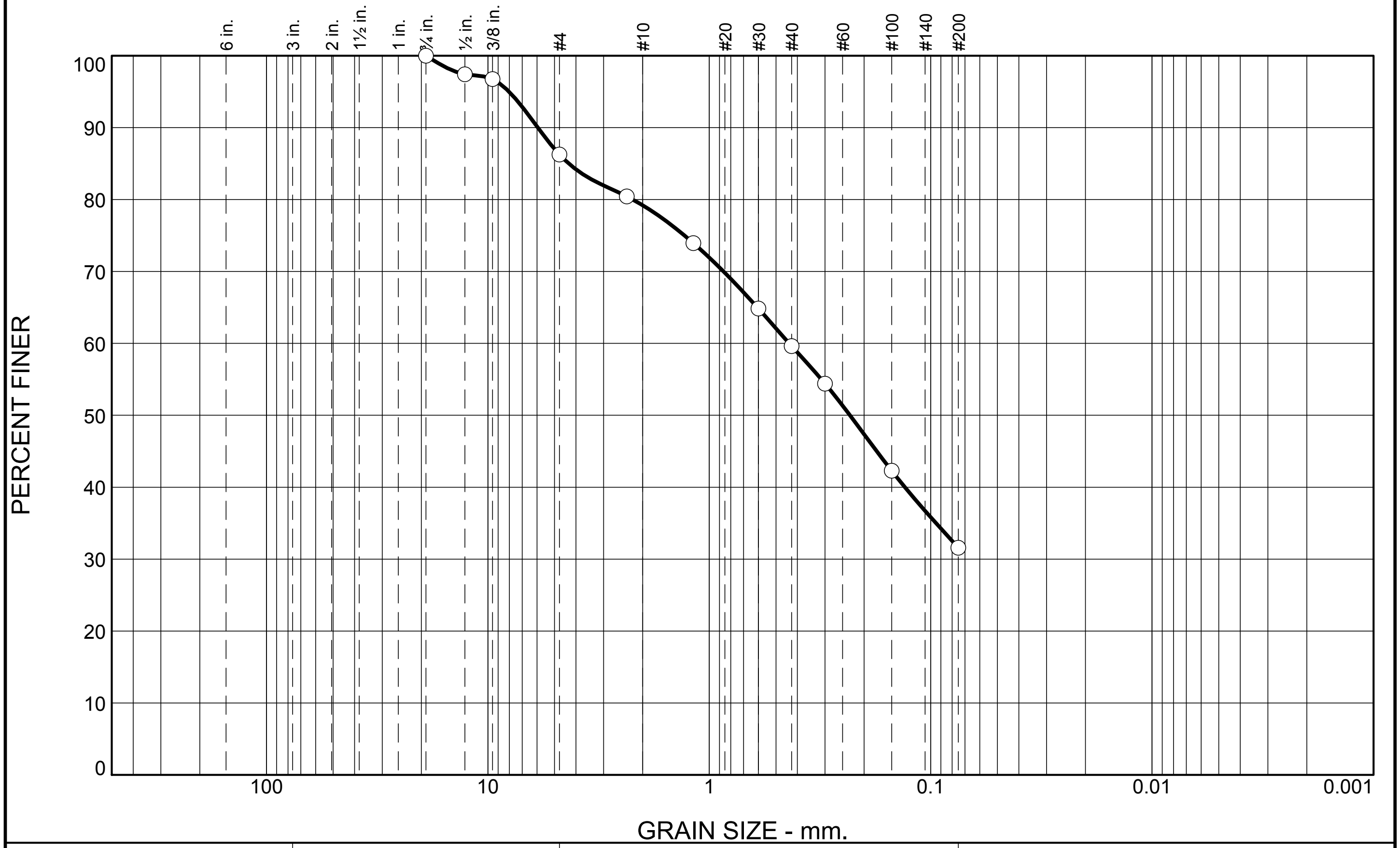
Project: Borrow Site

Project No: 16-0447

Figure

Tested By: J.Roy/MF Perry **Checked By:** ______________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.7	7.1	19.6	28.0	31.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	97.4		
3/8	96.8		
#4	86.3		
#8	80.4		
#16	74.0		
#30	64.8		
#40	59.6		
#50	54.4		
#100	42.3		
#200	31.6		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 5.9412 D_{85}= 4.3097 D_{60}= 0.4357

D_{50}= 0.2316 D_{30}= D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Lab #4385 Series.

