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June 10, 2022

Mr. Barry Ross
Orangevale Recreation and Park District
6826 Hazel Avenue
Orangevale, California 95662

Pavement Design Recommendations
PROPOSED ACCESS ROADWAY
Orangevale Recreation and Park District Complex
Orangevale, California
WKA No. 4730.2200008.0000

As authorized, we are providing pavement design recommendations for the proposed access road to be constructed between two parking lots at the Orangevale Recreation and Park District complex located in Orangevale, California (See Figure 1). The purpose of our study has been to explore the soil and groundwater conditions along the proposed access road alignment, and to provide geotechnical engineering conclusions and recommendations regarding the design and construction of the proposed improvements.

Our study has been completed in general accordance with our *Proposal for Geotechnical Engineering Services*, dated December 23, 2021 and authorized on May 5, 2022

Our scope of services included the following:

- Perform a site reconnaissance;
- Review of available groundwater data and historical aerial photographs within the vicinity of the site;
- Perform subsurface explorations, including the excavation and sampling of three test pits to a maximum depth of 7½ feet below existing grades;
- Collect bulk samples of anticipated pavement subgrade soils;
- Perform laboratory testing of selected soil samples;
- Perform engineering analyses; and,
- Preparation of this report.

Proposed Improvements

We understand an access road will be constructed from the parking lot at the Community Center to another parking lot and facility located approximate 250 feet to the north. The proposed access road will be at least 24-feet-wide or two lanes. The elevation difference between the two parking lots is about 18 feet.

Based on review of the undated *Schematic Grading Exhibit*, prepared by Warren Consulting Engineers, Inc., of El Dorado Hills, California, we understand the major portion of the access road will be excavated up to eight feet to achieve final grades and fills will be minimal.

Field Exploration, Sampling and Testing

On May 24, 2022, our representative observed and sampled a total of three test pits for the proposed access road at the approximate locations indicated in Figure 2. The test pits were excavated to depths ranging from 5 to 7½ feet below existing site grades, which was the maximum available reach of the Kubota M4509 backhoe provided by the Orangevale Recreation and Park District. Representative bulk samples of the pavement subgrade soils were collected from the test pits during our field exploration and returned to our laboratory for additional classification and testing. Following completion of the test pits, the test holes were backfilled with soil spoils by representatives of the Orangevale Recreation and Park District.

The Test Pit Logs are presented as Figures 3 through 5, which contain descriptions of the soils encountered at each test pit location. A Legend explaining the Unified Soil Classification System and the symbols used in the logs is contained on Figure 6.

FINDINGS

Site Description

The proposed access road is located north of the existing Orangevale Recreation and Park District facility in Orangevale, California (see Figure 2). The proposed access road is bounded to the north and south by existing parking lots; beyond which are existing facilities of the Orangevale Recreation and Park District, to the east by vacant land; beyond which is rural development, and to the west by vacant land, beyond which is Hazel Avenue.

At the time of our field explorations on May 24, 2022, the proposed access road alignment was vacant, undeveloped, and covered with a sparse to moderate growth of dried grass and volunteer weeds. The southern end of the alignment was covered in gravel and the site is

sloped down from south to north, with most of the elevation difference towards the center of the proposed access road. Several mature trees were observed along the project site.

Historic Aerial Photograph Review

We reviewed historical aerial photographs from the Google Earth Pro software (Google, 2018) and the website historicalaerials.com. Photographs were available from 1952 through 2021. Based on the aerial photographs, the site and its vicinity appear to have been occupied by rural development with various structures visible since at least 1952. The previous structures mainly occupy the southern, eastern, and northern end of the property. A photograph from 2009 revealed the structures are no longer visible. Since 2009 to at least 2021, the site has essentially remained the same.

Soil Conditions

We performed three Test Pits (TP1 through TP3) at the site on May 24, 2022 at the locations shown in Figure 2.

The soil conditions encountered at the test pit locations consist of brown to dark brown, variably cemented, silty sand (locally known as “hardpan”) to the maximum explored depth of 7½ feet below existing grades. For soil conditions at specific test pits, please refer to the Logs of Test Pits presented on Figures 3 through 5.

