Project #2026-03

County of Madera
GENERAL SERVICES

200 West 4th Street, Suite 4200
Madera, CA 93637-3538

559-675-7703 / Fax 559-675-7950 / TDD 559-675-8970

Issue Date: Tuesday, May 19, 2026

THE COUNTY OF MADERA
GENERAL SERVICES

ADDENDUM NUMBER ONE (1)
PROJECT NUMBER: RFP #2026-03

Madera County Riverstone Fire Station

RESPONDERS PLEASE NOTE:

The following information is provided:

This Addendum forms part of the Contract Documents. It modifies the original Project Manual and Drawings, as well as Addendums previously issued, as noted below. Bidders are required to acknowledge receipt of this Addendum on the space provided in the Proposal Form. Failure to acknowledge receipt of this Addendum may subject bidders to disqualification.

SPECIFICATIONS

- **Section 00 11 13 – Bid Opening Date**
  - Revise bid opening date from Wednesday, June 10, 2026 to **Friday, July 10, 2026 by 3:00 PM PDT.**
- **Section 00 21 13 – Instruction to Bidders, Section 27 – Pre-Bid Meeting**
  - Revise last day for questions from Friday, May 29, 2026 by 5:00 pm to **Friday, June 26, 2026 by 5:00 pm.**
- **Section 00 73 00 – Supplementary Conditions, Article SC-14 – Time of Completion**
  - In Event Description table, replace Bid Date of June 10, 2026 by 3:00 PM to **Friday, July 10, 2026 by 3:00 PM.**
- **Section 32 31 19 – Decorative Metal Fences and Gates**

- Replace section 32 31 19 in its entirety and replace with Section 32 31 19 - Decorative Metal Fences and Gates included in Addendum No. 1

REQUEST FOR CLARIFICATIONS:

1. **QUESTION:** There are two connections to existing water main on Road 40 on sheet c-3. Neither connection shows a meter or backflow device installed. With this be required? Assuming 2" service to be installed per RCWD W-14, W-19 & W-20. 4" service to installed per W-22 or W-23?

   RESPONSE: Yes, meter and backflow device, will be required by RCWD Standards W-14, W-19 and W-20 for the 2" Service. The 4" service to be installed per W-22. Unless Madera County Fire Department approval allows for the removal of the FDC. The plans remain under review with RCWD pending final approval.

2. **QUESTION**: Details on LC-3 & AS901, AS902 conflict w/ Spec for fence/gate construction, rails, pickets, posts, posts attachment & height. Which is to be followed for this project?

   RESPONSE: Refer to the revised specification included with this response indicating a minor edit related to section 2.03 (G), finials. The specification 32 3119 shall take precedence over details on sheets LC-3 and AS-901 for fence panels, fence posts, gates, gate posts, fence rails and fence pickets. Follow dimensions noted in sheet AS-901 for heights.

3. **QUESTION:** Is the Geotechnical report available? We do not see it in the provided documents. If they are not available when can we expect them to be provided?

   RESPONSE: Please see Geotechnical Report #012-2085 prepared by Krazan & Associates. Note that geotechnical report is incorrectly labeled "Fire Station 58" but it is in fact for "Riverstone Fire Station"

4. **QUESTION:** Concrete drive section shows placed on native in the plans, but aggregate spec calls for 6" of base.

   RESPONSE: Section shall be per plan section and page 14 of the Geotechnical Report #012-22085 by Krazan & Associates.

5. **QUESTION:** Please provide HMA thickness, number of lifts, aggregate base thickness, and subgrade compaction requirements.

RESPONSE: Temporary drive approaches shall be per Page 13 of Geotechnical Report #012-22085 by Krazan & Associates for TI of 7.5. 4.5" over 5" AB (95% Compaction) over 12" compacted subgrade (90%) Placed in 2 lifts.

6. **QUESTION:** What level of finish is required for the drywall?

   RESPONSE: Please refer to specification section 09 21163.09 for drywall finish requirements.

7. **QUESTION:** I noticed notes referencing shear walls and directing us to the structural drawings; however I am not able to locate them. Please provide the location of shear walls.

   RESPONSE: The shear walls are specified on the foundation plans sheet S2.01, see Note 28 for notes and legend depiction. Shear walls are also shown on the wall elevation sheets S3.01-S3.03. The shear wall schedule is also in the typical detail 1/S1.06.

ATTACHMENTS:

1. **Pre-Bid Conference Agenda.**
   - **a.** Any changes identified in red.
2. **Pre-Bid Conference Sign-In Sheet**
3. **Geotechnical Report**
   - **a.** Report No. 012-22085 dated June 22, 2022 prepared by Krazan & Associates, Inc.
4. **Section 31 31 19 – Decorative Metal Fences and Gates**

COUNTY OF MADERA

Jorge Mendoza
Capital Projects Manager

Company Name:

Acknowledged by:

_____ _____

END OF ADDENDUM ONE

Pre-bid Conference Agenda

200 West Fourth Street, Madera, CA 93637 Phone: (559) 675-7703 • FAX (559) 675-7750

DATE: Thursday, May 14, 2026

FROM: Jorge Mendoza

PROJECT: Madera County Riverstone Fire Station
MEETING: Pre-Bid Conference (Non-Mandatory)

DATE: May 14, 2026
TIME: 11:00 a.m.
PLACE: Intersection of Avenue 12 and Road 40

DISTRIBUTION: All Attendees

A. Introductions and Sign-in

1. All Prime Contractors participating in bidding of this project must sign in.

2. Introductions:

OWNER:	County of Madera 200 West Fourth Street, Suite 4200 Madera, CA 93637 (559) 675-7703 FAX (559) 675-7750 Joel Bugay, Assistant CAO Susanna Herrera, Senior Administrative Analyst Janelle Clark, Facilities Superintendent
END-USERS:	Madera County Fire / Cal-Fire 185 Tozer Street Madera, CA 93638 Justin Macomb, Deputy Chief of Operations Larry Pendarvis, Assistant Chief
ARCHITECT:	RRM Design Group 3765 S. Higuera St., Suite 102 San Luis Obispo, CA 93401 Michael Scott, Principal Darin Cabral, Director of Architecture Cameron Wire, Architect
CONSTRUCTION MANAGER:	Kitchell CEM 200 West Fourth Street, Suite 4200 Madera, CA 93637 (559) 675-7703 FAX (559) 675-7750 Contact: Jorge Mendoza Cell: (559) 474-3321 Contact: Ricky Arredondo Cell: (559) 706-5367

B. General Notes:

1. All information, correspondence, and communications shall / will be transmitted through **Jorge Mendoza,** as the Owner's Authorized Representative. 559-675-7703; fax: 559-675-7950; email: jorge.mendoza@maderacounty.com

2. Options for bid documents:

   Madera County Bid Opportunities – BidNet Direct
   https://www.bidnetdirect.com/california/maderacounty

   To receive electronic copies, use the link above and/or please contact Jorge Mendoza @ 559-474-3321 or via email at jorge.mendoza@maderacounty.com

C. Bid Overview:

1. Immediately following the Pre-bid meeting, there will be a site walk-thru.
2. RFP Release, **Monday, May 4, 2026**
3. Non-Mandatory Bid Walk, **Thursday, May 14, 2026**
4. Last day for RFC's prior to bid date is **Friday, May 29, 2026, at 5:00PM**. Submit as much of the required documentation electronically and on the Request for Clarification form as applicable. The electronic form has been provided as a sheet in the RFP for your usage as needed.
5. **Addendum** - Last addendum to be issued by **Friday, June 5, 2026.** After this, no further written information will be issued to bidders.
6. Bids are due on **Wednesday, June 10, 2026 by 3:00 PM** It was discussed during the pre-bid meeting that the bid due date will most likely change and be extended.
7. **Bid Location:** Transmit to location as indicated in the "Notice to Bidders".
   County of Madera, County Administrative Office, General Services Department
   200 West Fourth Street, 4th Floor, Suite 4200
   Madera, CA 93637
8. **Bid Opening: Wednesday, June 10, 2026, at 3:01 PM** (after bids are received)
9. **Bid Approval: Tuesday, July 14, 2026 (Tentative)**
10. **Notice to Proceed: Monday July 27, 2026 (Tentative)**
11. **Pre-Construction Conference**: **TBD**
12. **Construction Start Date:** Approx. **Monday, August 3, 2026**
13. **Construction Schedule** – **14 calendar months** from Notice to Proceed.
14. **Liquidated Damages**: **$2,000** per day for project delays that are determined to be attributable to the Contractor.
15. **Construction Cost Estimate**: **$9,780,000**
16. **Bid Forms** (proposed subcontractors, bidder qualification, non-collusion affidavit, certification regarding workers' comp, bid bond, DIR public works registration number).
    a) See bid documents for all applicable required forms.
    b) Contractor to verify the receipt of all contract documents and addendums. First addendum will be issued following the Pre-Bid Conference as needed.
17. **Contractor Qualifications to bid.**
    a) Contractor shall possess a Class B or necessary licenses or certifications at the time the Contract is awarded.
18. **Basis of Award:** Base Bid
19. **Wage Rates:** Prevailing Wage
20. **DIR Registration:** Contractor and subcontractors must be registered with the Department of Industrial Relations pursuant to Labor Code Sect. 1725.5.

D. Scope of Work

1. **Summary of Work:**
   CONSTRUCTION OF A NEW FIRE STATION FOR THE COUNTY OF MADERA. WORK INCLUDES (BUT IS NOT LIMITED TO): ON SITE IMPROVEMENTS, NEW FIRE STATION BUILDING, MECHANICAL, PLUMBING, FIRE PROTECTION & ALARM, VEHICLE EXHAUST, EMERGENCY GENERATOR, COMMUNICATIONS, AND ELECTRICAL SYSTEMS, OFF SITE IMPROVEMENTS AS PART OF CONTRACT INCLUDES, BUT IS NOT LIMITED TO: NEW CURB CUTS, NEW SEWER LATERAL TO EDGE OF GUTTER, NEW GAS CONNECTIONS AND NEW ELECTRICAL CONDUIT STUBBED TO EDGE OF GUTTER
2. **Permits:**
   The Contractor will be responsible for all permit fees. Fee totals TBD at a later date. The successful contractor is to apply for and pull permit.
3. **Utility Company Coordination:**
   County of Madera General Services.
4. **Deferred Approvals:**
   Fire Sprinkler and Fire Alarm. Reference 01 33 00 1.19 Deferred Submittals Section 01 25 00 1.04 D DELEGATED DESIGN AND ADMINISTRATIVE APPROVAL is **VOID**
5. **General Conditions Overview**
   a) All correspondence will be through the Construction Manager.
   b) 100% performance and payment bonds are required.
6. **General Requirements Overview**
   a) Contractor is reminded to review all of the specifications along with its requirement for enforcement through all levels of its subcontractors.
   b) **Substitutions.** All substitutions requests shall be in accordance with section 01 25 00 Substitution Procedures and Article 41 of the General Conditions.
   c) Contractor is reminded that all applicable codes, rules, and regulations shall be enforced.

E. Installation of the Work

1. Contractor shall adhere to the Specifications, General Conditions, and Supplemental Conditions as provided within the contract documents.
2. Cooperation and coordination with Owner vendor and other contractors Contractor's operations.
3. Contractor shall coordinate all work with CM to ensure construction operations do not disrupt or interfere with existing business in the adjacent buildings.