Location: B7 @ 0' - 2'

Sample Number: 4385 Series

Date: 4/10/17

Koury Engineering & Testing, Inc.

Chino, CA

Client:

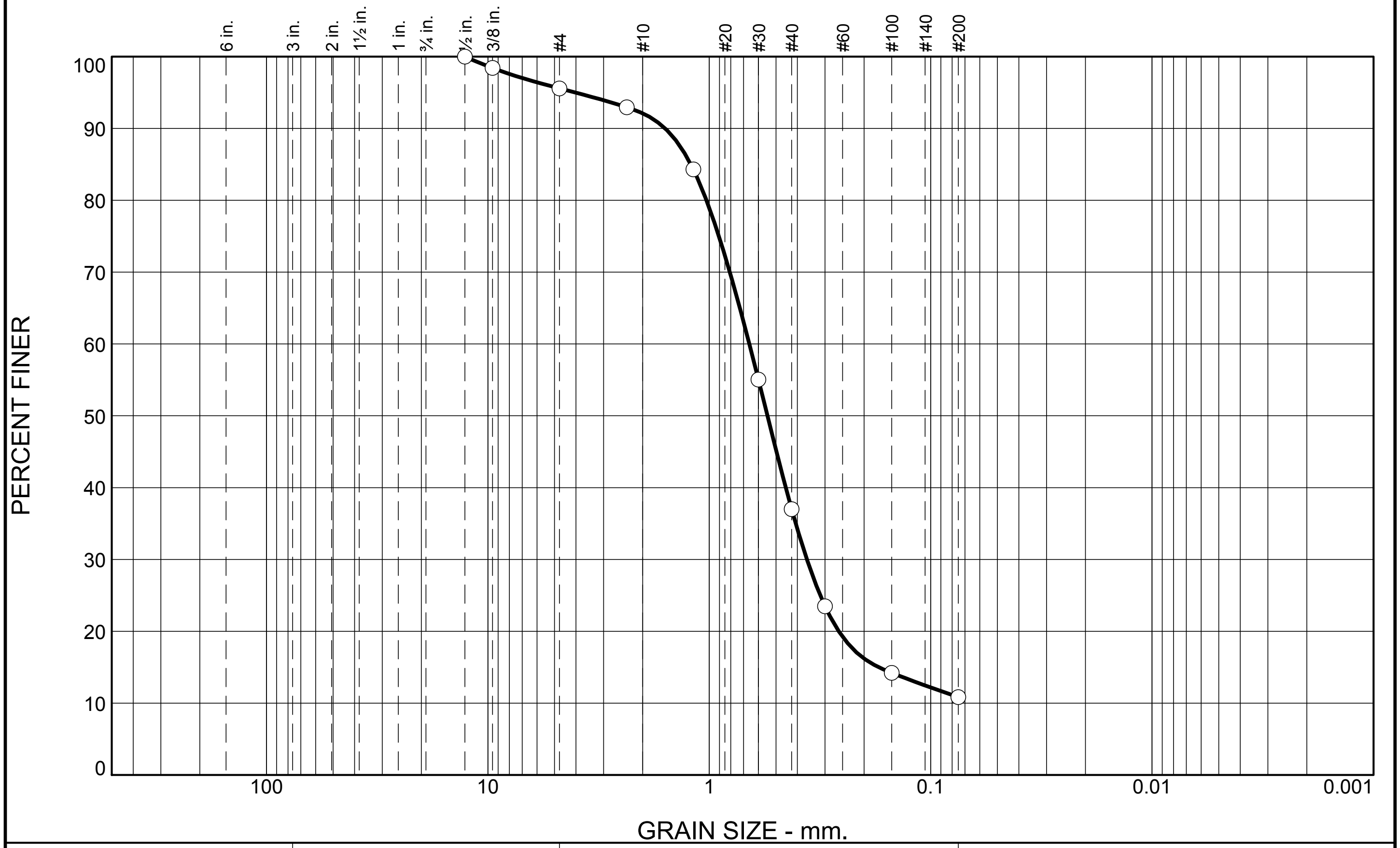
Project: Borrow Site

Project No: 16-0447

Figure

Tested By: J.Roy/MF Perry **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	3.5	55.1	26.2	10.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	98.4		
#4	95.6		
#8	92.9		
#16	84.3		