Groundwater Conditions

Groundwater was not observed at the test pit locations performed on May 24, 2022. To supplement the groundwater information, we reviewed available California Department of Water Resources (DWR) records for wells in the vicinity of the project site. DWR has monitored a well identified as Site Code 386874N1212206W001, located approximately ¼-mile southeast of the project site during the period from October 2011 to at least April 2022. The ground elevation at the well is indicated to be approximately +231 feet (NAVD88), which is similar to the lowest elevation of the project site. Groundwater measurements obtained from the well indicate a “high” groundwater +114 feet msl (about 117 feet below existing grade at the well) occurred in April 2013, and a “low” groundwater elevation of approximately +108 feet (about 123 feet below existing grade at the well) occurred in April 2022.

CONCLUSIONS

Soil Suitability for Engineered Fill Construction

The on-site soils encountered at the test pit locations are considered suitable for use in engineered fill construction, provided these materials do not contain significant organics, and deleterious material, and are at moisture contents capable of achieving the desired degree of compaction.

Excavation Conditions

The surface and near-surface soils at the site should be readily excavatable with conventional earthmoving and trenching equipment. The underlying cemented soils will be slower to excavate, but special excavation equipment is not anticipated. Based on the soil conditions encountered at the test pit locations, excavations associated with shallow trenches and other excavations less than five feet deep associated with the proposed construction, should stand vertically for short periods of time (i.e., less than one day) required for construction, unless cohesionless, saturated or disturbed soils are encountered. These unstable conditions may result in caving or sloughing; therefore, the contractor should be prepared to brace or shore the excavations, if necessary.

Excavations or trenches exceeding five feet in depth that will be entered by workers should be sloped, braced, or shored to conform to current California Occupational Safety and Health Administration (Cal/OSHA) requirements. The contractor must provide an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground.

Temporarily sloped excavations greater than five feet but not deeper than 10 feet should be constructed no steeper than a one horizontal to one vertical (1H:1V) inclination. Temporary slopes likely will stand at this inclination for the short-term duration of construction, provided significant pockets of loose and/or saturated granular soils are not encountered. Flatter slopes would be required if these conditions are encountered.

Excavated materials should not be stockpiled directly adjacent to an open excavation to prevent surcharge loading of the excavation sidewalls. Excessive truck and equipment traffic should be avoided near excavations. If material is stored or heavy equipment is stationed and/or operated near an excavation, a shoring system must be designed to resist the additional pressure due to the superimposed loads.

Pavement Subgrade Quality

Laboratory testing of the anticipated pavement subgrade soils revealed these materials possess Resistance ("R") values of 21 and 34 when tested in accordance with California Test 301. The R-value test results are contained in Figure 7.

Based on these results, it is our opinion the anticipated pavement subgrade soils are considered moderate quality material for support of asphalt concrete pavements. It is also our opinion that an R-value of 20 is considered appropriate for use in design of pavement subgrades.

Effects of Groundwater on Site Development

Based upon the anticipated groundwater levels in the area and information obtained from the borings, we conclude that a permanent groundwater level should not be a significant factor in the design or construction of the proposed access road.

Seasonal Moisture

Infiltrating surface run-off water from seasonal moisture during the winter and spring months, along with irrigation of adjacent row crops will create saturated surface soil conditions. It is probable that grading operations attempted following the onset of winter rains and prior to prolonged drying periods, and during heavy irrigation of adjacent crops, will be hampered by high soil moisture contents. Such soils, intended for use as engineered fill, will require a prolonged period of dry weather and/or considerable aeration to reach a moisture content suitable to achieve proper compaction. Wet soils should be anticipated and considered in the construction means and methods, and schedule for this project.

RECOMMENDATIONS

The recommendations presented below are appropriate for typical construction in the late spring through fall months. The on-site soils likely will be saturated by rainfall in the winter and early spring months and will not be compactable without drying by aeration or the addition of lime (or a similar product) to dry the soils. Should the construction schedule require work during wet conditions, additional recommendations can be provided, as conditions dictate.