F. **Scope Clarifications**

1. Generator – Will be Owner Provided – Contractor Installed.
2. Existing Trees – Will be in contractor's base scope
   i. There are 8 rows of 21 trees (168 trees) and 2 rows of 13 trees (26) for a total of **194** existing trees that will need to be removed.
3. Add Alternate 1 Bus Charging Stations – Will be included in future addendum.

G. Questions and Clarifications

1. **All questions and clarifications to be submitted in the RFC form included in the bid documents.**

ATTENDANCE SHEET

200 West Fourth Street, Madera, CA 93637 (559) 675-7703, Fax (559)675-7905

PROJECT:	**Madera County Riverstone Fire Station**
PROJECT NUMBER:	**RFP #2026-03**
DATE:	Thursday, May 14, 2026
TIME:	11:00 AM
PLACE:	Project Site - Intersection of Avenue 12 and Road 40

Name	Company Name	Email & Phone
Jorge Mendoza	Kitchell CEM	jorge.mendoza@maderacounty.com 559-474-3321
Andy Pumarejo	Mid State Automotive	Andy@maeco.us 559-393-5916
Nicholas Gutierrez	KYA Group	Nicholas.Gutierrez@theKYAGroup.com (209)761-1956
Jesse Gonzales	GC Builders	Estimating@gc-builders.com (559)478-3276
Adrian Maldonado	Diede Construction	estimating@diedeconstruction.com (209) 369-8255
Jenny Graasch	AMG Associates	estimating@amgassociatesinc.com (661-251-7401
Chris Drake	BDM Inc	estimating@bdminc.net

Name	Company Name	Email & Phone
BRUCE KINABREW	KRAZAN & ASSOCIATES	BRUCEKINABREW@KRAZAN.COM 559-664-8076
Bruce Waltz	WE ONEIL	bwaltz@weoneil.com 310-606-1305
Chase Brazil	BMY Construction Inc	estimating@bmyinc.com 559-243-4200
Steve del Pilar	Browning Contractors	Steve@browningcontractors.com (559) 938-6402
Chris Silva	SGC	Chriss@Eliteteamoffices.com
Rocky Hogue	Marvulli, Inc.	rocky@marvulli.com 209-658-5587
Jacob Kuhlemeier	Quiring General	estimating@quiring.com 559-451-6947
Fernando Rodarte	Bush Construction	FRodarte@BushConstruction.Net
TYLER THOMAS	BUSH CONSTRUCTION	tthomas@bushconstruction.net
BRANDON MAUGHAN	SIMILE CONSTRUCTION	estimating@similebuilt.com 209-545-6111

Name	Company Name	Email & Phone
Pablo Sroer	Shinen Landscape	
Ron Donaldson	Fortune-Ratliff	Estimating@Fortuneratliff.com
Davis Parkin	Swinerton Builders	davis.parkin@swinerton.com (559) 940-4643
DON WOOLWINE	SOLTEK PACIFIC	DWOOLWINE@SOLTEKPACIFIC.COM ESTIMATING@ " 559 707 5123
Alec Wright	central valley iron	559 765 7820
Cody Day	Bill Nelson	cody@bngec.us 559-593-1527
Glen Pennycook	American Elite Electric Inc	gp@americanee.com (209) 479-2750
Jacob Banks	Westech systems	Jbanks@westechsys.com 559-286-7799
ANTHONY AGUILAR	~~AGUILAR@harrisconstruction.com~~ HARRIS CONSTRUCTION	AAGUILAR@harrisconstruction.com 559-251-0301

Name	Company Name	Email & Phone
JESSE GUTIERREZ	MARK WILSON COST.	ESTIMATING@MARKWILSONCONSTION.COM
CAMERON WIRE	RRM DESIGN GROUP	cmwire@rrmdesign.com (805) 543-1794
JOSIE MIRAMONTES	MAG ENGINEERING	assistant@magcompanies.net (559) 515-1433

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED FIRE STATION 58
SOUTHWEST OF MILESTONE ROAD AND ROAD 40
MADERA COUNTY, CALIFORNIA

PROJECT NO. 012-22085
JUNE 22, 2022

Prepared for:

MR. MICHAEL NAZAROFF
COUNTY OF MADERA
200 WEST 4TH STREET, SUITE 4200
MADERA, CALIFORNIA 93637

Prepared by:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
215 W. DAKOTA AVENUE
CLOVIS, CALIFORNIA 93612
(559) 348-2200

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

June 22, 2022 Project No. 012-22085

Mr. Michael Nazaroff
County of Madera
200 West 4th Street, Suite 4200
Madera, California 93637

RE: Geotechnical Engineering Investigation
Proposed Fire Station 58
Southwest of Milestone Road and Road 40
Madera County, California

Dear Mr. Nazaroff:

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

George P. Hattrup

George P. Hattrup
Senior Geotechnical Engineer
RGE No. 2353/RCE No. 43979

GPH:ht

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

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Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

June 22, 2022 Project No. 012-22085

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED FIRE STATION 58
SOUTHWEST OF MILESTONE ROAD AND ROAD 40
MADERA COUNTY, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Fire Station 58 to be located southwest of Milestone Road and Road 40 in Madera County, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, seismic design parameters, soil cement reactivity, and pavement design.

A site plan showing the approximate boring locations is presented following the text of this report. A description of the field investigation, boring logs, and the boring log legend are presented in Appendix A. Appendix A also contains a description of the laboratory testing phase of this study; along with the laboratory test results. Appendices B and C contain guides to earthwork and pavement specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the soil and groundwater conditions at the site, to make geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and Engineered Fill construction.

Our scope of services was outlined in our proposal dated April 6, 2022 (KA Proposal No. P261-22) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A field investigation consisting of drilling six borings to depths ranging from 10 to 50 feet for evaluation of the subsurface conditions at the project site.
- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.

- Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.

- Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

Based on the information that was provided, which included a preliminary site plan, the planned development will consist of a new fire station with a one and two-story building that has a footprint area of approximately 8,200 square feet. It is anticipated the new building will have a structural steel or wood frame with a concrete slab-on-grade floor and shallow foundations. Structural loads acting on footings are anticipated to be relatively light to moderate. The project will also include asphalt concrete (AC) paved driveways and parking areas, a trash enclosure, exterior concrete flatwork, various underground utilities, and landscaping. Since the project site is relatively flat and level, minor cuts and fills (less than two feet) are anticipated to achieve the desired finished ground surface in the planned building and paved areas.

In the event these structural or grading details are inconsistent with the final design criteria, Krazan should be notified so that we may update this writing as applicable.

SITE LOCATION AND SITE DESCRIPTION

The project site is rectangularly shaped, encompasses approximately 2.2 acres, and is located along the west side of Road 40 just south of the Milestone Road alignment in Madera County, California. The subject site lies in a rural area of Madera County; however, there is a large residential development in progress east of Road 40. In addition, there is an existing well site and water pumping facility on the south side of the project site. The western half of the project site is part of a mature pistachio orchard, which extends to the west and south. The pistachio trees in the eastern half of the project site have been cleared away, the ground surface is relatively flat, and there is currently a minor amount of dry weeds and grass.

Based on historical Google Earth images, the site was part of a larger field that has been used for orchards starting sometime before 1986. Trees were cleared in 2015 to construct the referenced well site and pumping facility. In addition, trees were cleared within approximately 120 feet along the west side of Road 40 in 2020 or early 2021, which is consistent with the current site condition.

GEOLOGIC SETTING

The subject site lies near the east side of the central San Joaquin Valley, which is a topographic and structural basin that is bounded on the east by the Sierra Nevada and on the west by the Coast Ranges. The Sierra Nevada, a fault block dipping gently southwestward, is made up of igneous and metamorphic rocks of pre-Tertiary age that comprise the basement complex beneath the Valley. The Coast Ranges contain folded and faulted sedimentary rocks of Mesozoic and Cenozoic age, which are similar to those rocks that underlie the Valley at depth and non-conformably overlie the basement complex; gently

dipping to nearly horizontal sedimentary rocks of Tertiary and Quaternary age overlie the older rocks. These younger rocks are mostly of continental origin and in the Madera area, they were derived from the Sierra Nevada.

The San Joaquin and Fresno Rivers are the principal rivers in the area. Alluvial fans formed by these rivers are the largest geomorphic features in this part of the San Joaquin Valley. The formation of the fans has resulted in rather flat regional topography.

The Coast Ranges evolved as a result of folding, faulting and accretion of diverse geologic terrains. They are composed chiefly of sedimentary and metamorphic rocks that are sharply deformed into complex structures. They are broken by numerous faults, the San Andreas Fault being the most notable structural feature.

Both the Sierra Nevada and Coast Range are geologically young mountain ranges and possess active and potentially active fault zones. Major active faults and fault Zones occur at some distance to the east and west of the Fresno area. The Sierra Nevada Fault Zone and Owens Valley Fault are located approximately 86 miles east-northeast of the site, bound the eastern edge of the Sierra Nevada block, and contain both active and potentially active faults.

The nearest active or potentially active earthquake fault zones to the project site are the Great Valley – Coalinga Section (approximately 49 miles southwest), San Joaquin (approximately 53 miles west), the O'Neill (approximately 56 miles west), and the Ortigalita (approximately 60 miles west). The San Andreas Fault is possibly the best-known fault and is located about 72 miles to the southwest.

There are no active fault traces in the project vicinity. Accordingly, the project area is not within an Earthquake Fault Zone (Special Studies Zone) and will not require a special site investigation by an Engineering Geologist. However, it is anticipated that the project site will be subject to moderate ground shaking during a design seismic event and a peak earthquake ground acceleration adjusted for site class effects (PGA_M) of 0.322g is considered applicable.

Secondary hazards from earthquakes include rupture, seiche, landslides, liquefaction, and seismic settlement. Since there are no known faults within the immediate area, ground rupture from surface faulting should not be a potential problem. Seiche and landslides are not hazards in the area either. Taking into account the seismic setting, the dense consistency of the soil profile, and that historically high groundwater is estimated to be greater than 150 deep at the site, the risk of liquefaction (sudden loss of shear strength in a saturated cohesionless soil) or significant seismic settlement occurring during a design seismic event is considered negligible.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling six borings to depths ranging from 10 to 50 feet below existing site grade, using a truck-mounted drill rig. In addition, two bulk subgrade samples were obtained from the site for laboratory R-value testing. The approximate boring and bulk sample locations are shown on the attached site plan, Figure 1. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the

engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory-testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, expansion potential, shear strength, consolidation potential, Atterberg Limits, and R-value of the materials encountered. In addition, chemical tests were performed to evaluate the soil-cement reactivity. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, approximately 1 to 2 feet of fill material was encountered at the boring locations across the project site. This fill material consisted of fine to medium grained silty sand with varying amounts of clay. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soils during the time of our field and laboratory investigations. The limited testing indicates that these soils have low strength characteristics and are highly compressible when saturated.

Beneath the fill material, the native soils consisted predominantly of medium dense to very dense layers of fine and fine to medium grained silty sand, clayey sand, and sandy silt to maximum depth explored of 50 feet. Zones of weakly to moderately cemented soils (e.g. "hardpan") were encountered at depths ranging from approximately 2 to 25 feet. The hardpan layers varied from approximately 3 feet thick in Borings B1 and B6 to over 20 feet thick in Boring B2. Field and laboratory tests suggest that the native soils below a depth of approximately 2.5 feet are moderately strong and slightly compressible. Penetration resistance ranged from 22 blows per foot to over 50 blows per 6 inches. Dry densities in the upper 22 feet generally ranged from approximately 103 to 124 pcf. Below a depth of 22 feet the dry densities ranged from approximately 80 to 94 pcf. A representative soil sample obtained from a depth of 2 feet consolidated approximately 1.7 percent under a 2 ksf load when saturated. A representative soil sample had an angle of internal friction of 39 degrees. In addition, tests performed on two representative bulk samples show the near-surface soils have an Expansion Index ranging from 1 to 3, which indicates a very low expansion potential.