#30	55.0		
#40	37.0		
#50	23.5		
#100	14.2		
#200	10.8		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.5810 D_{85}= 1.2108 D_{60}= 0.6593
D_{50}= 0.5463 D_{30}= 0.3625 D_{15}= 0.1720
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Lab #4385 Series.

Location: B10 @ 15'
Sample Number: 4385 Series

Date: 4/10/17

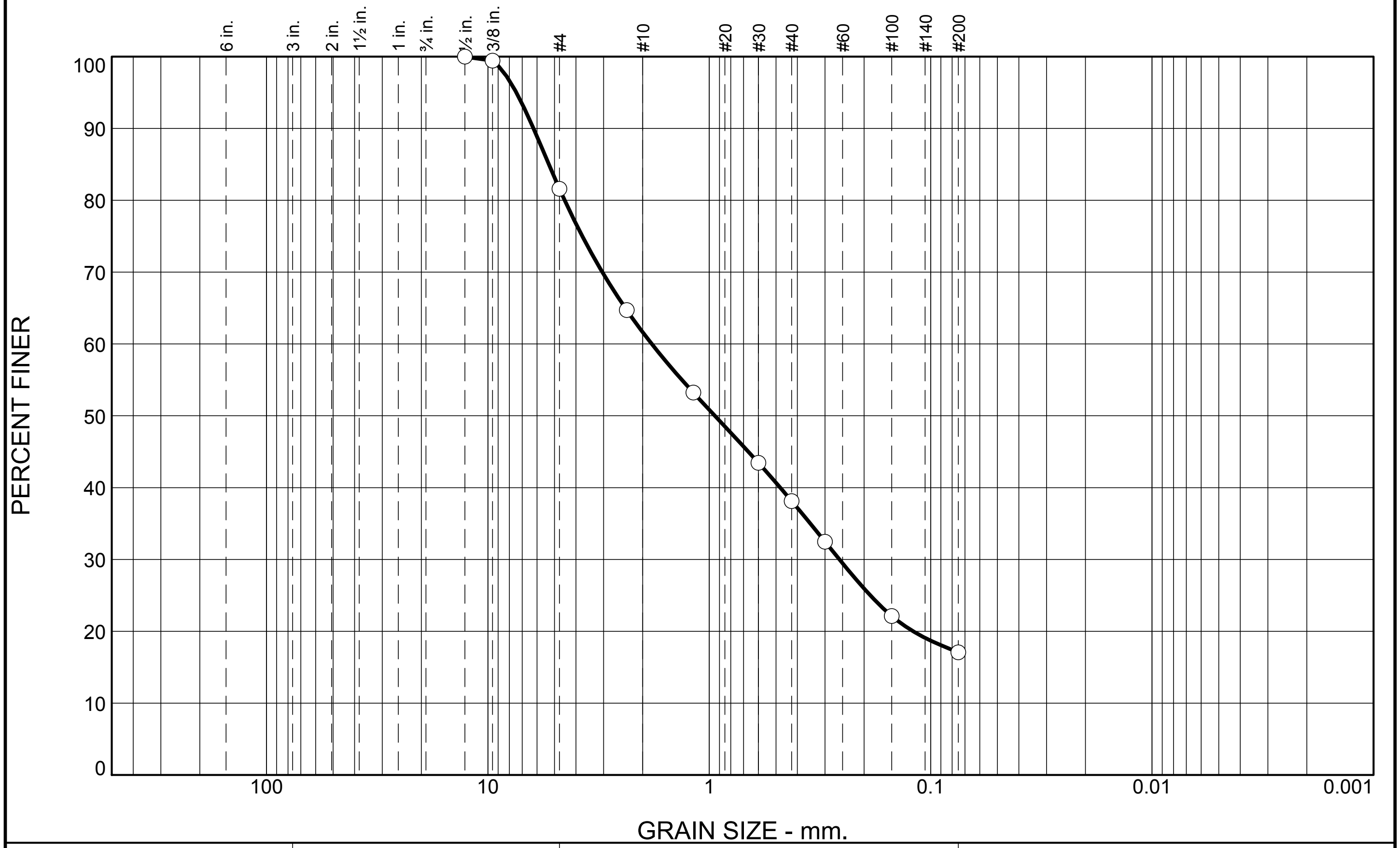
Koury Engineering & Testing, Inc.