Site preparation should be accomplished in accordance with the provisions of this report. A representative of the Geotechnical Engineer should be present during site grading to evaluate compliance with the recommendations provided in this report. The Geotechnical Engineer of

Record referenced herein should be considered the Geotechnical Engineer that is retained to provide geotechnical engineering observation and testing services during construction.

Site Clearing and Preparation

Initially, the proposed access road site should be cleared of below-grade structures (if any), utilities designated for removal, and other deleterious materials to expose existing undisturbed native soils. Where practical, the clearing operations should extend at least five feet beyond the limits of the proposed pavement areas.

Surface vegetation/organics and organically laden soil within construction areas should be stripped from the site. Debris from the stripping should not be used in general fill construction areas pavements, and any other surface improvements. With prior approval from the Geotechnical Engineer, strippings may be used in landscape areas, provided they are kept at least five feet from pavements, concrete slabs, and any other surface improvements, and are moisture conditioned, and compacted. Discing of organics may be a suitable alternative to stripping depending upon the quantity and condition of the surface vegetation at the time of grading. Discing will be allowed only with our prior approval and should be observed by our representative. Discing, if approved, must be continuous until organics are adequately mixed with the soil to provide a compactable mixture. Pockets or concentrations of organics will not be allowed.

Removal of trees, if any should include rootballs and roots larger than ½-inch in diameter. Adequate removal of debris and roots may require laborers and handpicking to clear the subgrade soils to the satisfaction of the Geotechnical Engineer's on-site representative.

Depressions resulting from clearing operations, as well as any disturbed, saturated, or organically contaminated soils, as identified by the Geotechnical Engineer's representative should be cleaned out to firm, undisturbed soils and the excavation widened as necessary to allow access with compaction equipment. Depressions should be backfilled with engineered fill in accordance with the recommendations in this report.

Following site clearing activities, areas to receive fill, remain at-grade, or subgrade achieved by excavation should be scarified to a minimum depth of 12 inches, thoroughly moisture conditioned to not less than the optimum moisture content, and uniformly compacted to not less than 90 percent of the ASTM D1557 maximum dry density.

Compaction of soil subgrades should be performed using a heavy, self-propelled, sheepsfoot compactor capable of achieving the required compaction and must be performed in the

presence of the Geotechnical Engineer's representative who will evaluate the performance of subgrade under compactive load. Difficulty in achieving subgrade compaction may be an indication of loose, soft, or unstable soil conditions associated with prior site activities. If these conditions exist, the soft or unstable materials should be excavated to expose stable soils. The resulting excavations should be backfilled with engineered fill placed and compacted in accordance with the recommendations in this report.

Site and subgrade preparation should be accomplished in accordance with the recommendations of this report. We recommend that the Geotechnical Engineer's representative be present during site clearing and preparation and grading operations to observe and test the fill to verify compliance with these recommendations.

Engineered Fill Construction

Engineered fill consisting of on-site or approved import materials should be placed in horizontal lifts not exceeding six inches in compacted thickness. Each lift should be thoroughly moisture conditioned to at least minimum moisture content for granular soils and at least two percent above the optimum moisture content for clay soils, maintained in that condition, and uniformly compacted to at least 90 percent relative compaction.

Imported fill materials, if required, should be possess a Plasticity Index of less than 15, an Expansion Index of less than 20, and contain no particles greater than three inches in maximum dimension. Import fill materials should possess a minimum Resistance Value of 20 when tested in accordance with California Test 301 test method. In addition, we recommend the contractor supply certification for any imported fill materials (other than aggregate base) that designates the fill materials do not contain known contaminants per Department of Toxic Substances Control's (DTSC) guidelines for clean fill and have corrosion characteristics within acceptable limits. Imported soils should be approved by the Geotechnical Engineer prior to being transported to the site.

The upper six inches of final pavement subgrades should be uniformly moisture conditioned to at least the optimum moisture content, and uniformly compacted to at least 95 percent relative compaction, regardless of whether final grade is completed by filling, excavation, or are left at existing grades.

Permanent excavation and fill slopes, if any, should be constructed no steeper than two horizontal to one vertical (2H:1V) and should be vegetated as soon as practical following grading to minimize erosion. As a minimum, erosion control measures should include placement of straw bale sediment barriers or construction of silt filter fences in areas where surface run-off

may be concentrated. Slopes should be over-built and cutback to design grades and inclinations.