For additional information about the soils encountered, please refer to the boring logs and laboratory test data in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered within the maximum depth explored of 50 feet. Based on information obtained from the Groundwater Information System website provided by

California Water Boards, the groundwater is estimated to be greater than 300 feet deep in the vicinity of the project site and the historical high groundwater since 1979 is estimated to be greater than 150 feet deep.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the existing fill material and loose near-surface soils, appear to be conducive to the development of the project. Approximately 1 to 2 feet of fill material was encountered in the borings that were drilled for our investigation of the site. These materials consisted of silty sand with minor amounts of clay. The thickness and extent of fill material was determined based on limited test borings. Thicker fill may be present at the site. Limited testing was performed on these soils during the time of our field and laboratory investigations. The limited testing indicates the fill soils were loosely placed and not properly compacted. Therefore, it is recommended these soils be removed so the underlying native soils can be properly prepared. Preliminary testing indicates the fill material will be suitable for reuse as Engineered Fill provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches maximum dimension. It is recommended that during construction, additional testing be performed on the fill material to verify the physical and index properties prior to reuse as Engineered Fill. Prior to fill placement, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

The site is currently undeveloped and has historically been used for agricultural purposes. Associated with this past use may be buried structures, irrigation lines, or other utility lines. Demolition activities should include the proper removal and/or relocation of any buried structures and underground utilities that will not be utilized as part of the new development. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill, compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Excavations, depressions, or soft and pliant areas extending below planned finish subgrade level should be cleaned to firm undisturbed soil, and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Geotechnical Engineer. Water wells should be abandoned according to county standards. Any other buried structures should be removed in accordance with the recommendations of the Geotechnical Engineer. The resulting excavations should be backfilled with Engineered Fill.

There are existing trees at the project site. In addition, trees have previously been removed from the site. If not utilized for the proposed development, tree removal operations should include zones of concentrated roots and any isolated roots greater than 1 inch in diameter. The resulting excavations should be backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Sandy soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy soils.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings may be design utilizing an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Isolated spread or continuous footings should have a minimum embedment of 18 inches. An allowable modulus of subgrade reaction of 65 pci may be used to design structural concrete slabs-on-grade or mat foundations.

Groundwater Influence on Structures/Construction

Based on our findings and historical records, it is not anticipated that groundwater will rise within the zone of structural influence or affect the construction of foundations and pavements for the project. However, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated, "pump," or not respond to densification techniques. Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Some structures that are founded on hardpan have experienced standing water for extended periods of time in crawl spaces below wooden floors or within sunken floor slab areas. The sources of the water were natural precipitation and landscape irrigation and, consequently, wood floor or sunken floor slab construction in hardpan soils is discouraged.

Site Preparation

General site clearing should include removal of vegetation; debris; existing utilities; stockpiled soil; trees and associated root systems; rubble; rubbish; structures including foundations; basement walls and floors; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Approximately 1 to 2 feet of fill material was encountered in the borings that were drilled for our investigation of the site. These materials consisted of silty sand with minor amounts of clay. The thickness and extent of fill material was determined based on limited test borings. Thicker fill may be present at the site. Limited testing was performed on these soils during the time of our field and

laboratory investigations. The limited testing indicates the fill soils were loosely placed and not properly compacted. Therefore, it is recommended these soils be removed so the underlying native soils can be properly prepared. Preliminary testing indicates the fill material will be suitable for reuse as Engineered Fill provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches maximum dimension. It is recommended that during construction, additional testing be performed on the fill material to verify the physical and index properties prior to reuse as Engineered Fill. Prior to fill placement, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Site preparation should include the proper removal of any buried structures, including irrigation lines, underground utilities that will not be utilized as part of the new development, and any related loose backfill material that is present at the site. The resulting excavations should be backfilled with Engineered Fill. It is suspected that demolition activities will disturb the upper soils. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any substructures, septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least three (3) feet below proposed footing elevations or as recommended by the Geotechnical Engineer. Water wells, if present, should be abandoned in accordance with the Madera County standards. Any other buried structures should be removed in accordance with the recommendations of the Geotechnical Engineer. Resulting excavations should be backfilled with Engineered Fill.

There are existing trees at the project site. In addition, trees have previously been removed from the site. If not utilized for the proposed development, tree removal operations should include zones of concentrated roots and any isolated roots greater than 1 inch in diameter. The resulting excavations should be backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

In order to reduce the amount of total and differential settlements and provide uniform support for the proposed buildings, it is recommended that following stripping, demolition activities, and fill removal, the upper native soils to a depth of at least 2 feet below the stripped ground surface or to a depth of at least 12 inches below the bottom of footings, whichever is lower, should be excavated within the area of the proposed building and other structural improvements. The over-excavation should extend to a minimum of 5 feet beyond proposed footing lines. Prior to fill placement, the exposed subgrade soils should be proof-rolled and observed by Krazan & Associates, Inc. to verify stability. Soft or pliant areas should be excavated to firm native ground. The resulting excavation should be backfilled with Engineered Fill, moisture-conditioned as necessary and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Following stripping, fill removal operations, and demolition activities, and prior to fill placement, the exposed subgrade in exterior flatwork and pavement areas should be excavated/scarified to a depth of at least 8 inches, worked until uniform and free from large clods, moisture-conditioned as necessary, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Soft or pliant areas should be excavated to firm native ground. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Subsequently, any fill required to achieve the required finished subgrade surface should consist of an Engineered Fill that is moisture-conditioned as necessary and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

During periods of wet weather, the upper soils may become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter or early spring months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Engineered Fill

Based on our test borings, the upper, on-site soils consist predominately of silty sand with varying amounts of clay. These soils should be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics and debris. Asphalt concrete or concrete debris will not be suitable for reuse as Engineered Fill within any proposed building area(s), but may be incorporated into general fill outside of these areas provided the maximum particle size does not exceed four inches. Clayey soils with an expansion index greater than 15 should not be used in the upper 12 inches of soil supporting slabs-on-grade and exterior flatwork areas.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since he has complete control of the project site at that time.

Imported Fill should consist of a well-graded, slightly cohesive, silty sand with relatively impervious characteristics when compacted. This material should be approved by Krazan prior to use and should typically possess the following characteristics:

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index (ASTM D4318)	10 maximum
Expansion Index (ASTM D4829)	15 maximum

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned as necessary, and compacted to achieve at least 90 percent maximum density based on ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2019 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Slots or weep holes should be placed in drop inlets or other surface drainage devices in pavement areas to allow free drainage of adjoining base course materials. Cutoff walls should be installed at pavement edges adjacent to vehicular traffic areas these walls should extend to a minimum depth of 12 inches below pavement subgrades to limit the amount of seepage water that can infiltrate the pavements. Where cutoff walls are undesirable subgrade drains can be constructed to transport excess water away from planters to drainage interceptors. If cutoff walls can be successfully used at the site, construction of subgrade drains is considered unnecessary.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be minimized; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

Sandy soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy soils.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. The utility trench backfill placed in pavement areas should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer's recommendations.

The Contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The Contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Foundations - Conventional

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structures may be supported on a shallow foundation system bearing on at least 12 inches of Engineered Fill. Isolated spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,850 psf
Dead-Plus-Live Load	2,500 psf
Total Load, including wind or seismic loads	3,350 psf

The footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Continuous footings should have a minimum width of 12 inches and isolated spread footings should have a minimum width of 24 inches, regardless of load.

The footing excavations should not be allowed to dry out any time prior to pouring concrete. It is recommended that continuous footings be reinforced with at least one No. 4 reinforcing bar in both top and bottom of the footing.

The total settlement is not expected to exceed 1 inch. Differential settlement should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 320 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads.

Pole-Type Foundations

It is anticipated that canopy structures, light poles, or signs may be supported on drilled piers or cast-in-drilled-hole (CIDH) piles. This type of foundation may be designed using an average allowable sidewall friction of 300 psf. This value is applicable for dead-plus-live loads and may be increased ⅓ for short duration loads, such as wind or seismic. In unpaved areas, the upper 1.5 feet should be neglected from friction calculations. Uplift loads can be resisted by CIDH piles using an allowable sidewall friction of 200 psf for the surface area plus the weight of the pier. CIDH piles should have a minimum embedment

depth of 5 feet. The total settlement of the drilled piers is not expected to exceed 1 inch and the differential settlement between two adjacent CIDH piles should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied.

The lateral capacity of CIDH piles may be determined in accordance with Section 1807.3 of the 2019 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 210 psf per foot of embedment be used to develop parameters S1 and S3 rather than one of the values given in Table 1806.2. This value includes a factor of safety of 2 and may be increased as indicated in Section 1806.3.4. In unpaved landscape areas, the upper 12 inches of soil should be ignored when calculating the minimum depth of embedment.

Prior to placing the reinforcing steel and concrete, loose or disturbed soils should be removed from CIDH pile excavations. A representative of the Geotechnical Engineer should observe the drilling and clean-out associated with the construction of pier foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. Drilled holes should be left open for as briefly as possible and should be protected from run-off. The contractor should take responsibility for staging the installation of CIDH piles so that significant amounts of sloughing or caving do not occur prior to installing the reinforcing steel and concrete.

Floor Slabs and Exterior Flatwork

In areas where moisture-sensitive floor coverings will be used, concrete slab-on-grade floors should be underlain by a water vapor retarder. The water vapor retarder should be installed in accordance with accepted engineering practice. The water vapor retarder should consist of a vapor retarder sheeting underlain by a minimum of 3 inches of compacted, clean, gravel of ¾-inch maximum size, which will act as a capillary break. To aid in concrete curing an optional 2 to 4 inches of granular fill may be placed on top of the vapor retarder. The granular fill should consist of damp clean sand with at least 10 to 30 percent of the sand passing the 100 sieve. The sand should be free of clay, silt, or organic material. Rock dust which is manufactured sand from rock crushing operations is typically suitable for the granular fill. This granular fill material should be compacted.

The exterior floors should be poured separately in order to act independently of the walls and foundation system. Exterior finish grades should be sloped a minimum of 1 to 1½ percent away from all interior slab areas to preclude ponding of water adjacent to the structures. All fills required to bring the building pads to grade should be Engineered Fills.

The floor slabs should be at least 4 inches thick and reinforced at a minimum with #3 reinforcing bars at 24 inches on-center each way within the floor slabs middle-third. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

Moisture within the structure may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor can travel through the capillary break and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be

installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the buildings is recommended. Positive drainage should be established away from the structure and should be maintained throughout the life of the structure. Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed. In addition, ventilation of the structures (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 38 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 58 pounds per square foot per foot per depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 1:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete, or other suitable backfill to reduce surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with CalTrans Standard Specifications (2018). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The pipes should be placed no higher than 6 inches above the heel of the wall, in the center line of the drainage blanket and should have a minimum diameter of four inches. Collector pipes may be either slotted or perforated. Slots should be no wider than ⅛ inch in diameter, while perforations should be no more than ¼ inch in diameter. If retaining walls are less than 6 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 4-inch diameter holes (concrete walls) or unmortared head joints (masonry walls) and not be higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

R-Value Test Results and Pavement Design

Two subgrade soil samples were obtained from the project site for R-value testing at the locations shown on the site plan. The samples were tested in accordance with the California Test Method 301. The results of these tests are as follows:

Sample	Depth	Description	R-Value at Equilibrium
RV1	8" – 30"	Silty Sand (SM)	57
RV2	8" – 30"	Silty Sand (SM)	58

The test results indicate that the onsite subgrade soils, when properly compacted, will provide good support characteristics under dynamic traffic loads. The following table shows the recommended pavement sections for various traffic indices.