Chino, CA

Client:
Project: Borrow Site
Project No: 16-0447
Figure

Tested By: J.Roy/MF Perry **Checked By:** ____________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.4	19.9	23.6	21.0	17.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	99.5		
#4	81.6		
#8	64.7		
#16	53.2		
#30	43.5		
#40	38.1		
#50	32.5		
#100	22.1		
#200	17.1		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.2186 D_{85}= 5.3000 D_{60}= 1.8185
D_{50}= 0.9436 D_{30}= 0.2583 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Lab #4385 Series.

Location: TP3 @ 3.5' - 4'
Sample Number: 4385 Series

Date: 4/10/17

Koury Engineering & Testing, Inc.

Chino, CA

Client:
Project: Borrow Site
Project No: 16-0447
Figure

Tested By: J.Roy/MF Perry **Checked By:** ____________________

COMPACTION TEST REPORT

Curve No.: 4385 Series

Project No.: 16-0447 **Date:** 3/24/17

Project: Borrow Site

Client:

Location: TP-4 @ 6.5' -7'

Sample Number: 4385 Series

Remarks: Less than 5% Material retained on the #4 Sieve.

MATERIAL DESCRIPTION

Description: Light Yellowish Brown to Light Olive Brown Silty Clay

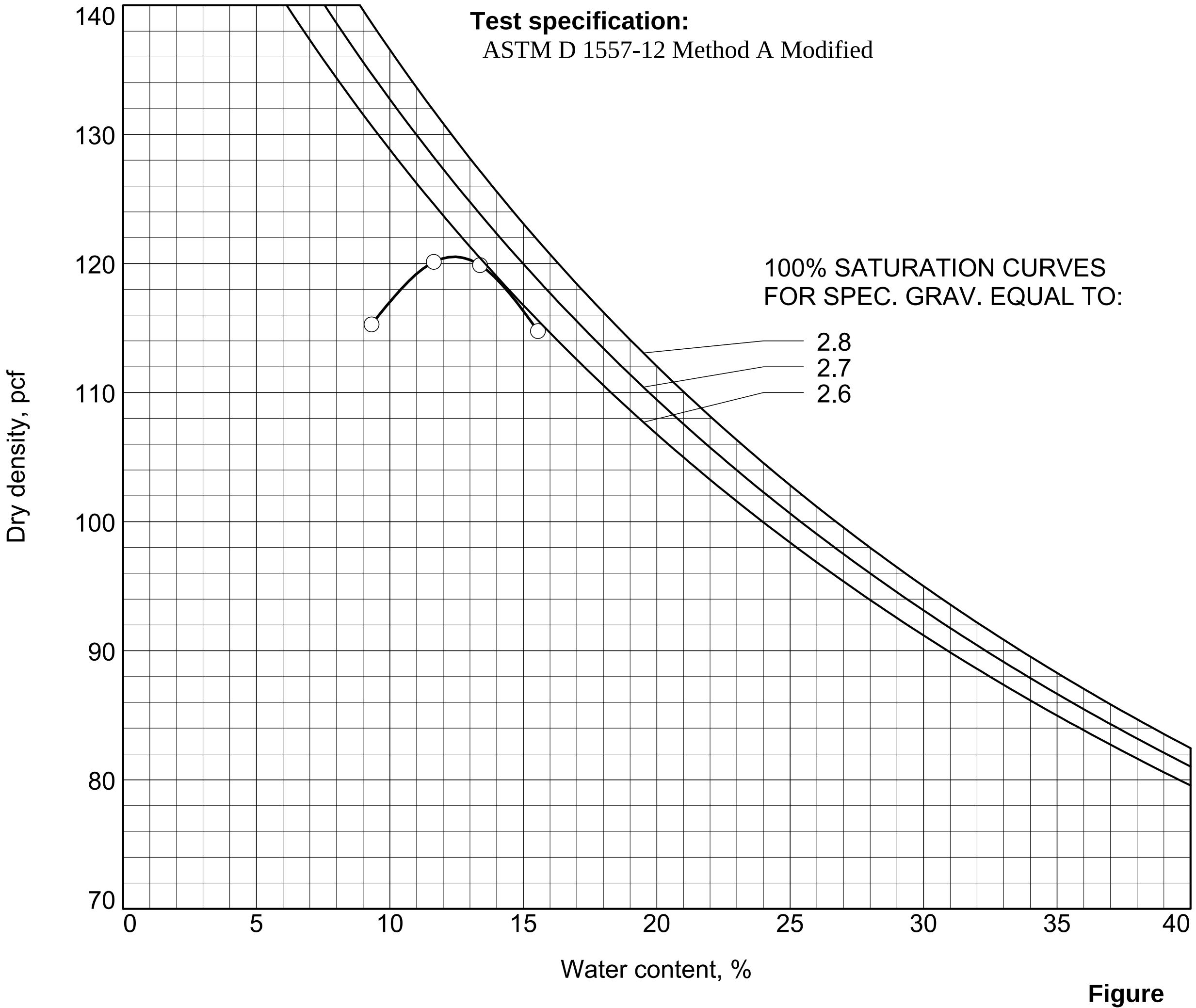
Classifications - **USCS:** CL **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% < No.200 =