Final pavement subgrade preparation and compaction should be performed just prior to placement of aggregate base, after underground utility construction is complete, if any. Final pavement subgrades should be stable under construction traffic prior to aggregate base placement and be protected from disturbance or desiccation until covered by aggregate base.

All earthwork operations should be accomplished in accordance with the recommendations contained within this report. It is essential that the Geotechnical Engineer's representative be present on a regular basis during earthwork operations to verify that the recommendations in this report and the project plans and specifications are satisfied.

Utility Trench Backfill

Bedding and initial backfill for utility construction should conform to the pipe manufacturer's recommendations and/or the applicable sections of the governing agency standards. General trench backfill should consist of native soils, or suitable fill material, backfilled in thin loose lifts, moisture conditioned to at least the optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557. The lift thicknesses will depend on the type of compaction equipment being used. Within the upper six inches of final subgrade for pavements, trench backfill should be compacted to at least 95 percent relative compaction.

Pavement Design

Based on laboratory test results for near-surface soils present at the site, we used a Resistance ("R") value of 20 for anticipated pavement subgrades. Pavement sections presented in Table 1 have been calculated using the above R-values and traffic indices (TIs) assumed to be appropriate for this project. The procedures used for pavement design are in general conformance with Chapters 600 to 670 of the *California Highway Design Manual*, 7th addition. The project civil engineer should determine the appropriate traffic index for pavements based on anticipated traffic conditions. If needed, we can provide additional pavement sections for different traffic indices.

TABLE 1
PAVEMENT DESIGN ALTERNATIVES
R-value = 20

Traffic Index (TI)	Type A Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
6.0	2½	12
	3½*	10

Notes: * = Asphalt concrete thickness contains the Caltrans safety factor.

We emphasize that the performance of pavement is critically dependent upon uniform and adequate compaction of the soil subgrade, as well as all engineered fill and utility trench backfill within the limits of the pavements. We recommend that final pavement subgrade preparation (i.e., scarification, moisture conditioning and compaction) be performed after underground utility construction (if any) is completed and just prior to aggregate base placement.

The upper six inches of pavement subgrade soils should be compacted to at least 95 percent relative compaction at the optimum moisture content, maintained in that condition (moist) and protected from disturbance. All aggregate base should be compacted to at least 95 relative compaction.

Pavement subgrades should be stable and unyielding under heavy wheel loads of construction equipment. To help identify unstable subgrades within the pavement limits, a proof-roll should be performed with a fully loaded, water truck on the exposed subgrades prior to placement of aggregate base. The proof-roll test should be observed by the Geotechnical Engineer's representative. Disturbed subgrade soils may require additional moisture conditioning, scarification, and re-compaction, depending on the level of disturbance.

All pavement materials and construction methods of structural pavement sections should conform to the applicable provisions of the *Caltrans Standard Specifications*, latest edition.

Site Drainage

Final pavement grading should be accomplished to provide positive drainage of surface water away from pavements, prevent ponding of water adjacent to the pavements, and channel runoff water to appropriate drainage facilities. Where possible, a positive surface gradient of at least two percent sloping away from the pavements should be provided for a distance of at least 10 feet away from the edge of the pavements.

Efficient drainage of all surface water to avoid infiltration and saturation of the supporting aggregate base and subgrade soils is important to pavement performance. Weep holes could be provided at drainage inlets, located at the subgrade-base interface, to allow accumulated water to drain from beneath the pavements.

Geotechnical Engineering Observation and Testing During Earthwork

Site preparation should be accomplished in accordance with the recommendations of this report. Geotechnical testing and observation during construction is considered a continuation of our geotechnical engineering investigation. Wallace-Kuhl & Associates should be retained to provide testing and observation services during site preparation and earthwork construction at the project to verify compliance with this geotechnical report and the project plans and specifications, and to provide consultation as required during construction. These services are beyond the scope of work authorized for this investigation.