Traffic Index	Asphalt Concrete	Class 2 Aggregate Base*	Compacted Subgrade**
4.0	2.0"	4.0"	12.0"
4.5	2.5"	4.0"	12.0"
5.0	2.5"	4.0"	12.0"
5.5	3.0"	4.0"	12.0"
6.0	3.0"	4.0"	12.0"
6.5	3.5"	4.5"	12.0"
7.0	4.0"	4.5"	12.0"
7.5	4.5"	5.0"	12.0"

**** 95% minimum compaction based on ASTM Test Method D1557 or CAL 216***
***** 90% minimum compaction based on ASTM Test Method D1557 or CAL 216***

If traffic indices are not available, an estimated (typical value) index of 4.5 may be used for light automobile traffic, and an index of 7.0 may be used for light truck traffic.

The following recommendations are for light-duty and heavy-duty Portland Cement Concrete Pavement Sections based on the design procedures developed by the Portland Cement Association.

PORTLAND CEMENT PAVEMENT
LIGHT DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
4.5	5.0"	- - -	12.0"

HEAVY DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
7.0	6.5"	- - -	12.0"

** 95% minimum compaction based on ASTM Test Method D1557 or CAL 216*
*** 90% minimum compaction based on ASTM Test Method D1557 or CAL 216*
****Minimum compressive strength of 3000 psi*

It is recommended that any uncertified fill material encountered within pavement areas be removed and/or recompacted. These materials should be moisture-conditioned to near optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the subgrade within paved areas. However, the Owner should be aware that the paved areas could settle and crack, which may require regular maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soils be moisture-conditioned to at least optimum moisture content and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Seismic Parameters – 2019 California Building Code

The Site Class per Section 1613 of the 2019 California Building Code (2019 CBC) and ASCE 7-16, Chapter 20 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2019 CBC, we recommend the following parameters:

Seismic Item	Value*	CBC Reference
Site Class	D	Section 1613.2.2
Site Coefficient F_a	1.364	Table 1613.2.3 (1)
S_s	0.545	Section 1613.2.1
S_{MS}	0.743	Section 1613.2.3
S_{DS}	0.495	Section 1613.2.4
Site Coefficient F_v	2.166	Table 1613.2.3 (2)
S_1	0.217	Section 1613.2.1
S_{M1}	0.470	Section 1613.2.3
S_{D1}	0.313	Section 1613.2.4
T_S	0.632	Section 1613.2

* Based on Equivalent Lateral Force (ELF) Design Procedure being used

Soil Cement Reactivity

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete (or stucco) and the soil. HUD/FHA and CBC have developed criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water.

A representative shallow soil sample was obtained from the site (Boring B2 at 2 to 3 feet) and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentration detected in the soil sample was 0.00364 percent (36.4 ppm), which is below the maximum allowable values established by HUD/FHA and CBC. Therefore, no special design requirements are necessary to compensate for sulfate reactivity with the cement.

The soil sample referenced above was also tested to evaluate the soluble chloride content, which was 94 ppm, indicating that there is a moderate soluble chloride content. In addition, a soil reactivity (pH) of 7.5 was determined.

Compacted Material Acceptance

Compaction specifications are not the only criteria for acceptance of the site grading or other such activities. However, the compaction test is the most universally recognized test method for assessing the performance of the Grading Contractor. The numerical test results from the compaction test cannot be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent on the stability of that material. The Soils Engineer has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be unstable or if future instability is suspected. A specific example of rejection of fill material passing the required percent compaction is a fill which has been compacted with an in-situ moisture content significantly less than optimum moisture. This type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

Testing and Inspection

A representative of Krazan & Associates, Inc. should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of these recommendations is incorporated into the project design and construction. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

LIMITATIONS

Geotechnical Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed in accordance with the current standard of practice, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Geotechnical Engineering, physical changes in the site, either due to excavation or fill

placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Geotechnical Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed building is relocated or redesigned, the conclusions in this report may not be valid. The Geotechnical Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

This report is a Geotechnical Engineering Investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

If you have any questions or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

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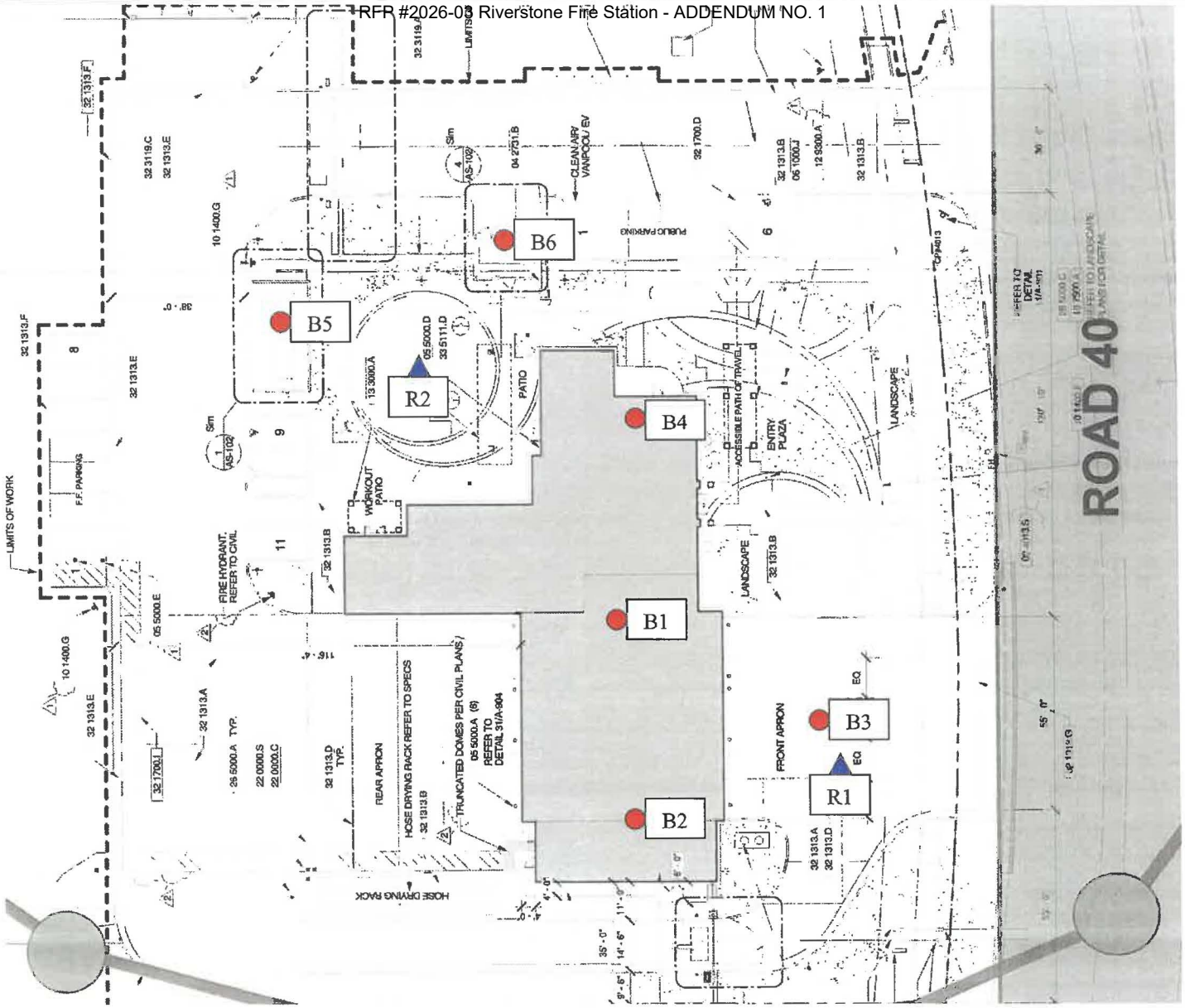
GPH/DRJ:ht



APPROXIMATE BORING LOCATION

APPROXIMATE R-VALUE LOCATION

N W E S

SITE MAP	Scale: NTS	Date: June 2022
Fire Station 58 Road 40 Madera County, California	Drawn by: HT	Approved by: DJ
	Project No. 012-22085	Figure No. 1

Krazan
GEOTECHNICAL ENGINEERING

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Six 4½-inch diameter exploratory borings were advanced for this geotechnical investigation. The boring locations are shown on the site plan.

The soils encountered were logged in the field during the exploration and, with supplementary laboratory test data, are described in accordance with the Unified Soil Classification System.

Modified standard penetration tests and standard penetration tests were performed at selected depths. These tests represent the resistance to driving 2½-inch and $1^3/_8$-inch inside diameter, respectively, core barrels. The driving energy was provided by an auto-hammer weighing 140 pounds and falling 30 inches. Relatively undisturbed soil samples were obtained while performing these tests. In addition, bag samples of the disturbed soil were obtained from the auger cuttings. The modified standard penetration tests are identified in the sample type on the boring logs with a full shaded block. The standard penetration tests are identified in the sample type on the boring logs with a half-shaded block. All samples were returned to our Clovis laboratory for evaluation.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the foundation soil underlying the site. Test results were used as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

In-situ moisture content, dry density, sieve analysis, consolidation, direct shear, and Atterberg Limits tests were completed on the undisturbed samples representative of the subsurface material. One R-value and two Expansion Index tests were also performed on a bag samples obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

The logs of the exploratory borings and laboratory test results are presented in this Appendix.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	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 smaller than No. 4 sieve size	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 less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of 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 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, 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

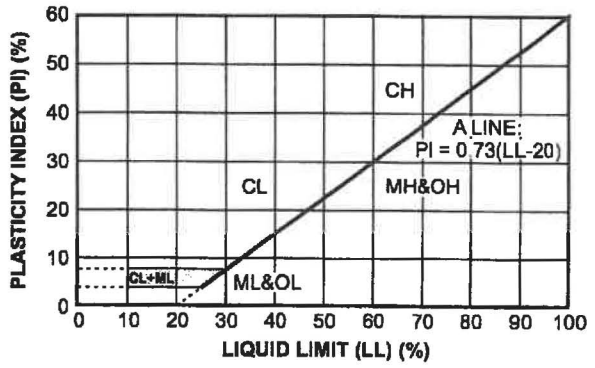
CONSISTENCY CLASSIFICATION

Description	Blows per Foot
Granular Soils	
Very Loose	< 5
Loose	5 – 15
Medium Dense	16 – 40
Dense	41 – 65
Very Dense	> 65
Cohesive Soils	
Very Soft	< 3
Soft	3 – 5
Firm	6 – 10
Stiff	11 – 20
Very Stiff	21 – 40
Hard	> 40

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.42
Fine-grained	No. 40 to No. 200	0.42 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