TEST RESULTS
Maximum dry density = 120.5 pcf
Optimum moisture = 12.4 %



Figure

Koury Engineering & Testing, Inc.

Tested By: Mathew F. Perry **Checked By:**

COMPACTION TEST REPORT

Curve No.: 4385 Series

Project No.: 16-0447 **Date:** 3/24/17

Project: Borrow Site

Client:

Location: TP-5 @ 3.5'

Sample Number: 4385 Series

Remarks: Less than 5% Material retained on the #4 Sieve.

MATERIAL DESCRIPTION

Description: Dark Brown to Dark Yellowish Brown Silt

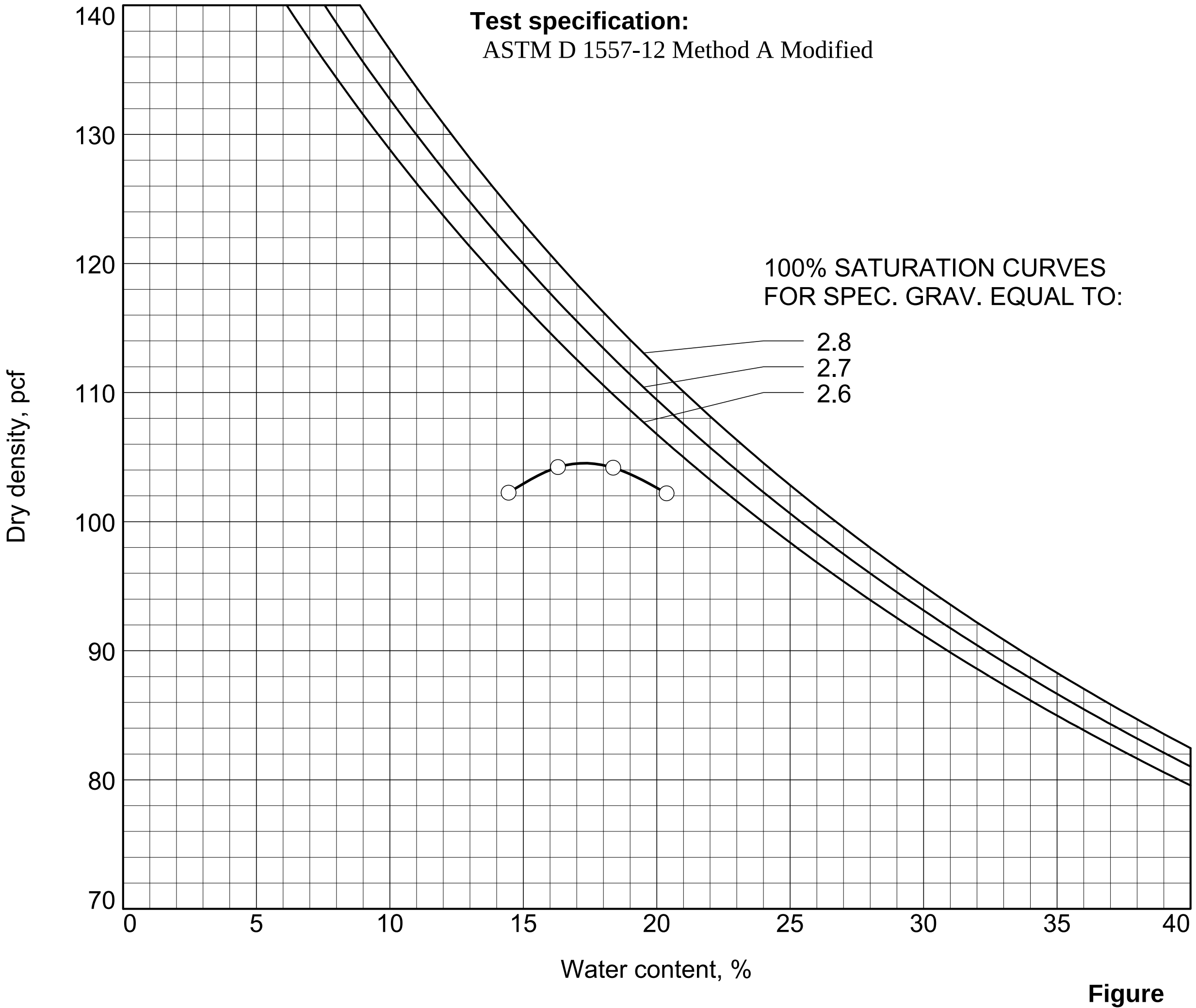
Classifications - **USCS:** ML **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% < No.200 =

TEST RESULTS
Maximum dry density = 104.5 pcf
Optimum moisture = 17.3 %



Figure

Koury Engineering & Testing, Inc.

Tested By: Mathew F. Perry **Checked By:** ____________________

COMPACTION TEST REPORT

Curve No.: 4385 Series

Project No.: 16-0447 **Date:** 3/24/17

Project: Borrow Site

Client:

Location: TP-11 @ 12' - 12.5'

Sample Number: 4385 Series

Remarks: Less than 5% Material retained on the #4 Sieve.