In the event that Wallace-Kuhl & Associates is not retained to provide geotechnical engineering observation and testing services during construction, the Geotechnical Engineer retained to provide these services should indicate in writing that they agree with the recommendations of this report or prepare supplemental recommendations as necessary. A final report by the "Geotechnical Engineer" should be prepared upon completion of the project.

LIMITATIONS

Our recommendations are based upon the information provided regarding the proposed project, combined with our analysis of site conditions revealed by the field exploration and laboratory testing programs. We have used our engineering judgment based upon the information provided and the data generated from our investigation. This report has been prepared in substantial compliance with generally accepted geotechnical engineering practices that exist in the area of the project at the time the report was prepared. No warranty, either expressed or implied, is provided.

If the proposed construction is modified or re-sited; or, if it is found during construction that subsurface conditions differ from those we encountered at the test pit locations, we should be afforded the opportunity to review the new information or changed conditions to determine if our conclusions and recommendations must be modified.

We emphasize that this report is applicable only to the proposed construction and the investigated site and should not be utilized for construction on any other site.

We appreciate the opportunity to provide our services. Please contact us if you have any questions at (916) 372-1434.

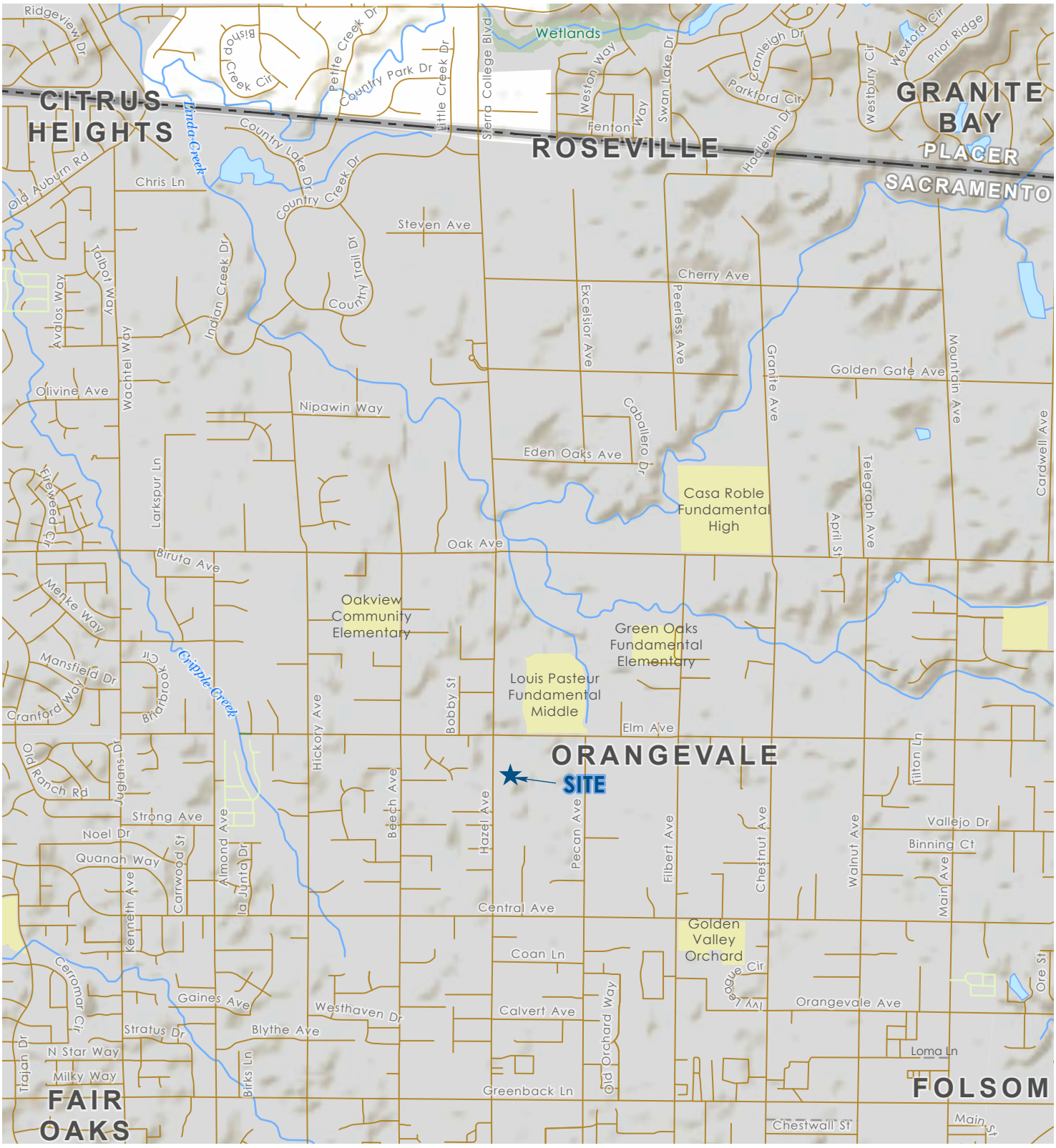
Wallace – Kuhl & Associates

Guang H. Zhu
Staff Engineer

Michael M. Watari
Principal Engineer

GHZ:MMW:/ghz

Attachments: Figure 1 – Vicinity Map
Figure 2 – Site Plan
Figures 3 through 5 – Logs of Test Pits
Figure 6 – Unified Soil Classification System
Figure 7 – Resistance Value Test Results



N

0 1,000 2,000

Feet

Spatial Data provided by Esri, NOAA, and USGS.
Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US

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VICINITY MAP

PROPOSED ACCESS ROADWAY

Orangevale, California

FIGURE	1
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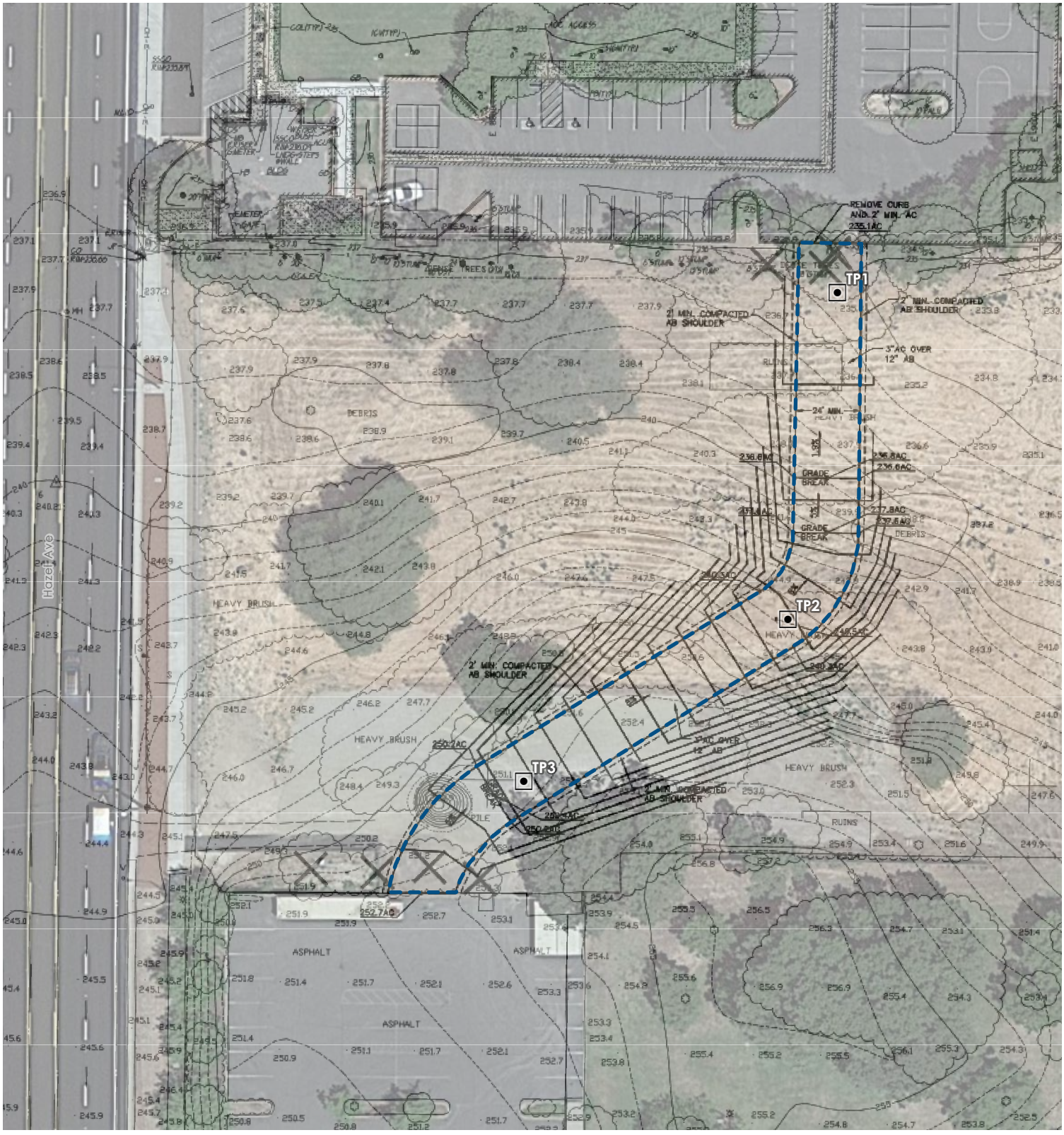
PROJECT MGR	MMW
DATE	06/2022
4730.2200008.0000	