Project: Fire Station 58 | **Project No:** 012-22085

Client: County of Madera | **Figure No.:** A-1

Location: Road 40, Madera County, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** FILL, fine- to medium-grained with CLAY; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Loose, fine- to medium-grained with trace CLAY; reddish-brown, moist, drills easily	114.8	9.2		10
4		***CLAYEY SAND (SC)*** Medium dense, fine- to medium-grained; reddish-brown, moist, drills easily	116.8	11.7		22
6						
8		***SILTY SAND (SM)*** Very dense, fine- to coarse-grained with trace GRAVEL, weakly cemented; light brown, moist, drills hard				
10			112.8	8.0		50+
12						
14						
16			113.2	5.9		53
18		***CLAYEY SAND (SC)*** Very dense, fine- to medium-grained, weakly cemeted; light brown, moist, drills hard				
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Jim Watts | **Elevation:** 50 Feet

Log of Boring B1

Project: Fire Station 58

Project No: 012-22085

Client: County of Madera

Figure No.: A-1

Location: Road 40, Madera County, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22			120.4	9.8		50+
24		***SAND (SP)*** Dense, fine- to medium-grained; light gray, damp, drills firmly	94.0	1.7		33
26						
28						
30		***SANDY SILT (ML)*** Very dense, fine-grained; light grayish-brown, damp, drills hard	94.3	17.5		56
32						
34		***SANDY SILT (ML)*** Dense, fine-grained; light brown, moist, drills firmly	89.5	9.4		43
36						
38		***SANDY SILT (ML)*** Very dense, fine-grained; light olive-brown, moist, drills hard				
40						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight

Drill Rig: CME 45C-4

Driller: Jim Watts

Krazan and Associates

Drill Date: 5-27-22

Hole Size: 4½ Inches

Elevation: 50 Feet

Log of Boring B1

Project: Fire Station 58 | **Project No:** 012-22085

Client: County of Madera | **Figure No.:** A-1

Location: Road 40, Madera County, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
42			85.9	9.4		59		
44		Medium dense and drills easily below 44 feet						
46			80.3	17.0		29		
48								
50		End of Borehole						
52								
54								
56								
58								
60								

Drill Method: Solid Flight | **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Jim Watts | **Elevation:** 50 Feet

Sheet: 3 of 3

Log of Boring B2

Project: Fire Station 58 **Project No:** 012-22085

Client: County of Madera **Figure No.:** A-2

Location: Road 40, Madera County, California **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** FILL, fine- to medium-grained with CLAY; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Very dense, fine- to medium-grained with CLAY, moderately cemented; light brown, moist, drills hard	123.6	5.2		50+
6			122.9	7.9		50+
8		With trace GRAVEL and reddish-brown below 8 feet				
10				7.0		50+
16			116.6	7.8		50+

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Solid Flight **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 **Krazan and Associates** **Hole Size:** 4½ Inches

Driller: Jim Watts **Elevation:** 25 Feet

Log of Boring B2

Project: Fire Station 58

Project No: 012-22085

Client: County of Madera

Figure No.: A-2

Location: Road 40, Madera County, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
			107.0	10.8		50+		
22								
24								
		End of Borehole						
26								
28								
30								
32								
34								
36								
38								
40								

Drill Method: Solid Flight

Drill Date: 5-27-22

Drill Rig: CME 45C-4

Krazan and Associates

Hole Size: 4½ Inches

Driller: Jim Watts

Elevation: 25 Feet

Sheet: 2 of 2

Log of Boring B3

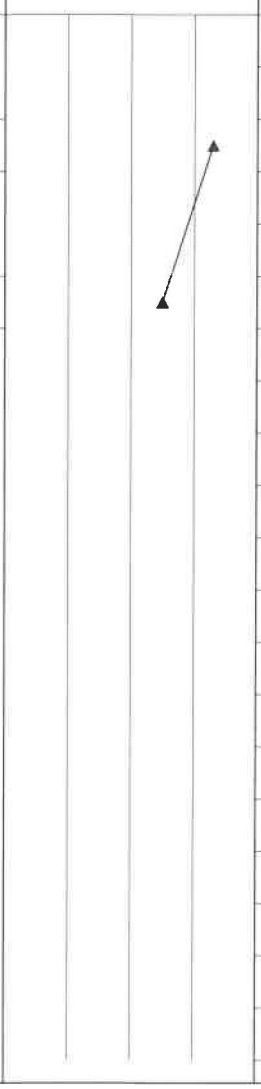
Project: Fire Station 58 **Project No:** 012-22085

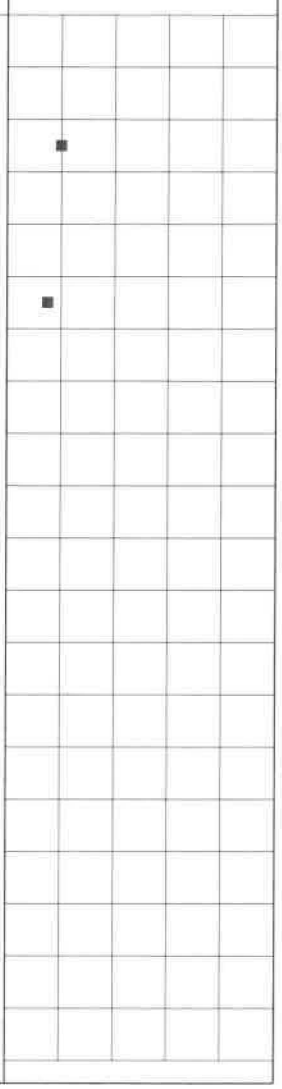
Client: County of Madera **Figure No.:** A-3

Location: Road 40, Madera County, California **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
		CLAYEY SILTY SAND (SM/SC) FILL, fine- to medium-grained; brown, damp, drills easily				
2		***CLAYEY SILTY SAND (SM/SC)*** Very dense, fine-grained; orangish-brown, moist, drills hard	125.0	10.0		66
4		Fine- to medium-grained and moderately cemented below 5 feet	119.2	7.6		50+
6		With trace GRAVEL below 7 feet				
8						
10		End of Borehole				
12						
14						
16						
18						
20						





Drill Method: Solid Flight **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 **Krazan and Associates** **Hole Size:** 4½ Inches

Driller: Jim Watts **Elevation:** 10 Feet

Log of Boring B4

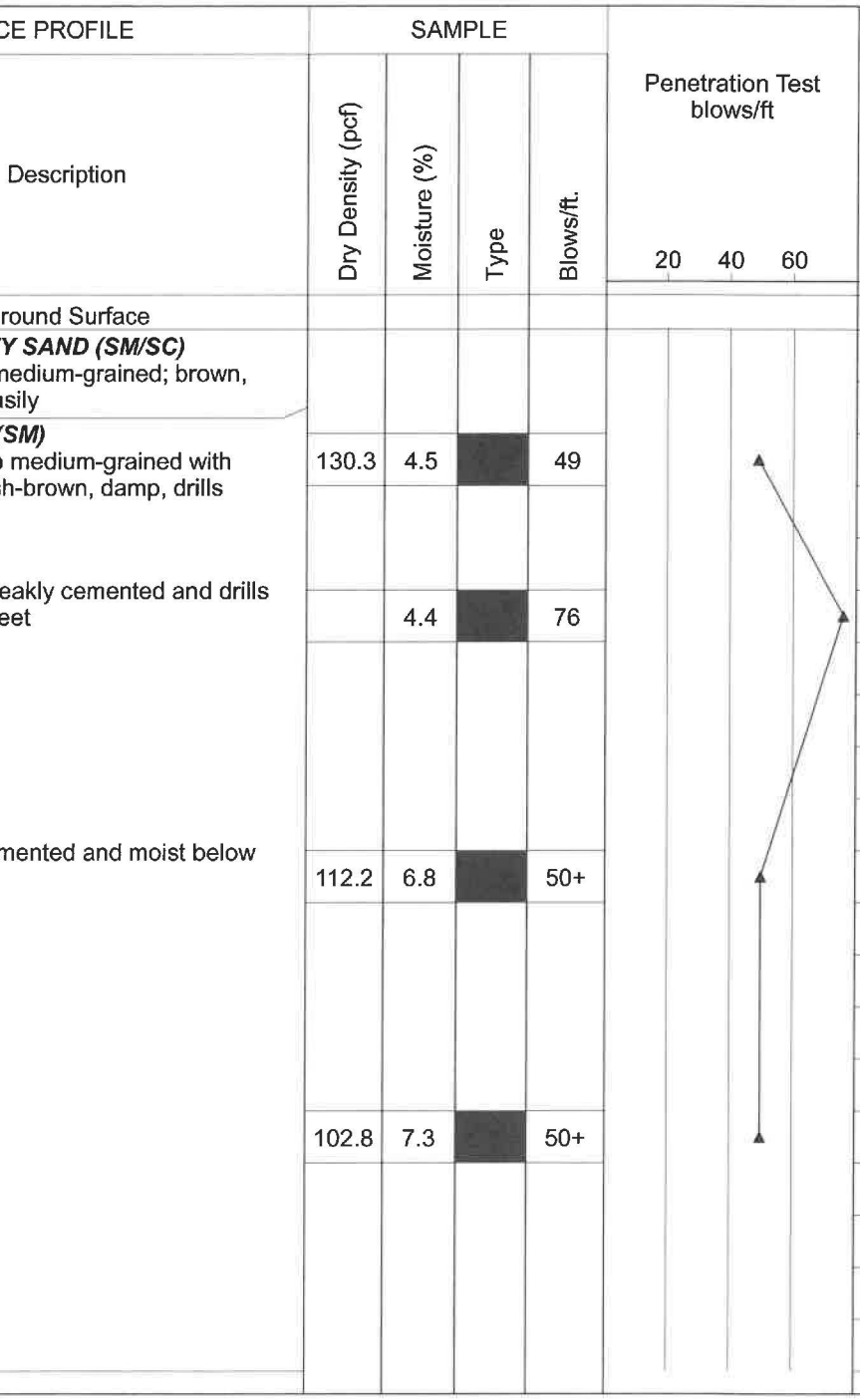
Project: Fire Station 58 | **Project No:** 012-22085

Client: County of Madera | **Figure No.:** A-4

Location: Road 40, Madera County, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
		CLAYEY SILTY SAND (SM/SC) FILL, fine- to medium-grained; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Dense, fine- to medium-grained with CLAY; orangish-brown, damp, drills firmly	130.3	4.5		49
4						
		Very dense, weakly cemented and drills hard below 5 feet		4.4		76
6						
8						
10		Moderately cemented and moist below 10 feet	112.2	6.8		50+
12						
14						
			102.8	7.3		50+
16						
18						
20						



Drill Method: Solid Flight | **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Jim Watts | **Elevation:** 20 Feet

Sheet: 1 of 1

Log of Boring B5

Project: Fire Station 58 | **Project No:** 012-22085

Client: County of Madera | **Figure No.:** A-5

Location: Road 40, Madera County, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to medium-grained; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Very dense, fine- to medium-grained with CLAY; light brown, damp, drills hard Reddish-brown and moderately cemented below 2½ feet	130.8	3.5	■	50+
6			115.9	3.0	■	50+
8		Moist below 8 feet	114.9	8.5	■	50+
15		End of Borehole				