MATERIAL DESCRIPTION

Description: Very Dark Greyish Brown Silty Clay

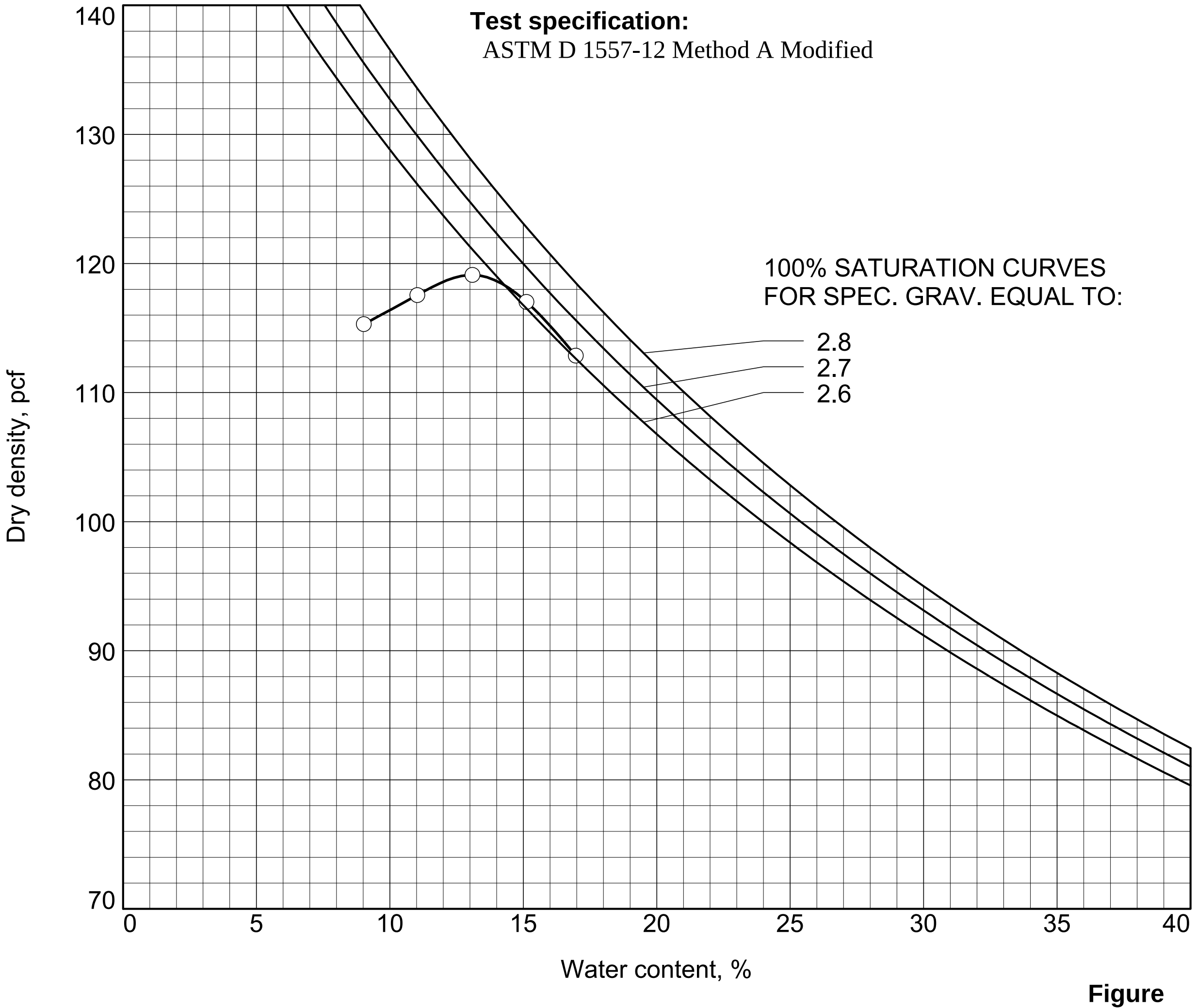
Classifications - **USCS:** CL **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% < No.200 =

TEST RESULTS
Maximum dry density = 119.1 pcf
Optimum moisture = 13.1 %



Figure

Koury Engineering & Testing, Inc.

Tested By: Mathew F. Perry **Checked By:** ______________________

COMPACTION TEST REPORT

Curve No.: 4385 Series

Project No.: 16-0447 **Date:** 3/24/17

Project: Borrow Site

Client:

Location: TP-17 @ 8.5' - 9.5'

Sample Number: 4385 Series

Remarks: Less than 5% Material retained on the #4 Sieve.