Approximate Test Pit Location

Approximate Site Boundary

N

0 25 50

Feet

Aerial imagery provided by Esri.
Site Plan adapted from a undated drawing provided by Warren Consulting Engineers, Inc.
Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US

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SITE PLAN

PROPOSED ACCESS ROADWAY

Orangevale, California

FIGURE	2
DRAWN BY	RWO
CHECKED BY	GHZ
PROJECT MGR	MMW
DATE	06/2022
4730.2200008.0000	

Project: Access Road Orangevale
Project Location: Orangevale, California
WKA Number: 4730.2200008.0000

LOG OF TEST PIT TP1

Sheet 1 of 1

Date(s) Drilled	**5/24/22**	Logged By	**GHZ**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Orangevale Recreation and Park District**	Total Depth of Drill Hole	**5.0 feet**
Drill Rig Type	**Kubota M4509**	Diameter(s) of Hole, inches	**24**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**Not encountered**	Sampling Method(s)		Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3')**			Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark brown, silty SAND (SM); moist, fine to medium sand		TP1 (0-3')				
	5		Test Pit terminated at approximately 5 feet below existing ground surface. Groundwater not encountered.						

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FIGURE 3

Project: Access Road Orangevale
Project Location: Orangevale, California
WKA Number: 4730.2200008.0000

LOG OF TEST PIT TP2

Sheet 1 of 1

Date(s) Drilled	**5/24/22**	Logged By	**GHZ**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Orangevale Recreation and Park District**	Total Depth of Drill Hole	**5.0 feet**
Drill Rig Type	**Kubota M4509**	Diameter(s) of Hole, inches	**24**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**Not encountered**	Sampling Method(s)		Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (3'-5')**			Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Brown, silty SAND (SM); moist, fine to medium sand						
			cemented		TP2(3'-5')				
	5		Test Pit terminated at approximately 5 feet below existing ground surface. Groundwater not encountered.						

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FIGURE 4

Project: Access Road Orangevale
Project Location: Orangevale, California
WKA Number: 4730.2200008.0000

LOG OF TEST PIT TP3

Sheet 1 of 1

Date(s) Drilled	**5/24/22**	Logged By	**GHZ**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Orangevale Recreation and Park District**	Total Depth of Drill Hole	**7.5 feet**
Drill Rig Type	**Kubota M4509**	Diameter(s) of Hole, inches	**24**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**Not encountered**	Sampling Method(s)		Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3')**			Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Approximately 2 inches of gravel						
			Brown, silty SAND (SM); moist, fine to coarse sand		TP3 (0-3')				
			cemented						
	5								
			Practical Refusal encountered at approximately 7½ feet below existing ground surface. Groundwater not encountered.						