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 5-27-22

Drill Rig: CME 45C-4 | **Hole Size:** 4½ Inches

Driller: Jim Watts | **Elevation:** 15 Feet

Krazan and Associates

Log of Boring B6

Project: Fire Station 58 **Project No:** 012-22085

Client: County of Madera **Figure No.:** A-6

Location: Road 40, Madera County, California **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** FILL, fine- to medium-grained with trace CLAY; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Medium dense, fine- to medium-grained with trace CLAY; reddish-brown, damp, drills easily	114.8	4.4		22
4		Dense and moist below 4 feet				
6			116.8	11.4		51
8		***CLAYEY SAND (SC)*** Very dense, fine- to medium-grained, moderately cemeted; reddish-brown, moist, drills hard	112.8	12.5		50+
10						
12		***CLAYEY SAND (SC)*** Dense, fine- to medium-grained; reddish-brown, damp, drills firmly				
14						
16		End of Borehole				
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight **Drill Date:** 5-27-22

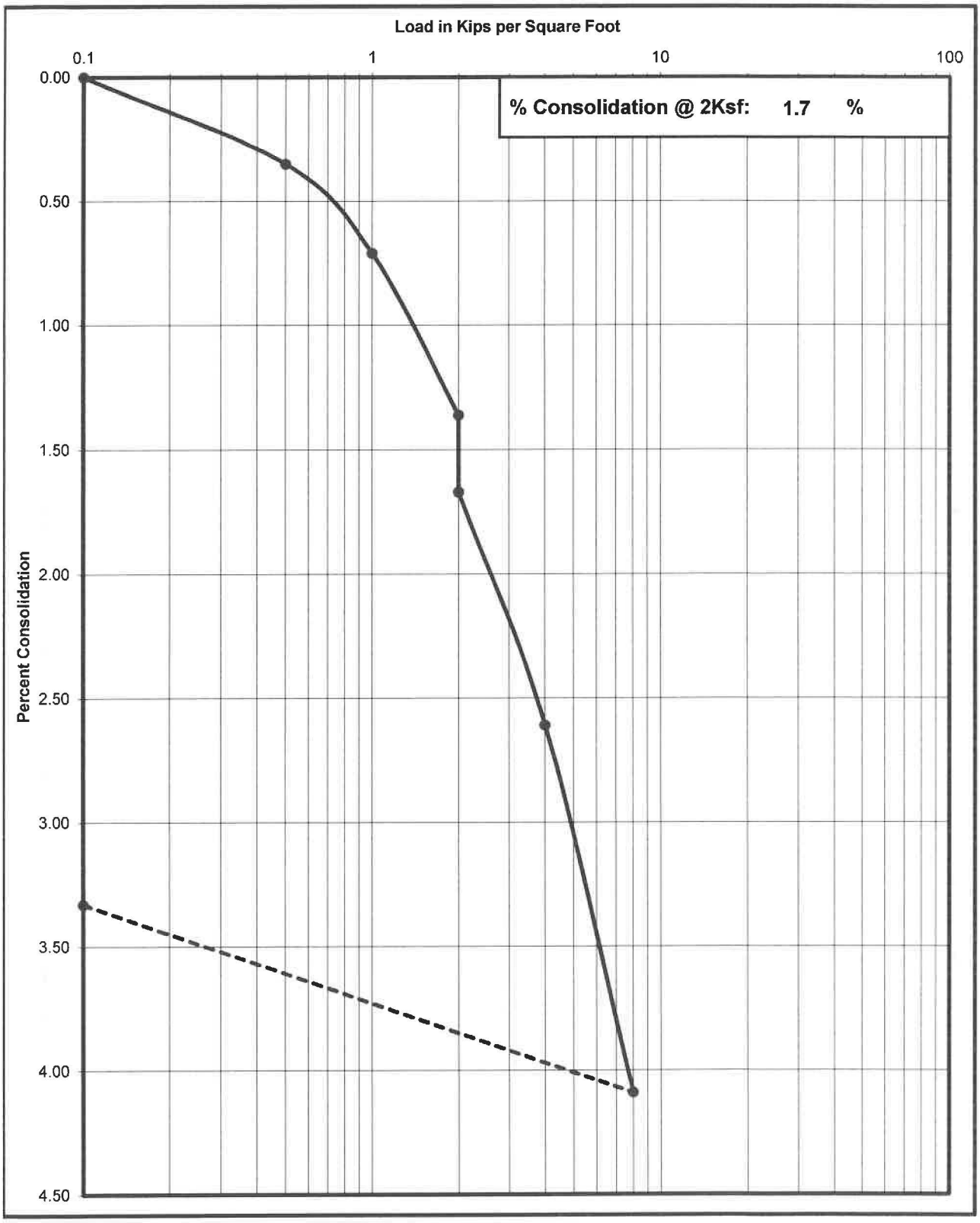
Drill Rig: CME 45C-4 **Krazan and Associates** **Hole Size:** 4½ Inches

Driller: Jim Watts **Elevation:** 15 Feet

Sheet: 1 of 1

Consolidation Test

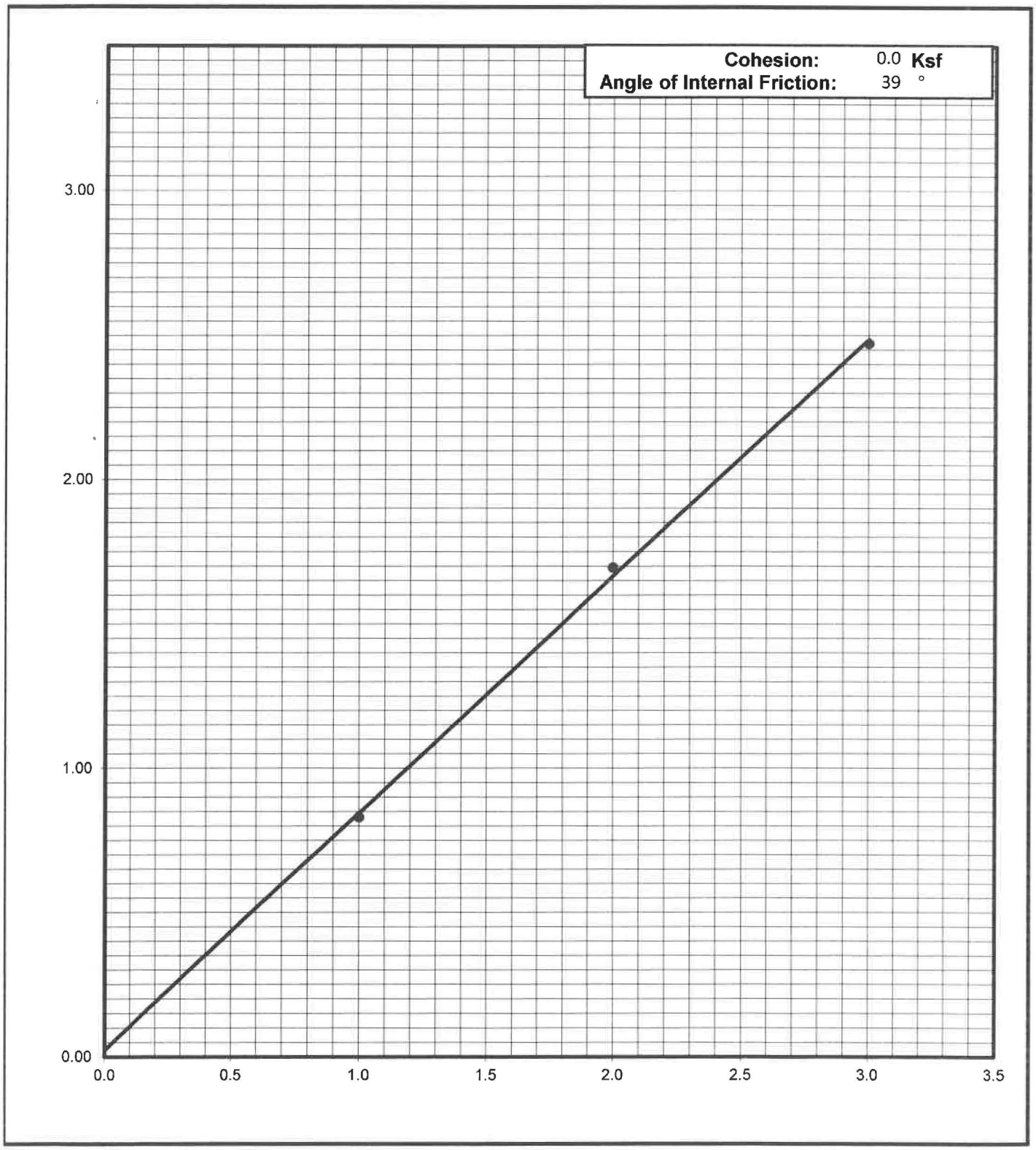
Project No	Boring No. & Depth	Date	Soil Classification
012-22085	B1 @ 2-3'	6/10/2022	SM



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
012-22085	B4 @ 2-3'	SM	6/10/2022



Krazan Testing Laboratory

Grain Size Analysis

Project Name	Fire Station 58
Project Number	012-22085
Soil Classification	SM
Sample Number	B1 @ 2-3'

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829

Project Number : 012-22085
Project Name : Fire Station 58
Date : 6/10/2022
Sample location/ Depth : B2 @ 0-5'
Sample Number : X1
Soil Classification : SM

Trial #	1	2	3
Weight of Soil & Mold, gms	796.0		
Weight of Mold, gms	367.0		
Weight of Soil, gms	429.0		
Wet Density, Lbs/cu.ft.	129.4		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	185.8		
Moisture Content, %	7.6		
Dry Density, Lbs/cu.ft.	120.2		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	51.4		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0026

Expansion Index $_{measured}$ = 2.6

Expansion Index = **3**

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829

Project Number : 012-22085
Project Name : Fire Station 58
Date : 6/10/2022
Sample location/ Depth : B5 @ 0-4'
Sample Number : X2
Soil Classification : SM

Trial #	1	2	3
Weight of Soil & Mold, gms	801.4		
Weight of Mold, gms	367.1		
Weight of Soil, gms	434.3		
Wet Density, Lbs/cu.ft.	131.0		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	187.0		
Moisture Content, %	7.0		
Dry Density, Lbs/cu.ft.	122.5		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.0		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0014

Expansion Index $_{measured}$ = 1.4

Expansion Index = 1

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

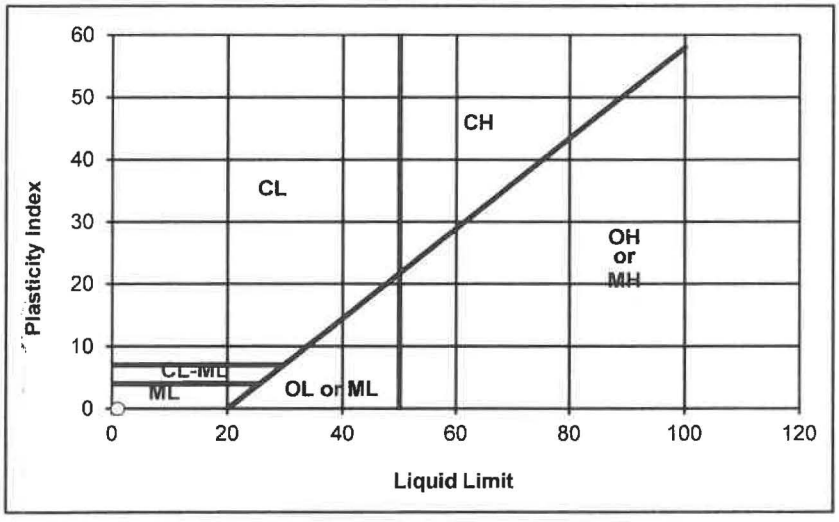
Project: **Fire Station 58**
Project Number: **012-22085**
Date Sampled: 5/27/2022
Sampled By: WA
Sample Number: -
Sample Location: B1 @ 10-11'
Sample Description: SM