MATERIAL DESCRIPTION

Description: Olive Brown to Light Olive Brown Clay

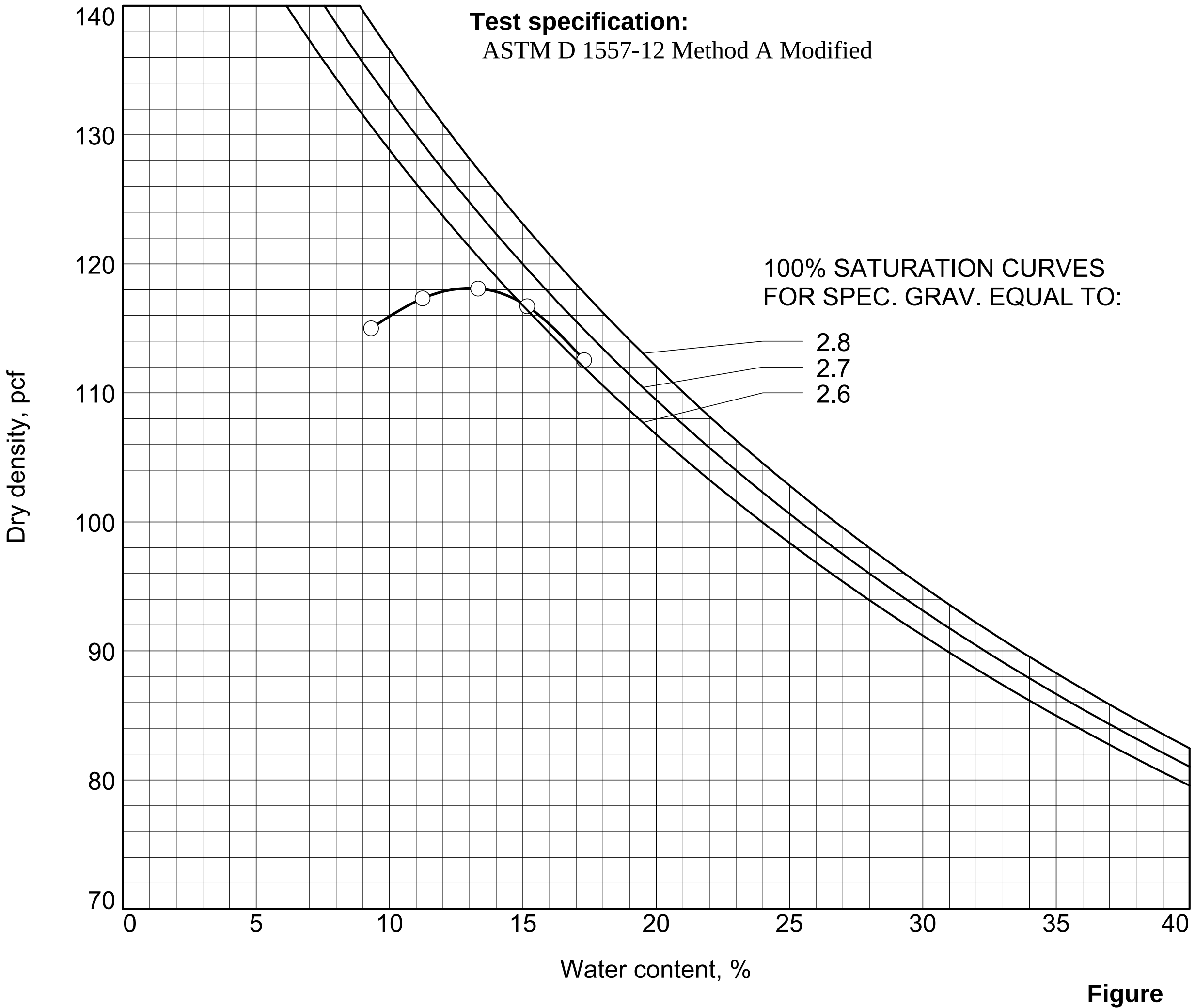
Classifications - **USCS:** CL/CH **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% < No.200 =

TEST RESULTS
Maximum dry density = 118.1 pcf
Optimum moisture = 13.0 %


Test specification:
ASTM D 1557-12 Method A Modified

Figure

Koury Engineering & Testing, Inc.

Tested By: Mathew F. Perry **Checked By:** ____________________

We are a key member of the construction team while safeguarding the public. We improve operational logistics and provide superior quality control through the continuing development of our engineering staff and technical expertise, utilization of classroom training and field supervisors, thus defining the industry standard.

KOURY ENGINEERING & TESTING, INC.

CORPORATE OFFICE
14280 Euclid Avenue
Chino, California 91710
P: 909•606•6111
F: 909•606•6555

BRANCH OFFICE
17800 South Main Street, Suite 302
Gardena, California 90248
P: 310•851•8685
F: 310•851•8692

www.kouryengineering.com