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FIGURE 5

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)

MAJOR DIVISIONS		USCS[4]	CODE	CHARACTERISTICS
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS[1] (More than 50% of coarse fraction > no. 4 sieve size)	GW		Well-graded gravels or gravel - sand mixtures, trace or no fines
		GP		Poorly graded gravels or gravel - sand mixtures, trace or no fines
		GM		Silty gravels, gravel - sand - silt mixtures, containing little to some fines[2]
		GC		Clayey gravels, gravel - sand - clay mixtures, containing little to some fines[2]
	SANDS[1] (50% or more of coarse fraction < no. 4 sieve size)	SW		Well-graded sands or sand - gravel mixtures, trace or no fines
		SP		Poorly graded sands or sand - gravel mixtures, trace or no fines
		SM		Silty sands, sand - gravel - silt mixtures, containing little to some fines[2]
		SC		Clayey sands, sand - gravel - clay mixtures, containing little to some fines[2]
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML		Inorganic silts, gravely silts, and sandy silts that are non-plastic or with low plasticity
		CL		Inorganic lean clays, gravelly lean clays, sandy lean clays of low to medium plasticity[3]
		OL		Organic silts, organic lean clays, and organic silty clays
	SILTS & CLAYS LL ≥ 50	MH		Inorganic elastic silts, gravelly elastic silts, and sandy elastic silts
		CH		Inorganic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
		OH		Organic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat
ROCK		RX		Rocks, weathered to fresh
FILL		FILL		Artificially placed fill material

OTHER SYMBOLS

- = Drive Sample: 2-1/2" O.D. Modified California sampler
- = Drive Sampler: no recovery
- = SPT Sampler
- = Initial Water Level
- = Final Water Level
- — — — = Estimated or gradational material change line
- ——— = Observed material change line

Laboratory Tests

CR = Corrosion
PI = Plasticity Index
EI = Expansion Index
UCC = Unconfined Compression Test (TSF)
TR = Triaxial Compression Test
GR = Gradational Analysis (Sieve/Hydro)
FC = Wash (Fines Content)
PP = Pocket Penetrometer Test (TSF)
PID = Photo Ionization Detector Test (PPM)
RV = Resistance ("R") Value

REF = Refusal (>50 blows in 6 inches)

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS (b)	Above 12"	Above 300
COBBLES (c)	12" to 3"	300 to 75
GRAVEL (g) coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	75 to 4.75 75 to 19 19 to 4.75
SAND coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.75 to 0.075 4.75 to 2.00 2.00 to 0.425 0.425 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

Trace - Less than 5 percent
Few - 5 to 10 percent
Little - 15 to 25 percent
Some - 35 to 45 percent
Mostly - 50 to 100 percent

* Percents as given in ASTM D2488

NOTES:

1. Coarse grained soils containing 5% to 12% fines, use dual classification symbol (ex. SP-SM).
2. If fines classify as CL-ML (4<PI<7), use dual symbol (ex. SC-SM).
3. Silty Clays, use dual symbol (CL-ML).
4. Borderline soils with uncertain classification list both classifications (ex. CL/ML).

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UNIFIED SOIL CLASSIFICATION SYSTEM

PROPOSED ACCESS RODWAY

Orangevale, California

FIGURE	6
DRAWN BY	GHZ
CHECKED BY	GHZ
PROJECT MGR	MMW
DATE	06/2022
4730.2200008.0000	

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Dark brown, silty sand

LOCATION: TP1 (0' - 3')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	126	8.62	657	27	117	65
2	127	9.84	255	3	13	26
3	126	9.42	395	11	48	47

R-Value at 300 psi exudation pressure = 34

MATERIAL DESCRIPTION: Brown, silty sand

LOCATION: TP2 (3' - 5')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	127	8.81	690	58	251	69
2	127	10.0	291	17	74	20
3	127	9.43	447	31	134	41

R-Value at 300 psi exudation pressure = 21

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RESISTANCE VALUE TEST RESULTS

PROPOSED ACCESS ROADWAY

Orangevale, California

FIGURE	7
DRAWN BY	GHZ
CHECKED BY	GHZ
PROJECT MGR	MMW
DATE	06/2022
4730.2200008.0000	