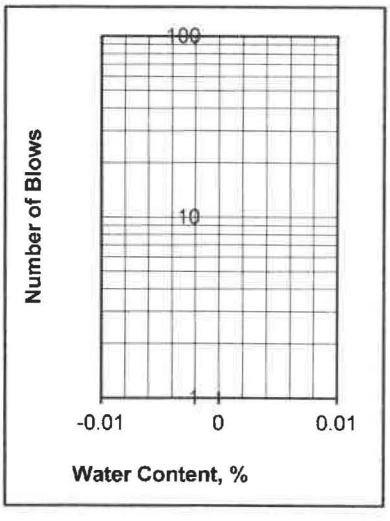
Date Tested: 6/9/2022
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						

Plastic Limit : N/D **Liquid Limit : N/D**

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC **Requirement:**
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

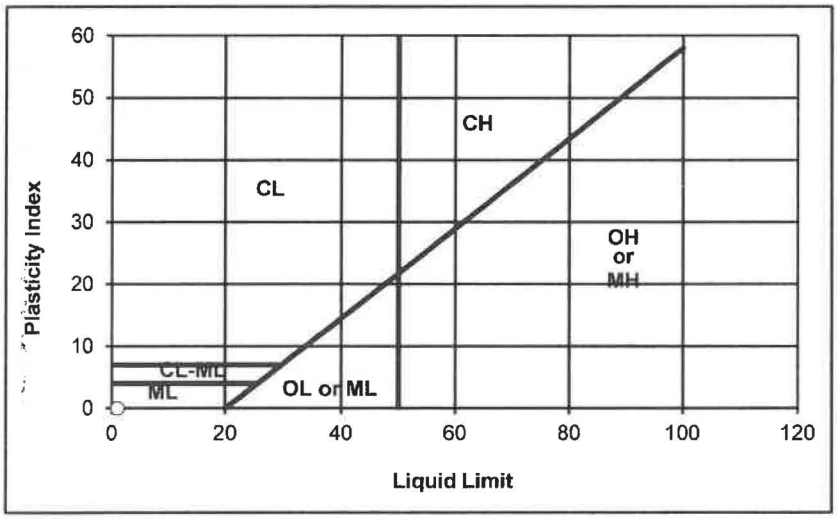
Project: **Fire Station 58**
Project Number: **012-22085**
Date Sampled: 5/27/2022
Sampled By: WA
Sample Number: -
Sample Location: B1 @ 15-16'
Sample Description: SM

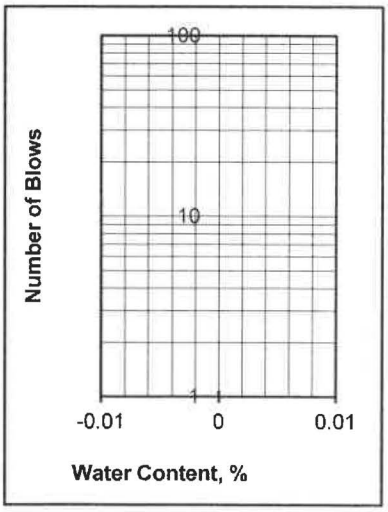
Date Tested: 6/9/2022
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						

Plastic Limit : N/D **Liquid Limit : N/D**

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC **Requirement:**
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

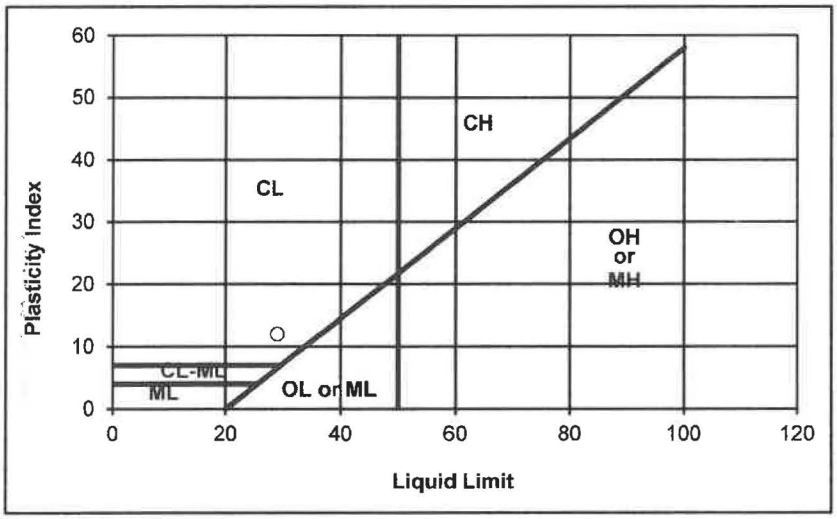
Project: **Fire Station 58**
Project Number: **012-22085**
Date Sampled: 5/27/2022
Sampled By: WA
Sample Number: -
Sample Location: B1 @ 20-21'
Sample Description: SC

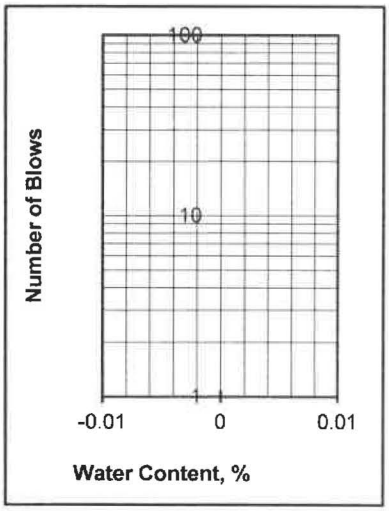
Date Tested: 6/9/2022
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	44.58	45.87		36.72	35.02	
Weight of Dry Soil & Tare (g)	41.57	42.49		33.73	32.46	
Weight of Tare (g)	23.52	23.41		23.44	23.62	
Weight of water (g)	3.02	3.38		3.00	2.57	
Weight of Dry Soil (g)	18.04	19.08		10.29	8.84	
Water Content (% of dry wt.)	16.7%	17.7%		29.1%	29.0%	
Number of Blows				25	25	

Plastic Limit : 17 **Liquid Limit : 29**

Plasticity Index : 12
Unified Soil Classification : CL **Requirement:**
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

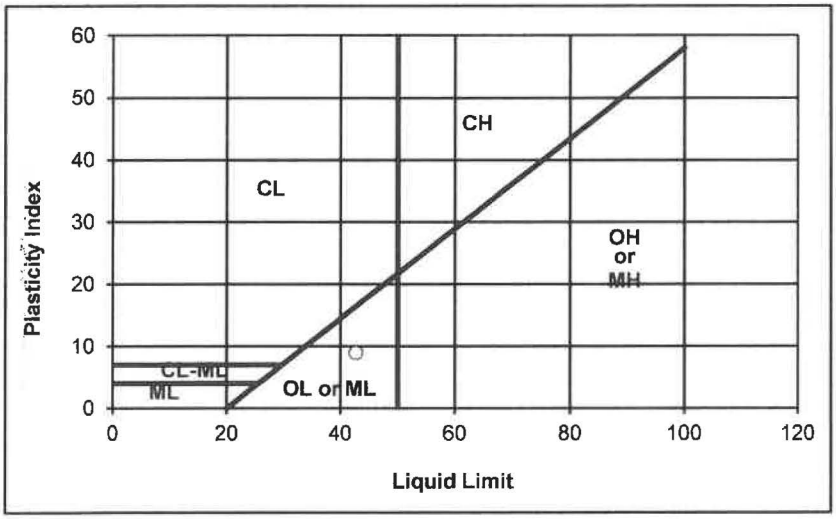
Project: **Fire Station 58**
Project Number: **012-22085**
Date Sampled: 5/27/2022
Sampled By: WA
Sample Number: -
Sample Location: B1 @ 30-31'
Sample Description: ML

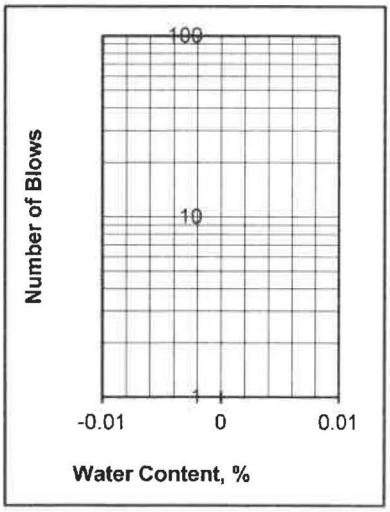
Date Tested: 6/9/2022
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	38.43	36.49		41.56	36.88	
Weight of Dry Soil & Tare (g)	34.68	33.13		36.15	32.90	
Weight of Tare (g)	23.52	23.41		23.46	23.63	
Weight of water (g)	3.74	3.37		5.40	3.98	
Weight of Dry Soil (g)	11.17	9.72		12.69	9.27	
Water Content (% of dry wt.)	33.5%	34.7%		42.6%	42.9%	
Number of Blows				25	25	

Plastic Limit : 34 **Liquid Limit : 43**

Plasticity Index : 9
Unified Soil Classification : ML or OL **Requirement:**
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

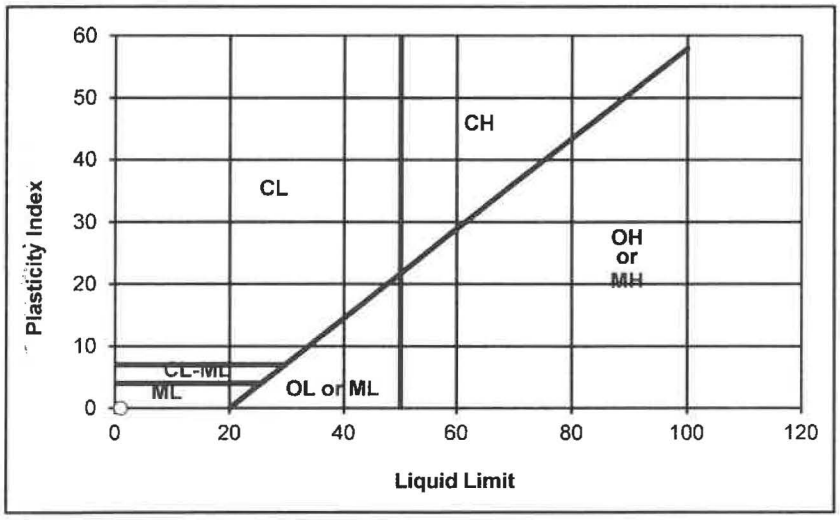
Project: **Fire Station 58**
Project Number: **012-22085**
Date Sampled: 5/27/2022
Sampled By: WA
Sample Number:
Sample Location: B1 @ 35-36'
Sample Description: ML

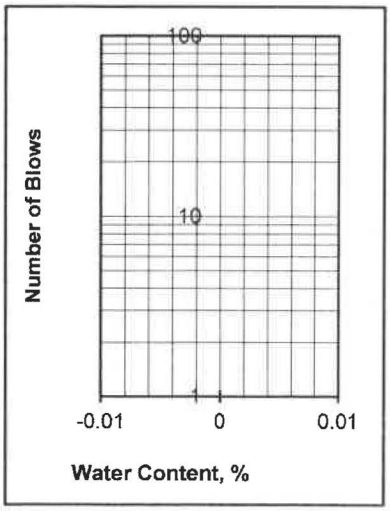
Date Tested: 6/9/2022
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						

Plastic Limit : N/D **Liquid Limit : N/D**

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC **Requirement:**
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Geotechnical Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Geotechnical Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Geotechnical Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Geotechnical Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be compacted to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CTM-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Geotechnical Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Geotechnical Engineer.

SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.

The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the Contract documents for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing and the preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Geotechnical Engineer to be deleterious or otherwise unsuitable. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations should not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

SUBGRADE PREPARATION: Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 18 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas, areas of uncertified fill, and/or areas of disturbed soils shall be moisture-conditioned as necessary and recompacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Geotechnical Engineer prior to the placement of any of the fill material.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Geotechnical Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Geotechnical Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Geotechnical Engineer.

PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Geotechnical Engineer.

Both cut and fill areas shall be surface-compacted to the satisfaction of the Geotechnical Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Geotechnical Engineer indicates that the moisture content and density of previously placed fill are as specified.

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS - The term "pavement" shall include asphalt concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term "Standard Specifications": hereinafter refers to the 2018 Standard Specifications of the State of California, Department of Transportation, and the "Materials Manual" is the Materials Manual of Testing and Control Procedures, State of California, Department of Public Works, Division of Highways. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual.

2. SCOPE OF WORK - This portion of the work shall include all labor, materials, tools, and equipment necessary for, and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

4. UNTREATED AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 material. The aggregate base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

6. ASPHALT CONCRETE SURFACING - Asphalt concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10 and the asphalt concrete mix shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50° F. The compaction of asphalt concrete shall be performed as described in Section 39-2.01. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

7. FOG SEAL COAT - The fog seal (mixing type asphalt emulsion) shall conform to and be applied in accordance with the requirements of Section 37.

Section 32 31 19
Decorative Metal Fences and Gates

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Decorative steel picket fences.

B. Decorative steel single rolling vehicle gate system.

C. Decorative steel picket single vehicle swing gate system.

D. Decorative steel picket single pedestrian swing gate.

E. Automatic gate operators complete with safety devices, proximity reader and radio signal remote.

F. Pedestal for gate operator with housing for operators

G. Detection loops in pavement

H. Coordination with work in Division 26 Electrical

I. Coordination with work in Division 27 Communications

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 04 20 00 - Unit Masonry

C. Section 08 71 00 - Door Hardware

D. Division 26 - Electrical

E. Division 27 - Communications

F. Section 31 23 16 - Excavation.

G. Section 32 12 16 - Asphalt Paving

H. Section 32 13 13 - Concrete Paving

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.

C. ASTM D523 - Standard Test Method for Specular Gloss; 2014.

D. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints; 2025.

E. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013.

F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.

G. ASTM D2244 - Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates; 2011.

H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2010).

I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test; 2009.

J. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction; 2014.

K. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016.

L. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

O. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

P. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

Q. UL 991 - Standard for Tests for Safety-Related Controls Employing Solid-State Devices; 2004.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings:
   1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components including:
      a. Gate elevations indicating the Finish Grade along the length of the gate.
      b. Post foundations details.
      c. Gate hardware (including hinges, latches, drop bar for inactive leaf, card reader system, details, etc.).
      d. Gate operator details.

D. Installer's Qualification Statement.

E. Manufacturer's Warranty.

F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling.

B. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.07 WARRANTY

A. Correct defective Work within a one year period after Date of Substantial Completion.

B. Provide five year manufacturer warranty for commercial gate operator.

C. Provide manufacturers finish warranty against cracking, peeling, chipping, blistering or corroding for a period of 10 years

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Decorative Metal Fences and Gates:
   1. Ameristar Perimeter Security, USA: www.ameristarfence.com/#sle. (Basis of Design)
   2. Builders Fence Company; buildersfence.com

B. Automatic Gate Operators:
   1. LiftMaster; www.liftmaster.com
   2. HySecurity; hysecurity.com
   3. Maximum Controls: max.us.com

2.02 FENCES

A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
   1. Capable of resisting vertical load, horizontal load and infill performance requirements for industrial fence as defined in ASTM F2408.

B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.
   1. Total Coating Thickness: 2 mils, minimum.
   2. Color: As shown on drawings.
   3. Coating Performance: Comply with general requirements of ASTM F2408.
      a. Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.
      b. Corrosion Resistance: ASTM B117, ASTM D714 and ASTM D1654; 1/8 inch coating loss or medium No.8 blisters after 1,500 hours.
      c. Impact Resistance: ASTM D2794; 60 inch pounds.
      d. Weathering Resistance: ASTM D523, ASTM D822/D822M and ASTM D2244; less than 60 percent loss of gloss.

C. Steel: ASTM A653/A653M; tensile strength 45,000 psi, minimum.
   1. Hot-dip galvanized; ASTM A653/A653M, G60.
   2. 62 percent recycled steel, minimum.

2.03 WELDED STEEL FENCE AND GATES

A. Provide fence meeting requirements for industrial class as defined by ASTM F2408.

B. Fence Panels: Fusion welded; 7 feet height
   1. Fence Style: Majestic
   2. Panel Style: Three rail.
   3. Attach panels to posts with manufacturer's standard panel brackets.

C. Fence Posts:

Fence Post	Panel Height
2-1/2” x 12 Ga.	Up to & Including 6’ Height
3” x 12 Ga.	Over 6’ Up to & Including 8’ Height

D. 3' Single Gate, height to match fence
   1. Style: To match fence
   2. Panel Style: To match fence

E. Gate posts to be sized per manufacturer's recomended minimum sizes based on gate width and height.

Gate		Gate Height	
Leaf	Up to & Including 4’	Over 4’ Up to & Including 6’	Over 6’ Up to & Including 8’
Up to 4’	2-1/2” x 12 Ga.	3” x 12 Ga.	3” x 12 Ga.
4’1” to 6’	3” x 12Ga.	4” x 11 Ga.	4” x 11 Ga.
6’1” to 8’	3” x 12 Ga.	4” x 11 Ga.	6” x 3/16”
8’1” to 10’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”
10’1” to 12’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”
12’1” to 14’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”
14’1” to 16’	6” x 3/16”	6” x 3/16”	6” x 3/16”

1. Post Cap: Standard

F. Fence Rails: Manufacturer's standard, double-wall steel channel 1-3/4 inch square by 12 gauge, 0.1094 inch with prepunched picket holes.
1. Picket Retaining Rods: 0.125 inch galvanized steel.
2. Picket-to-Rail Intersection Seals: PVC grommets.

G. Fence Pickets: Steel tube.
1. Spacing: 3-3/4 inch clear.
2. Size: 1 inch square by 18 gauge, 0.0478 inch.
3. Style: Flush top rail.
4. Finial: No extension, Majestic.

H. Flexibility: Capable of following variable slope of up to 1:2.

2.04 PERFORATED STEEL SCREENS

A. Perforated Steel Screen:
1. Holes: ¼ inch diameter round
2. Pattern: 5/16 inch staggered rows, 58% open area.
3. Thickness: 20 gauge

B. Contractor to provide all attachments necessary to provide a complete screening device.

C. Manufacturer:
1. McNichols: www.mcnichols.com (Basis of Design)
2. Direct Metals: www.directmetals.com

2.05 AUTOMATIC GATE OPERATORS

A. Swinging Gates: Pre-wired, pedestal mounted gate operator for horizontal swinging gates, per ASTM F2200 and UL 325.
1. Class: Class II.
2. Operating type: Swing arm.
3. Control Functions: Open, pause, and close.

4. Open/Close Time: Operator to utilize slow start and slow close functions
5. Access: Keypad and Remote.
6. Maximum gate weight: 1,300 lbs for a 12 foot gate.
7. Horsepower Rating: Suitable for connected load.
8. Monitoring and Controls:
   a. Internet connectivity
   b. Radio reciever
   c. Auxilary relays
9. Motor: 24 Volt DC, continuous duty type
10. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325 and UL 991.
    a. Primary Device: Provide NEMA 4X photo eye sensors as required with momentary-contact control device.
    b. Secondary Device: Provide electric sensing edge with wireless edge kit or non-monitored safety edge as an option along with continuous-constant control device.
11. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
    a. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
       1) Outdoor Locations, direct splashing: Type 4.
12. Products:
    a. Liftmaster Model CSW24UL ; www.liftmaster.com
    b. HySecurity SwingSmart DC 20 ; hysecurity.com
    c. Maximum Controls Megatron 1400 Pro ; max.us.com

B. Slide Gates: Prewired, pedestal-mounted gate operator for horizontal slide gates, per ASTM F2200 and UL 325.
1. Operating type: Gear drive.
2. Control Functions: Open, Pause, Close.
3. Maximum Open/Close Speed: One foot per second in conformance with UL 325
4. Access: Card.
5. Size: Unit to handle gate length as indicated on Drawings.
6. Horsepower Rating: Suitable for connected load.
7. Timer: Unit to have adjustable 0-60 second hold open timer.
8. Cycles: Unit to be rated to 35 cycles per hour minimum.
9. Parts: Permanently lubricated continuous duty worm gear reduction and reliable rotary limits on output shaft to ensure accurate open and closed gate positions. All bearings to be permanently lubricated.
10. Braking: Electronic braking system, self-locking in both the open and closed positions. Unit to have full systems capability and soft start/stop protection for mechanical parts.
11. Safety: Internal safety sensing devices, obstruction sensing in both the opening and closing directions, stop circuit for pedestrian doors, and manual operation switch.
12. Options: Surge suppression, steel mounting stand, and audible gate movement warning siren.
13. Keypads: Coordinate gate operator with keypad and card reader mounted at high/low pedestal, as shown on Drawings.
14. Warning signs to be provided and installed as part of this work on both sides of each gate controlled by an operator. Sign to be mounted on a minimum of 0.063" aluminum and shall be screen printed.

15. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    a. Primary Device: Provide NEMA 4X photo eye sensors as required with momentary-contact control device.
    b. Secondary Device: Provide electric sensing edge with wireless edge kit or non-monitored safety edge as an option along with continuous-constant control device.
16. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
    a. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
17. Products:
    a. Liftmaster Model ISL24UL ; www.liftmaster.com
    b. HySecurity Slide DriverII SD40 ; hysecurity.com
    c. Maximum Controls Megatron Max 2000 ; max.us.com

2.06 ACCESSORIES

A. Pedestal Mounting Supports: Provide mounting supports for keypad/access control installation.
    1. Products:
        a. StrongPoles, LLC; Dual Height Keypad Pedestal: www.strongpoles.com/#sle.
        b. Engineered Parking Systems; Style 4, Dual Height :www.engineeredparkingsystems.com

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set fence posts in accordance with the manufacturer recommended spacing.

C. When cutting rails immediately seal the exposed surfaces by:
    1. Removing metal shavings from cut area.
    2. Apply zinc-rich primer to thoroughly cover cut edge and drilled hole; allow to dry.
    3. Apply two coats of custom finish spray paint matching fence color.
    4. Failure to seal exposed surfaces in accordance with manufacturer's instructions will negate manufacturer's warranty.

D. Install operator in accordance with manufacturer's instructions and in accordance with NFPA 70.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

3.04 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

B. Clean fence with mild household detergent and clean water rinse well.

C. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

D. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate operation of system to County's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.

B. Training: Train County's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Location: At project site.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION