

PROJECT 1801 FRONTAGE ROAD LIVING GREEN TRAIL PROJECT

ADDENDUM NO. 3

ALL PROSPECTIVE BIDDERS are hereby notified that changes to the bidding documents for Project 1801; FRONTAGE ROAD LIVING GREEN TRAIL PROJECT are to be made to the Contract Documents. The additions and/or deletions contained in this Addendum shall be made part of the plans and specifications, Special Provisions, and contract documents for the above-described project, and shall be subject to all applicable requirements thereunder, as if originally shown and/or specified. The changes and clarifications (additions shown in underline, removals shown in strikeout) are as follows:

1. QUESTIONS:

- 1) See Attachment A for Pre-Bid Question and Answer Responses

2. BID DEADLINE

- a. The revised bid due date and time, due to the City Clerk's office, of Thursday, October 26, 2023, at 2:00 p.m. shall be changed to **Tuesday, October 31, 2023, at 2:00 p.m.**

3. PLANS/SPECIFICATIONS

- a. Please be advised of the following revisions/additions to the contract documents:
 - i. Updated Bid Proposal
 - ii. Updated Bid Schedule
 - iii. **ATTACHEMENT B – REVISED DOCUMENTS**
 1. Rip Rap Detail
 2. Valley Gutter Detail
 3. Drain Inlet Base Detail
 4. Catch Basin Top Detail
 5. For Reference Only - Horizontal Control Plan_2023-10-13_Sheets C3.1-C3.4
 6. Missing Sheet C11.3
 7. Revised Sheet C11.2 (Relocation of PG&E meter pedestal and associated work)
 - iv. **ATTACHMENT C - For Reference Only – Geotechnical Evaluation (Geotech_Evaluation_N_M_12202022.pdf)**

4. CLARIFICATIONS

- a. Please be advised of the following clarifications to the contract documents:
 - i. **Concrete Pedestrian Sidewalk Pavement shall be removed and replaced with Asphalt Concrete Pavement with 2 foot decomposed granite shoulders as reflected on the main trail segment. See attached Horizontal Control Plan.**

- ii. **Technical Specification Sections (ALL) – References to all Measurement and Payment shall be removed and directed to Section 01 22 00 – Unit Prices for Measurement and Payment Clauses.**

BIDDERS MUST SIGN AND ATTACH one (1) copy of this addendum document to the proposal as acknowledgment of receipt of these instructions and that said addendum was properly evaluated in the proposal.

ANY PROPOSAL NOT IN COMPLIANCE WITH THIS ADDENDUM MAY BE REJECTED.



Issued: 10-24-23

Dayne Johnson, P.E.
Assistant City Engineer

Addendum No. 3, Project 1801; FRONTAGE ROAD LIVING GREEN TRAIL PROJECT is hereby acknowledged and was considered in this Project Proposal.

Bidder's Signature

Date

Firm Name

Mailing Address

City/State/Zip+4

ATTACHMENT A

Frontage Road Trail Pre-Bid Q & A- 10-24-2023

1. Q: Can you please provide the existing depth of asphalt and base rock for the roadway as it's needed to accurately calculate demo and saw cutting?

A: Contractor shall assume a 4-inch asphaltic concrete pavement (AC) over 6-inch Aggregate Base (AB) section.

2. Q: Please confirm what type of Curb and Gutter is to be removed (i.e., S1-6, S1-6M, S1-8, or S1-8M).

A: Contractor shall assume S1-6M type curb and gutter.

3. Q: The payment item for curb and gutter removal mentions to include the base removal. It would seem to make more sense to put all base removal in the rough grading bid item as that is paid per CY and the actual depth of base rock is unknown.

A: Base removal shall be included in curb and gutter removal bid item.

4. Q: Please confirm the actual depths and requirements paid under the Clear and Grub bid item 1 compared to the rough grading bid item 8. The specifications for clear and grub mention clearing to 8 inches below subgrade or 8 inches below original ground. But then paragraph K in section 31 05 13 it mentions to grub all construction areas to a depth of at least 0.50 feet. Or is this item to just strip the top vegetation and then all dirt is to be removed in the rough grading item?

A: Clearing and Grubbing is to strip the top vegetation and shall be to a depth of 6". Bid Items for Rough grading and fine grading shall be for providing grading operations for excavation and earthwork, and export/offhaul, for movement of material to meet the requirements to top of subgrade depth.

5. Q: Please confirm where the pay item 12 for aggregate base is used on the project. All other items appear to include base rock with their respective bid items.

A: Aggregate base Bid Item shall be considered under asphalt pavement improvement sections, Bid Items for Trail Pavement and Vehicular Pavement. All other items shall include base rock with their respective bid items.

6. Q: Can you please provide a manufacturer and model number for the bike rack?

A: The manufacturer and model number of the bike rack is shown on Sheet L1.01.

7. Q: C-11.3 is missing page 29 of 59

A: Refer to attached C-11.3 sheet. The matchlines in the 11 series currently show C-10.0X series. These shall be corrected and referenced as C-11.X series.

8. Q: The alternate for the 6" storm drain cleanouts calls out 5 ea, but only 2 ea are shown on the plans. Furthermore, there is a 6" perforated pipe which runs through the synthetic rubber

surfacing area but isn't shown connected to any other storm drain system. The pay item for synthetic rubber surfacing calls out connection to drainage system. Please confirm that we should include the 6" perf and connection to the drainage system in the bioswale in the bid item for the synthetic rubber surfacing. Also, if the alternative is not accepted, what is to go in its place and where will that be paid for? Where should we include the rough grading and fine grading as if the alternate isn't accepted those areas will still need to be graded?

A: Bid Item cleanouts are 2 ea. A 6 inch solid pvc pipe shall be added at 30 LF for the connection to the bio retention system as an add alternate item. Rough and fine grading for these areas shall be included in the base bid. Grading design shall be part of the base bid. Alternate Bid Item for synthetic rubber surfacing shall include the 6" perf and connection to the drainage system in the bioswale in the bid item. If Additive Alternate is not awarded the base bid includes the rough and fine grading associated and installation of standard landscaping will be as part of the base bid.

9. Q: Please confirm that the intent is to place redwood header at the asphalt edge (between the asphalt and decomposed granite) and on the outer edge of the decomposed granite. Plans appear to only clearly show the redwood header at the decomposed granite edge.

A: Redwood header shall be installed at the asphalt edge (between the asphalt and decomposed granite) and on the outer edge of the decomposed granite next to earthen material. See also Detail 3 on Sheet L5.03.

10. Q: Please confirm that the asphalt for the new trail should be 1/2".

A: Trail pavement and vehicular pavement shall be 1/2" gradation.

11. Q: I understand you are aware of this, but wanted to check in to see if the revised set of drawings will be forthcoming this week?

A: See attached revised drawing and detail sheets.

12. Q: In which bid item does the solid PVC pipe get paid. For example, on sheet C-6.0 there are two runs of 6" solid PVC, one called out as an "Equalizer Pipe" but unsure where to include these in the bid.

A: A bid item for solid 6" SD has been added.

13. Q: What is the detail for rip rap? The civil plans point to the rip rap and say "rip rap typ. see landscape plans". The landscape plans say see civil plans.

A: Refer to the attached Rip Rap detail.

14. Q: Can you please clarify where the 6" vertical curb at the on-street parking locations is paid for.

A: Bid items for 6" vertical curb and valley gutter have been added to the unit prices spec section. Aggregate Base shall be included as paid for in the elements of work associated with these bid items.

15. Q: Could you please review the plans that were released? It appears the lighting plan sheet C—11.3 is missing.

A: See attached sheet C-11.3.

16. Q: Please clarify horizontal control and layout (line/curve tables, station and offsets) for the project.

A: Refer to the attached horizontal control plan sheets C-3.1 – C-3.4.

17. Q: Specification Section 01 22 00 – Unit Prices, Subsection NN, Bubblers at shrubs call out overhead spray with bubbler nozzle but plans L3.09 detail I-14 show bubblers on IPS Flex hose and tree bubblers are to receive pop up sprays with bubbler nozzles. Please clarify which is accurate.

A: Rainbird 1401 bubblers on risers are installed as indicated on irrigation plan legend and details, one per shrub and two per tree. City standard detail (I-14) for Pop-up tree bubbler in turf areas is not applicable.

18. Q: Specification Section 01 22 00 – Unit Price, Subsection PP, calls out mainline to receive schedule 80 fittings, but Specification Section 32 80 00 Part 55 Materials, Subpart 2.1.A.3 says to use Schedule 40 fittings. Which is accurate?

A: Refer to Sheet L3.07 - Mainline fittings shall be Schedule 80 per legend and City standard detail.

19. Q: Specifications Section 01 22 00 Unit Price, Subsection JJ, calls out Remote control valves as well as quick coupler valves? Quick coupler valves are included in their own line item and unit price #38. Please clarify.

A: The quick coupler valves are to be deleted from the payment clause.

20. Q: Is the entire irrigation system to be non potable purple or only certain aspects? You have a purple quick coupler, but pipe, valve boxes and other irrigation components do not indicate a non potable system. Please clarify if we need to bid system and non potable.

A: Irrigation system is served by potable water, not recycled water. Quick coupler shall be Rainbird 44NP per City standard detail (I-12).

21. Q: Specification Section 32 80 00 Part 2 Material, Subpart 2.8.A calls out RainBird 44NP 1" quick coupler, plans L3.07 Sheet 45 of 59 Irrigation legend calls out RainBird 33DLRC ¾". Which is accurate?

A: Quick coupler shall be Rainbird 44NP per City standard detail (I-12).

22. Q: Specifications Section 32 80 00 Part 2 Materials, Subpart 2.12.E calls out sch 80 true union ball valves at all RCV Locations, plans L3.09 Sheet 47 of 59 Detail I-11 calls out brass ball valves. Which is accurate?

A: Install per City standard detail with brass Ball Valve NIBCO T-FP-600A.

23. Q: Please confirm per detail 1 on sheet L5.03 Pedestrian Concrete Paving that the thickened edge should only be installed where the concrete abuts landscaping. Or should it be installed where the concrete paving abuts the trail as well.

A: Pedestrian Concrete Paving shall be removed from the project and the Bid Item will be removed and replaced with Trail AC Pavement Section.

24. Q: Please provide depths, diameter, and pipe type for the sewer and water main connections.

A: Domestic and Irrigation water lateral line connection to the main shall be 1" diameter type K copper and shall be installed with a minimum of 30" cover. SS line shall be 4" diameter PVC SDR-26 and installed with a minimum of 48" cover. See plans for existing depths, sizes, and pipe material of the existing system.

25. Q: Bid item 49 is for 1 ea water meter but there are water meters shown for both the irrigation and the domestic water. Please confirm if the quantity needs to be updated. Please confirm who pays the water department fees and meter fees.

A: See answer to Question 24. Two (2) water meters should be installed, 1 for domestic water and 1 for irrigation. A No Fee grading and encroachment permit shall be issued to the contractor. The City will provide for and install the water meters. The contractor shall provide and install the main connections, main laterals, and boxes, and install the work beyond the meter.

26. Q: Sheet L3.01 shows a new water meter and connection for the irrigation and says to reference the civil plans. The civil plans show a water meter for domestic water located on sheet C-6.3 in a completely different location. Bid item 51 calls out only 1 ea water main connection. Because the connections are shown in two different locations are we to assume we're making two different connections and pay item 51 should be 2 ea? Or is the irrigation connection shown at the wrong location?

A: Two (2) water meters should be installed, 1 for domestic water and 1 for irrigation. No fee permit will be produced to contractor. The City will cover the cost of the water meters and the public works crews will install them. The contractor is responsible for prepping the water service for the meters and the contractor must provide the boxes.

27. Q: C-11.2, Lighting Notes # 9 states "Coordinate with PG&E for POC and service location based on the City provided PG&E application." Please provide the PG&E application.

A: The application was submitted and is in review process for approval. Please see the attached redlined sheet C11.2 for elements of work. The assumption will be 100 LF from the pedestal to the PGE Point of connection.

28. Q: Please provide actual dimensions of the energy dissipators at back of curb and gutter. C-6 Utility sheets show the dissipators to be 5.5' long x 1' wide. Detail 5/C-8.2 shows the dissipators to be 1' long x 1'6" wide. Please also provide a cross-section which shows how they're to be constructed. Detail CAA81/C-7.0 is referenced but this detail isn't provided.

A: The energy dissipator footprint shall be installed as shown on the utility plan sheets (C-6.1 – C6.3). The energy dissipator is a 6" minimum layer of 4" cobble installed as shown on the plan.

29. Q: Please advise the following:

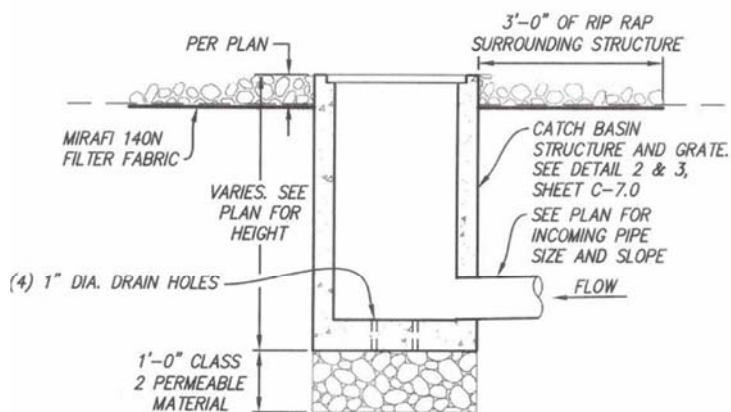
- a. Regarding the fabric under the Decomposed Granite, is this a reinforcing fabric like Mirifi 500x or a filter fabric like Mirifi 140?

A: Mirifi 140 is acceptable.

- b. What gauge wire is the 4x4 wire mesh that goes into the Pedestrian Concrete?

A: AC pavement shall be installed to replace the Pedestrian concrete section.

- c. Detail 3 on C-8.1:



BUBBLE UP BOX

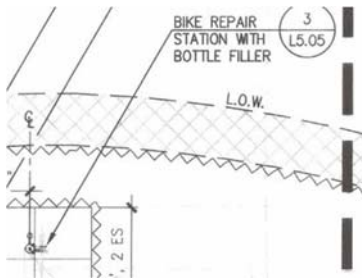
1"=2'

3

Shows the Catch Basin Structure & Grate per detail 2 & 3 on C7-0. C7-0 is the stormwater Management Plan without details. Please advise.

A: Refer to attached Drain Inlet Base Detail for clarification.

d. On sheet L2.05, for the water bottle station:



Yet on sheet L5.05, detail 3 is the Equipment Announcement Board. I see that the detailed reference should be 3/L5.04.

A: Refer to Detail 3 Bike Repair Station and Bottle Filler on Sheet L5.04 for clarity.

30. Q: Please advise on the following questions:

- a. Sheet C-11.2, note 5 refers to sheet E-4 for reference, and I do not have a sheet E-4. Can the wiring diagram for the service pedestal be provided. We need to know the size of the service pedestal and the size of each individual circuit.

A: See attached sheet C-11.3 for wiring diagram.

- b. Sheet C-11.2, note 9 refers to the POC for the PG&E service. Has the POC for the PG&E electrical service for the pedestal been provided yet? We need to know the location in order to know the distance/length of the trenching and conduit called out in note 6.

A: Application is in progress for approval. PG&E and City to coordinate for remaining project questions. See attached redlined Sheet C11.2 for elements of work. The assumption will be 100 LF from the pedestal to the PGE Point of connection.

- c. Section 76.5-D states that all conduit shall be rigid galvanized steel, unless otherwise specified. Can you please confirm or provide clarification on the type of conduit that will be required on this project for the street lighting/CCTV system, as sch40 and sch80 are also noted as options.

A: Contractor shall assume that rigid galvanized steel or Schedule 80 is acceptable material for the project.

- d. Section 77.5-F states that jacking or drill is required for installation of the conduit under existing pavement. Will open trenching be an option for the street light conduit installation across the existing pavement? Please advise.

A: Open trenching or directional bore shall be the acceptable methods for construction for the street light conduit/joint trench installation.

- e. Sheets C-11.1, C11.2 and C11.3 all call for only one No5 splice box at each location. The streetlight, CCTV and power for CCTV are all to be spliced within one splice box, or will there be a separate box required for the CCTV and street light power?

A: There shall be a separate pull/splice box for CCTV and Streetlight conduit each specified location. Power Conductors for the CCTV and camaras shall be provided by the City (Not in Contract). Splicing of CCTV cabling is not expected.

- f. Note 2 on the Lighting plans call for conduit only for the CCTV communications and power system but bid item 59 calls for data conduits and cabling. Please provide the specifications for the required data cabling as well as required power cabling for the Security Camera Make-Ready system.

A: As indicated on the plans, cabling for the CCTV is not included in the project. Bid Item shall exclude data and power cabling for CCTV. Contractor shall supply and install the conduits for the CCTV system within the joint trench.

34. Q: Questions on the Grading & Drainage Plan, Sheets C5.0-5.3

- a. Note 1 -Adjust utility structures to grade ... Please quantify them and provide info regarding which ones will need the rims/lids replaced. Bid item?

A: Bid Item has been added for Adjust utility structures to grade

- b. Asphalt deep lift@ curb & gutter & valley gutter where is this paid for?

A: Deep lift shall be included in the work associated with the curb and gutter and valley gutter bid items.

- c. Asphalt paving and base rock for trail. Where is this paid for? Item# 10 only refers to decomposed granite paving.

A: Trail pavement shall include the AC pavement section only. Aggregate base quantity shall be paid for by its respective bid item.

- d. Item # 12 Aggregate Base-Bid schedule shows units as CY, Item description by the ton. Which is it? And, if this is not for the AB under any of the concrete what is it for?

A: Aggregate base shall be bid by units of CY. Aggregate base shall be paid for as a separate bid item and shall be aggregate base that is placed under the asphalt concrete pavement sections

- e. Plan sheets C-4.0-4.3 have a legend-Demolish & remove existing building. Where is it? And what bid item pays for it?

A: This legend item should be ignored. There is no existing building to be demolished.

- f. Plan sheet L2.05 references for the bike repair station with bottle filler as 3/L5.05. (which is a sign detail). Please provide a detail for this.

A: Refer to Detail 3 on Sheet L5.04 for bottle filler.

- g. If the bid alternate is not included in the awarded contract what is to be done in that area?

A: The base bid for this area shall be landscaping/planting.

- h. Please provide a detail for the proposed rip rap shown along the northern edge of the property.

A: Refer to the attached Rip Rap detail.

- i. Page 193 of the specs: Rock excavation Cuts up to about 45' deep are planned for this project. Where is that?

A: This statement in the specs is not applicable to this project.

- j. Pages 194-195 are referring to over exc and lime treatment and appear to be important (underlined). Why is this included in the specifications?

A: Contractor shall assume that overexcavation and lime treatment is necessary in the areas of the trail and vehicular pavement, curb and gutter, vertical curb, and concrete ramps. Refer to provided geotechnical report for additional information. Please note: Geotechnical report is for reference only.

35. Q: Refer to Bid Schedule, bid item #25 shows 180 days maintenance period. However, section 32 90 00, part 3.6 shows 90 days. Please clarify.

A: The maintenance period shall be 90 days.

36. Q: The set of plans includes two typical sheets C-6.3 (Utility plan), however one sheet C-11.3 (Lighting plan) is missing. Please clarify.

A: Refer to included sheet C-11.3.

37. Q: Layout notes #14 on sheet L1.01 shows "Refer to Geotechnical report for additional information". However, no soil report is provided in the documents. Please provide.

A: Refer to provided geotechnical report for reference.

38. Q: Please Clarify the Specification section language.

- a. Refer to part 3.2J of section 01 22 00, Measurement and Payment of Bid Item #10 - Trail Pavement includes works of pre-emergent, decomposed granite, stabilizer, compacting testing, subgrade preparation and for doing all work in installing Decomposed Granite Paving. However, there is another item for decomposed granite - bid item #18. Please clarify.

A: Trail Asphalt concrete pavement section shall be paid for under Bid Item for Trail Pavement and Decomposed granite shoulder section shall be paid for under Bid Item Decomposed Granite.

- b. Refer to part 3.2L of section 01 22 00, Basis of Measurement of Bid Item #12 - Aggregate Base is by the Ton as specified in the bid form. However, Bid Schedule shows CY for item #12. Please clarify. Please also clarify if this item includes the aggregate base under decomposed granite per detail 3 on sheet L5.03.**

A: Bid item for Aggregate Base shall be by CY. The aggregate base for all pavement types should be priced under bid item for Aggregate Base.

- c. Refer to part 3.2W of section 01 22 00, Payment of Bid Item #23 includes both Bioretention Soil Mix and Drain Rock. However, Bid Item #23 in Bid Schedule shows only Bioretention Soil Mix (BSM) 18" Depth. Please clarify.**

A: Bid item for Drain Rock has been added.

- d. Refer to Accessories note 4 on sheet L1.02, all stormwater curb cuts and catch basins located in drainage areas must be reinforced with Noiyo Cobbles. Please clarify which bid item is supposed to cover the cost related to Cobbles.**

A: These shall be included in bid item for Rip Rap.

- e. Refer to part 3.3C of section 32 90 00, mulch all planted areas (including bioretention facilities) with minimum 3" depth of organic mulch. However, Accessories note 3 on sheet L1.02 shows all mulch within stormwater planting areas must be 3" of washed pea gravel. Please clarify the material of mulch at bioretention areas.**

A: Refer to Accessories Note No.3 on Sheet L1.02 for mulch material within storm water treatment planting areas. There shall be no pea gravel as part of the project.

- f. Refer to part 3.2K of section 32 90 00, all planting areas (excluding Bioretention Soil) shall be amended with 6 cy composted organic amendment and 20 pounds of 18-12-6 Commercial Fertilizer. However, soils note 8 on sheet L1.02 shows amend all soil with 6 cy OMRI compost, 50 LBS gypsum, 20LBS soil sulfur and 160LBS of Gro-power plus 5-3-1 per 1,000 SF. Please clarify which ratio shall be applied for soil preparation for bidding purposes.**

A: Refer to Note no. 8 on sheet L1.02 for soil amendment requirements for bid purposes.

- g. Refer to point 3, part 3.3B of section 32 90 00, Plant Fertilizer Packs in backfill shall be followed the following rate: one gallon - 1 Pak; 5 gallon - 3 Packs; 15 gallon - 9 Packs; boxed trees - 12 Packs. However, detail 2 & 3 on sheet L5.01 show 2 planting tablets per 5-gallon, 5 food packs per 15 gallon. Please clarify the rate of planting tablets for bidding purposes.**

A: Refer to Detail 2 & 3 on sheet L5.01 for the rate of planting tablets.

- h. Refer to part 2.1A of section 32 80 00, mainline 4" and larger shall be Class 200 with ductile iron fittings, mainline 3" and smaller shall be schedule 40 with schedule 40 fittings. However, Irrigation legend on sheet L3.07 shows mainline 2.5" and 3" shall be class 315 with schedule 80 fittings & mainline 2" and smaller shall be schedule 40 with schedule 80 fittings. In addition, per part 3.2PP of section 01 22 00, mainline fittings shall be Schedule 80 PVC. Please clarify the material of mainlines and mainline fittings.

A: Mainline Pipe shall be 2.5" & 3" schedule Class 315 PVC with Schedule 80 PVC fittings. 2" and smaller pipes shall be Schedule 40 PVC with schedule 80 PVC fittings.

- i. Refer to part 3.2GG of section 01 22 00, payment of bid item #33 - Irrigation Master Valve and Flow Sensor includes 1.25" PVC conduit. However, detail I-7 on sheet L3.08 & Plan note 4 on sheet L3.01 show 1" PVC conduit. Please clarify the size of conduit.

A: Conduit size shall be 1".

- j. Refer to part 3.2FF of section 01 22 00, payment of bid item #32 - Irrigation Controller includes tracer wire, wye strainer and filters. However, plans and details do not show tracer wire, wye strainer and filters for controller. Please revise the payment of bid item 32.

A: Remove tracer wire, wye strainer and filter from controller bid item.

- k. Refer to part 3.2JJ of section 01 22 00, Measurement and Payment of Bid Item #36 - Irrigation remote control valve includes irrigation quick coupler. However, there is another item for irrigation quick coupler valve – bid item #38. Please clarify.

A: Remove irrigation quick coupler from the bid item for the Irrigation remote control valve.

- l. Refer to part 2.13C of section 32 80 00, detectable tape shall be installed on all pressurized pipes greater than 2". However, detail I-2 on sheet L3.08 shows detectable warning tape for all mainlines. Please clarify.

A: These are the same, install per model number shown on the plans.

- m. Refer to part 2.12 of section 32 80 00, remote-control valves shall be installed with one Schedule 80 PVC FIPT threaded union ball valve with EDPM O-rings on the upstream side of valve. However, detail I-11 on sheet L3.09 shows brass ball valve. Please clarify the material of ball valve in remote control valve.

A: Material of ball valve shall be as shown in City standard detail I-11.

39. Q: Refer to detail 3 - redwood header on sheet L5.02, straight redwood header includes 1 line of 2"x4" and curved redwood header includes 4 lines of 1"x4". It is supposed to be 2 lines of 1"x4" redwood header at curved runs. Please advise.

A: Detail 3 shown on L5.02 is a graphic representation for the curved condition - Redwood header shall be installed at the asphalt edge (between the asphalt and decomposed granite) and on the outer edge of the decomposed granite next to earthen material. See also Detail 3 on Sheet L5.03.

- 40. Q: Refer to Accessories note 2 on sheet L1.02, all planting areas must be top-dressed with 3" layer of recycled chipped mulch, color brown. However, point 10, part 2.1A of section 32 90 00 shows "100% recycled, clean, untreated lumber coarsely ground to 2" minus, and dyed with colorfast, natural dye with 1-year color retention; no ground wood stumps or branches "Mission Mahogany"". Please clarify the material of mulch applied for all planting areas.**

A: Refer to Spec section 32 90 00 for bark mulch material and provide a 3" layer of specified material.

- 41. Q: Please provide the depth of installation for bid item #24 - import topsoil for bidding purposes. Will this import topsoil be used for all planting areas?**

A: For bidding purposes, provide 24" depth of import topsoil for the tree plantings, and 12" depth for shrub plantings.

This bid item is revocable. In the case that the existing topsoil is amendable and suitable for planting per soil lab's recommendations.

- 42. Q: Refer to Irrigation legend on sheet L3.07, model of quick coupler valve is Rain Bird 33-DRC. However, detail I-12 on sheet L3.09 and part 2.8/ section 32 80 00 indicate Rain Bird model 44NP. Please clarify the model of the quick coupler valve.**

A: Quick coupler valve shall be Rain Bird 44NP as shown on City Standard Detail (I-12).

- 43. Q: Refer to irrigation legend on sheet L3.07, model of backflow preventer is Wilkins 975XL2SEU. However, the detail DWD11 on sheet L3.08 shows Febco LF825YA. Please clarify the model of backflow preventer.**

A: The backflow preventor shall be as shown in detail DWD11 on sheet L3.08.

- 44. Q: Refer to sheet L3.01 & L3.03, there are more than two lateral lines crossing hardscape. There is also one 4" sleeve for one lateral line and one 6" sleeve for all other lateral lines. Please confirm if this is the design intent.**

A: Include one (1) 6" sleeve as shown on sheet L3.01. One (1) 4" & one (1) 6" sleeve will be included as shown on sheet L4.03.

- 45. Q: Refer to sheet L3.03, the plan shows (5) callouts for remote-control valve, however, only (4) symbols of remote-control valves are shown. Please advise.**

A: 5 valves are shown on sheet L3.03, matching the corresponding valve call outs.

- 46. Q: Refer to irrigation legend on sheet L3.07, there is symbol of Schedule 40 PVC conduit. However, this symbol is not shown on plans. Please provide the location of conduit.**

A: The conduit is shown on the plan at the controller; refer to sheet L3.01 for location.

47. Q: What are the costs of the demolition permits?

A: There shall be a No Fee Grading and Encroachment Permit issued.

48. Q: Please confirm where the fencing shown on C-4.3 to be removed and replaced is to be paid.

A: Bid item for fencing has been added.

49. Q: Will we be required to perform the "Rehabilitation of Manholes" at any locations per paragraph 62.5 specification section 33 05 13.

A: Contractor shall assume that there shall be no Rehabilitation of Manholes.

50. Q: The basis of award is not clear in the Instructions to Bidders section 16. Additive and Deductive Alternates. It mentions:

 ✓ (B) The lowest bid will be the lowest total of the bid prices on the base contract and those additive or deductive items that were specifically identified in the bid solicitation or Bid Proposal as being used for the purpose of determining the lowest bid price.

Please confirm if the additive alternate is to be included as part of the basis of award.

A: The basis of award shall include the base bid and additive alternate #1 with deductive items.

Bid Proposal

Frontage Road Living Green Trail Project

_____ (“Bidder”) hereby submits this Bid Proposal to The City of Pittsburg (“City”) for the above-referenced project (“Project”) in response to the Notice Inviting Bids and in accordance with the Contract Documents referenced in the Notice.

- 1. **Base Bid.** Bidder proposes to perform and fully complete the Work for the Project as specified in the Contract Documents, within the time required for full completion of the Work, including all labor, materials, supplies, and equipment and all other direct or indirect costs including, but not limited to, taxes, insurance and all overhead, for the following price (“Base Bid”):
\$ _____.

Add Alternate#1 Bid. Bidder proposes to perform and fully complete the Work for the Project as specified in the Contract Documents, within the time required for full completion of the Work, including all labor, materials, supplies, and equipment and all other direct or indirect costs including, but not limited to, taxes, insurance and all overhead, for the following price (“Add Alternate#1 Bid”):
\$ _____.

- 2. **Addenda.** Bidder agrees that it has confirmed receipt of or access to, and reviewed, all addenda issued for this bid. Bidder waives any claims it might have against the City based on its failure to receive, access, or review any addenda for any reason. Bidder specifically acknowledges receipt of the following addenda:

Addendum:	Date Received:	Addendum:	Date Received:
#01	_____	#05	_____
#02	_____	#06	_____
#03	_____	#07	_____
#04	_____	#08	_____

- 3. **Bidder’s Certifications and Warranties.** By signing and submitting this Bid Proposal, Bidder certifies and warrants the following:
 - 3.1 **Examination of Contract Documents.** Bidder has thoroughly examined the Contract Documents and represents that, to the best of Bidder’s knowledge, there are no errors, omissions, or discrepancies in the Contract Documents, subject to the limitations of Public Contract Code § 1104.
 - 3.2 **Examination of Worksite.** Bidder has had the opportunity to examine the Worksite and local conditions at the Project location.
 - 3.3 **Bidder Responsibility.** Bidder is a responsible bidder, with the necessary ability, capacity, experience, skill, qualifications, workforce, equipment, and resources to perform or cause the Work to be performed in accordance with the Contract Documents and within the Contract Time.
 - 3.4 **Responsibility for Bid.** Bidder has carefully reviewed this Bid Proposal and is solely responsible for any errors or omissions contained in its completed bid. All statements and information provided in this Bid Proposal and enclosures are true and correct to the best of Bidder’s knowledge.
 - 3.5 **Nondiscrimination.** In preparing this bid, the Bidder has not engaged in discrimination against any prospective or present employee or Subcontractor on grounds of race, color,

ancestry, national origin, ethnicity, religion, sex, sexual orientation, age, disability, or marital status.

3.6 Iran Contracting Act. If the Contract Price exceeds \$1,000,000, Bidder is not identified on a list created under the Iran Contracting Act, Public Contract Code § 2200 et seq. (the "Act"), as a person engaging in investment activities in Iran, as defined in the Act, or is otherwise expressly exempt under the Act.

4. Award of Contract. By signing and submitting this Bid Proposal, Bidder agrees that if Bidder is awarded the Contract for the Project, within ten days following issuance of the Notice of Potential Award to Bidder, Bidder will do all of the following:

4.1 Execute Contract. Enter into the Contract with City in accordance with the terms of this Bid Proposal, by signing and submitting to City the Contract prepared by City using the form included with the Contract Documents;

4.2 Submit Required Bonds. Submit to City a payment bond and a performance bond, each for 100% of the Contract Price, using the bond forms provided and in accordance with the requirements of the Contract Documents; and

4.3 Insurance Requirements. Submit to City the insurance certificate(s) and endorsement(s) as required by the Contract Documents.

5. Bid Security. As a guarantee that, if awarded the Contract, Bidder will perform its obligations under Section 4 above, Bidder is enclosing bid security in the amount of ten percent of its maximum bid amount in one of the following forms (check one):

_____ A cashier's check or certified check payable to City and issued by _____ [Bank name] in the amount of \$_____.

_____ A bid bond, using the Bid Bond form included with the Contract Documents, payable to City and executed by a surety licensed to do business in the State of California.

This Bid Proposal is hereby submitted on _____, 20__.

s/ _____

Name and Title

s/ _____
[See Section 3 of Instructions to Bidders]

Name and Title

Company Name

License #, Expiration Date, and Classification

Address

DIR Registration #

City, State, Zip

Phone

Contact Name

Contact Email

END OF BID PROPOSAL

Bid Schedule

This Bid Schedule must be completed in ink and included with the sealed Bid Proposal. Pricing must be provided for each Bid Item as indicated. Items marked "(SW)" are Specialty Work that must be performed by a qualified Subcontractor. The lump sum or unit cost for each item must be inclusive of all costs, whether direct or indirect, including profit and overhead. The sum of all amounts entered in the "Extended Total Amount" column must be identical to the Base Bid price entered in Section 1 of the Bid Proposal form.

AL = Allowance CF = Cubic Feet CY = Cubic Yard EA = Each LB = Pounds
 LF = Linear Foot LS = Lump Sum SF = Square Feet TON = Ton (2000 lbs)

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
Base Bid					
1	Clear and Grub	58,000	SF	\$	\$
2	Demolition - AC Paving	19,500	SF	\$	\$
3	Demolition - Curb and Gutter	1,370	LF	\$	\$
4	Demolition - Utilities	10	LF	\$	\$
5	Sawcut	1,400	LF	\$	\$
6	Tree Protection	3	EA	\$	\$
7	Tree Removal	2	EA	\$	\$
8	Rough Grading	2,500	CY	\$	\$
9	Fine Grading	80,400	SF	\$	\$
10	Asphalt Pavement-Trail	180	TONS	\$	\$
11	Asphalt Pavement-Vehicular	147	TONS	\$	\$
12	Aggregate Base	310	CY	\$	\$
13	Concrete Curb and Gutter	1,400	LF	\$	\$
14	ADA Compliant Curb Ramp	4	EA	\$	\$
15	Striping Thermoplastic	30	LF	\$	\$
16	Pedestrian Concrete Paving (REMOVED)	0	SF	\$	\$
17	Redwood Header	5,775	LF	\$	\$
18	Decomposed Granite	5,955	SF	\$	\$
19	Storm Drain Piping 6" Perforated	663	LF	\$	\$
19a	Storm Drain Piping 6" Solid	100	LF	\$	\$
20	6" Storm Drain cleanout	7	EA	\$	\$
21	Storm Drain Bubbler	4	EA	\$	\$
22	Catch Basin	6	EA	\$	\$
23	Bioretention Soil Mix (BSM) 18" Depth	195	CY	\$	\$

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
24	Import Soil	985	CY	\$	\$
25	Plant Establishment Period- 90 days	1	LS	\$	\$
26	Mulch (Bark)	39,682	SF	\$	\$
27	Pea Gravel for Storm Water Treatment Area	3,416	SF	\$	\$
28	Tree - 24" Box	65	EA	\$	\$
29	Shrub planting - 1 Gal	732	EA	\$	\$
30	Shrub Planting- 5 Gal	415	EA	\$	\$
31	Root Barrier - 24" Depth	740	LF	\$	\$
32	Irrigation Controller	1	EA	\$	\$
33	Master Valve, Flow Sensor	1	EA	\$	\$
34	Backflow Preventer Enclosure	1	EA	\$	\$
35	Tree bubbler (2 per tree)	130	EA	\$	\$
36	Remote Control Valve	22	EA	\$	\$
37	Irrigation Gate Valve	9	EA	\$	\$
38	Irrigation Quick Coupler Valve	11	EA	\$	\$
39	Irrigation Conduit	10	LF	\$	\$
40	Bubbler at Shrub (1 per shrub)	1,147	EA	\$	\$
41	Low Voltage Wire	1	LS	\$	\$
42	Irrigation Mainline	1,460	LF	\$	\$
43	Irrigation Lateral Line	9,528	LF	\$	\$
44	Irrigation Sleeves	135	LF	\$	\$
45	Sanitary Sewer Clean Out - 4"	1	EA	\$	\$
46	Sanitary Sewer Piping - 4"	93	LF	\$	\$
47	Sewer Main Connection	1	EA	\$	\$
48	Backflow Preventer	1	EA	\$	\$
49	Water Meter Box - Domestic/Irrigation	2	EA	\$	\$
50	Water Line Lateral - Domestic/Irrigation	105	LF	\$	\$
51	Water Main Connection- Domestic/Irrigation	2	EA	\$	\$
52	Bike Rack	2	EA	\$	\$
53	Boulder	26	EA	\$	\$
54	Bike Repair Station	1	EA	\$	\$

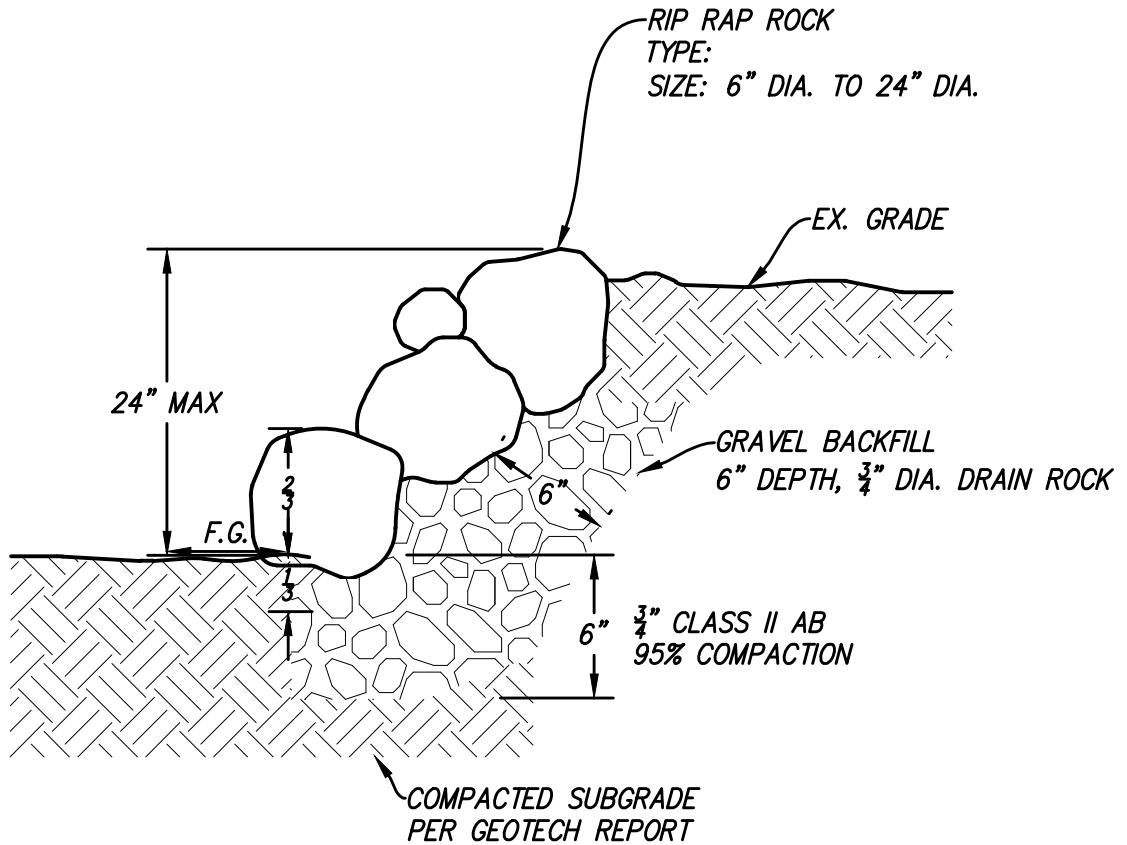
BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
55	Dog Waste Dispenser	1	EA	\$	\$
56	Rip Rap	101	TON	\$	\$
57	Install City Furnished Pedestrian Post Top Light- 20ft pole and foundation	12	EA	\$	\$
58	Install City Furnished Roadway Luminaire – 32ft pole and foundation	6	EA	\$	\$
59	Security Cameras Make-Ready (Conduits only)	1	LS	\$	\$
60	Service Cabinet	1	EA	\$	\$
61	Electrical Systems – Conduits, Conductors, and Pull Boxes	1	LS	\$	\$
62	Construction Surveying	1	LS	\$	\$
63	SWPPP	1	LS	\$	\$
64	Traffic Control	1	LS	\$	\$
62	Mobilization	1	LS	\$	\$
Subtotal — Base Bid:					\$
ADD ALTERNATE # 1 Fitness Station					
1	Concrete Mowband	128	LF	\$	\$
2	Synthetic Rubber Surfacing	989	SF	\$	\$
3	Storm Drain Piping 6” Perforated	100	LF	\$	\$
4	6” Storm Drain Cleanout	5	EA	\$	\$
5	Storm Drain Piping 6” Solid	100	LF	\$	\$
6	Fitness Station	1	LS	\$	\$
7	Import Soil/Planting Deduct	989	SF	\$	-\$
Subtotal — Add Alternate #1:					\$

TOTAL BASE BID: Items 1 through _____
inclusive: \$ _____
TOTAL ADD ALTERNATE#1 BID: Items 1 through _____
inclusive: \$ _____

Note: The amount entered as the “Total Base Bid” and Total Add Alternate#1 Bid should be identical to the Base Bid and Add Alternate#1 Bid amount entered in Section 1 of the Bid Proposal form.

BIDDER NAME: _____

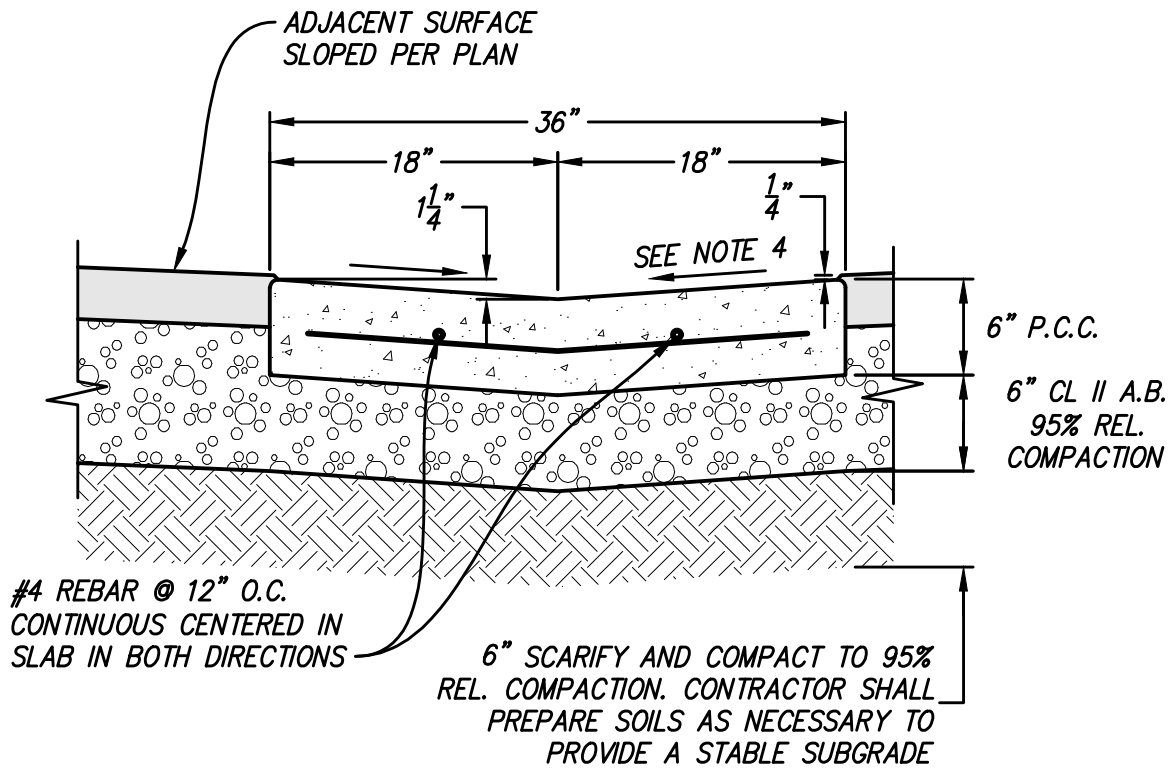
END OF BID SCHEDULE



BUILD ON.
SANDIS.NET

DATE: 2023-10-12
 SCALE: N.T.S.
 BY: CW
 PROJECT No.:
222427

RIP RAP DETAIL AT NORTHERN CONFORM
 PITTSBURG LIVING GREEN FRONTAGE



NOTES:

1. INSTALL A 1/4" EXPANSION JOINT AND SLIP DOWELS AT THE END OF THE VALLEY GUTTER IN CASES WHERE IT CONNECTS TO A CURB AND GUTTER.
2. #4 x 12" SLIP DOWELS AND 1/4" EXPANSION JOINTS TO BE PROVIDED ON 20' CENTER. MATERIAL FOR EXPANSION JOINTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION D 1751.
3. REFER TO PLANS FOR ADJACENT PAVEMENT SECTIONS.
4. GUTTER PAN SHALL NOT EXCEED 5% CROSS SLOPE ACROSS PEDESTRIAN ROUTE. GUTTER PAN SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION WITHIN ACCESSIBLE PARKING STALLS.



BUILD ON.
SANDIS.NET

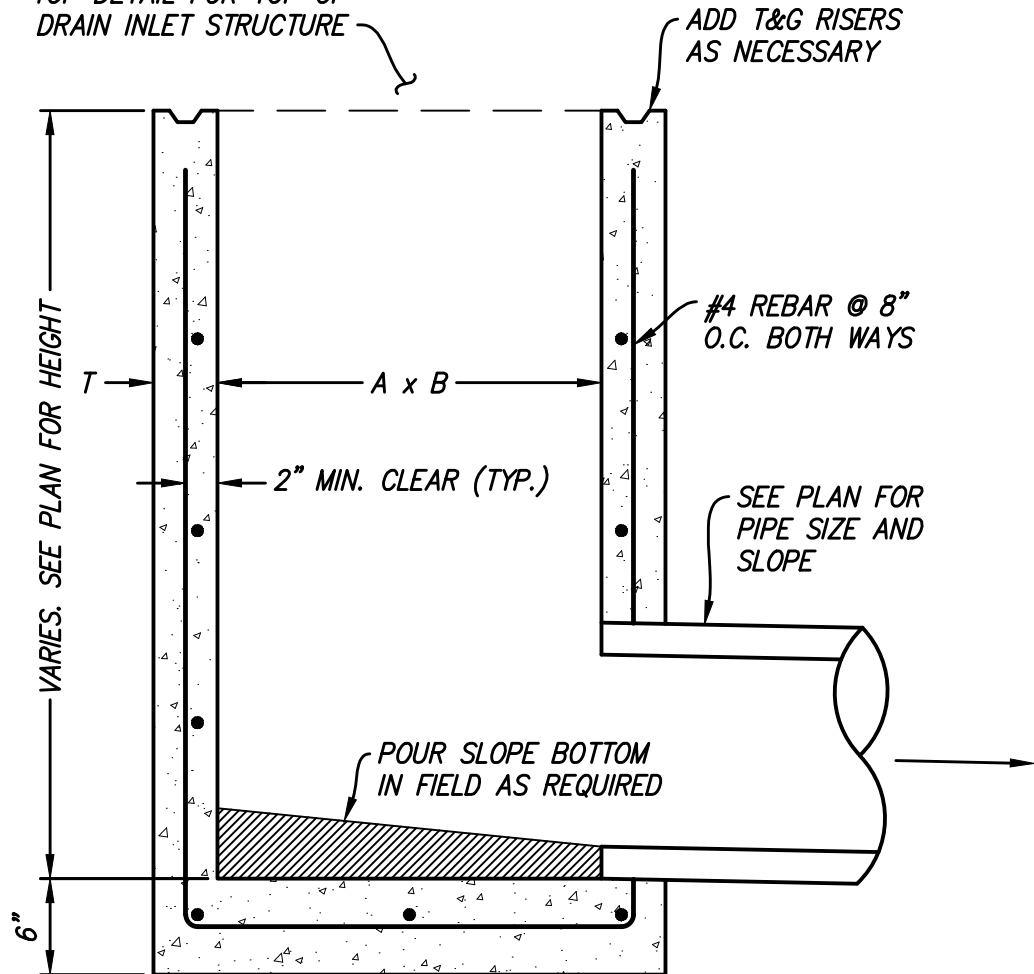
DATE: 2023-10-12
SCALE: 1"=1'
BY: CW
PROJECT No.:
222427

VALLEY GUTTER
PITTSBURG LIVING GREEN FRONTAGE

A x B	T	MAX PIPE SIZE	OLDCASTLE MODEL
12"x12"	4"	8"	DI-1212
18"x18"	4"	12"	DI-1818
24"x24"	4"	18"	DI-2424
36"x36"	6"	24"	DI-3636
24"x48"	5"	18",36"	DI-2448
36"x48"	6"	24",36"	DI-3648

NOTE: MAX SIZES ARE BASED ON PERPENDICULAR CONNECTION

SEE CATCH BASIN TOP,
COMBINATION INLET TOP,
OR CURB OPENING INLET
TOP DETAIL FOR TOP OF
DRAIN INLET STRUCTURE



NOTES:

1. SEE PLANS FOR DRAIN INLET SIZE.
2. PRE-CAST DRAIN INLET IN LIEU OF CAST-IN-PLACE INLET IS ACCEPTABLE, OLDCASTLE OR APPROVED EQUIVALENT.



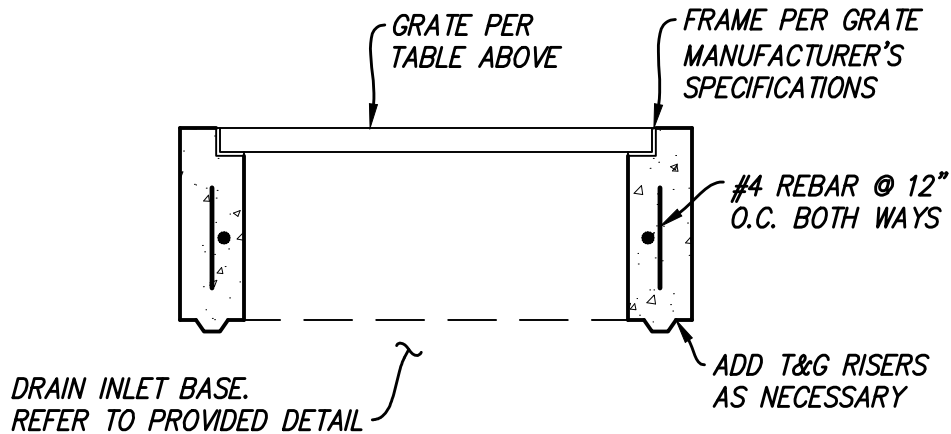
BUILD ON.
SANDIS.NET

DATE: 2023-10-12
SCALE: 1"=1'
BY: CW
PROJECT No.:
222427

DRAIN INLET BASE
PITTSBURG LIVING GREEN FRONTAGE

OLDCASTLE GRATE MODEL NUMBER			
A x B	PEDESTRIAN*	LANDSCAPE / NON-TRAFFIC	H2O RATED
12"x12"	SD-13 12X12	PEDESTRIAN SD-12 12X12	TRAFFIC SD-12 12X12
18"x18"	SD-13 18X18	PEDESTRIAN SD-12 18X18	TRAFFIC SD-12 18X18
24"x24"	SD-13 24X24	PEDESTRIAN SD-12 24X24	TRAFFIC SD-12 24X24
36"x36"	SD-13 36X36	PEDESTRIAN SD-12 36X36	TRAFFIC SD-12 36X36
24"x48"	SD-13 24X48	PEDESTRIAN SD-12 24X48	TRAFFIC SD-12 24X48

* OR APPROVED EQUIVALENT GRATE WITH 1/4" MAX OPENINGS



NOTES:

1. SEE PLANS FOR CATCH BASIN SIZE AND TYPE.
2. FRAME SHALL BE ANCHORED TO CONCRETE PER MANUFACTURER'S SPECIFICATIONS.
3. FOR JUNCTION BOXES (JB) IN NON-VEHICULAR AREAS ONLY, REPLACE GRATE WITH NON-SLIP SOLID STEEL COVER. ADD "STORM DRAIN" TEXT TO LID.



BUILD ON.
SANDIS.NET

DATE: 2023-10-12
SCALE: 1"=1'
BY: CW
PROJECT No.:
222427

CATCH BASIN TOP
PITTSBURG LIVING GREEN FRONTAGE

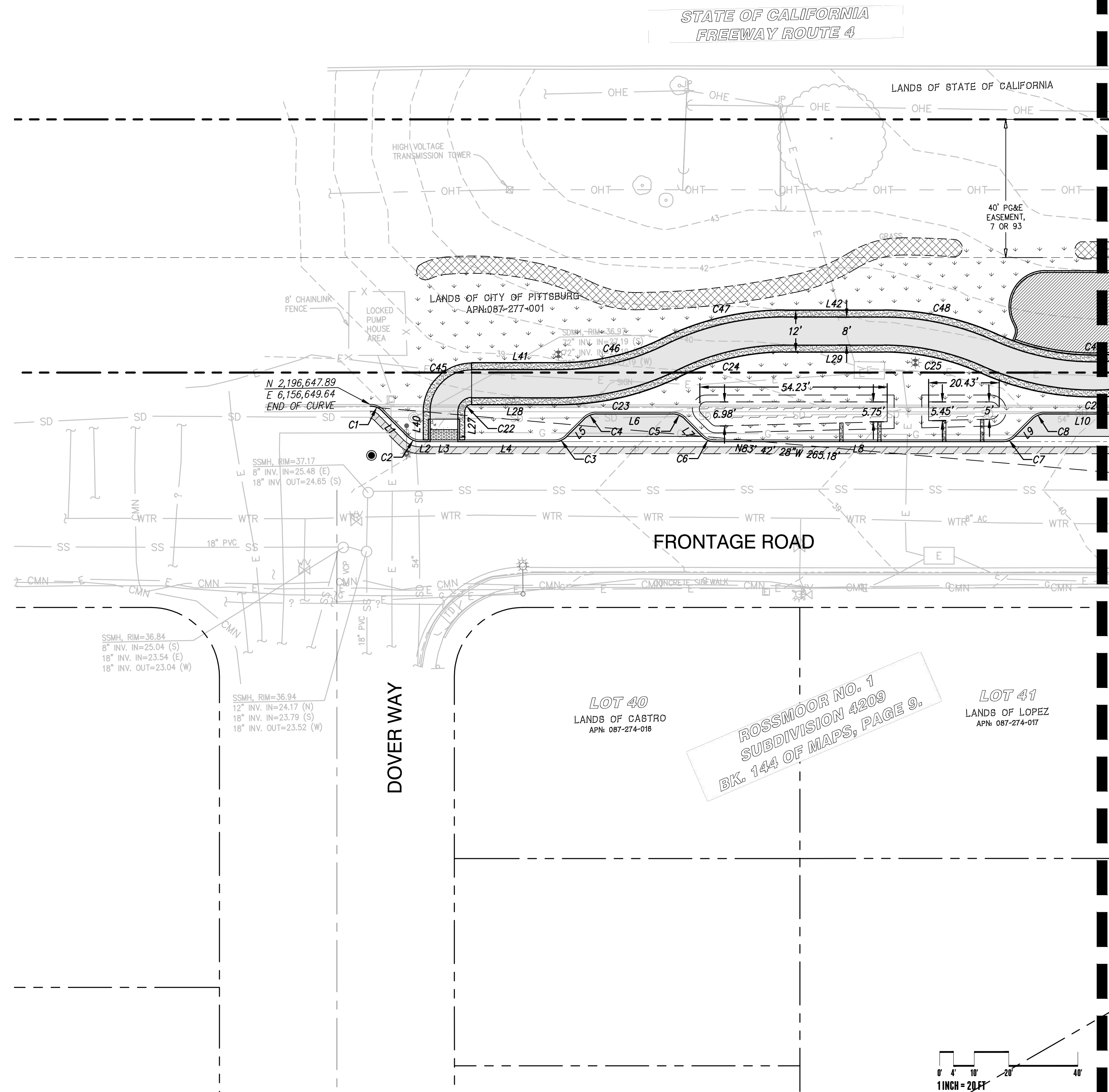
CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C1	3.93'	5.00'	45°00'00"
C2	3.93'	5.00'	45°00'00"
C3	3.93'	5.00'	45°00'00"
C4	3.93'	5.00'	45°00'00"
C5	3.93'	5.00'	45°00'00"
C6	3.93'	5.00'	45°00'00"
C7	3.93'	5.00'	45°00'00"
C8	3.93'	5.00'	45°00'00"
C9	3.93'	5.00'	45°00'00"
C10	3.93'	5.00'	45°00'00"
C11	3.93'	5.00'	45°00'00"
C12	3.93'	5.00'	45°00'00"
C13	3.93'	5.00'	45°00'00"
C14	3.93'	5.00'	45°00'00"
C15	3.93'	5.00'	45°00'00"
C16	3.93'	5.00'	45°00'00"
C17	3.93'	5.00'	45°00'00"
C18	3.93'	5.00'	45°00'00"
C19	35.68'	200.00'	101°3'20"
C20	60.76'	389.00'	8°56'59"
C21	38.13'	39.00'	56°00'41"
C22	3.15'	2.02'	89°35'38"
C23	36.63'	80.00'	26°14'00"
C24	31.13'	68.00'	26°14'00"
C25	28.71'	68.00'	24°11'39"
C26	67.56'	80.00'	48°23'18"
C27	28.71'	68.00'	24°11'39"
C28	17.73'	68.00'	14°56'08"
C29	20.85'	80.00'	14°56'08"
C30	29.58'	80.00'	21°10'58"
C31	25.14'	68.00'	21°10'58"
C32	22.46'	68.00'	18°55'29"
C33	26.42'	80.00'	18°55'29"
C34	29.58'	80.00'	21°10'58"

CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C35	25.14'	68.00'	21°10'58"
C36	22.46'	68.00'	18°55'29"
C37	26.42'	80.00'	18°55'29"
C38	27.57'	68.00'	23°13'53"
C39	32.44'	80.00'	23°13'53"
C40	39.87'	80.00'	28°33'09"
C41	33.89'	68.00'	28°33'09"
C42	19.43'	68.00'	16°22'14"
C43	22.86'	80.00'	16°22'14"
C44	21.71'	30.00'	41°27'23"
C45	21.13'	14.07'	86°04'23"
C46	31.13'	68.00'	26°14'00"
C47	36.63'	80.00'	26°14'00"
C48	33.78'	80.00'	24°11'39"
C49	57.43'	68.00'	48°23'18"
C50	33.78'	80.00'	24°11'39"
C51	20.85'	80.00'	14°56'08"
C52	17.73'	68.00'	14°56'08"
C53	25.14'	68.00'	21°10'58"
C54	29.58'	80.00'	21°10'58"
C55	26.42'	80.00'	18°55'29"
C56	22.46'	68.00'	18°55'29"
C57	25.14'	68.00'	21°10'58"
C58	29.58'	80.00'	21°10'58"
C59	26.42'	80.00'	18°55'29"
C60	22.46'	68.00'	18°55'29"
C61	32.44'	80.00'	23°13'53"
C62	27.57'	68.00'	23°13'53"
C63	33.89'	68.00'	28°33'09"
C64	39.87'	80.00'	28°33'09"
C65	22.86'	80.00'	16°22'14"
C66	19.43'	68.00'	16°22'14"
C67	23.18'	42.00'	31°37'35"
C68	33.77'	40.00'	48°21'53"

LINE TABLE		
LINE	BEARING	LENGTH
L1	S43°46'01"E	10.36'
L2	S88°46'01"E	3.00'
L3	S88°46'01"E	8.00'
L4	S88°46'01"E	28.00'
L5	N46°13'59"E	7.17'
L6	S88°46'01"E	22.00'
L7	S43°46'01"E	7.17'
L8	S88°46'01"E	83.42'
L9	N46°13'59"E	7.17'
L10	S88°46'01"E	22.00'
L11	S43°46'01"E	7.17'
L12	S88°46'01"E	204.72'
L13	N46°13'59"E	7.17'
L14	S88°46'01"E	44.00'
L15	S43°46'01"E	7.17'
L16	S88°46'01"E	6.00'
L17	S88°46'01"E	8.00'
L18	S88°46'01"E	313.00'
L19	S88°46'01"E	8.00'
L20	S88°46'01"E	204.72'

LINE TABLE		
LINE	BEARING	LENGTH
L21	N46°13'59"E	7.17'
L22	S88°46'01"E	22.00'
L23	S43°46'01"E	7.17'
L24	S88°46'01"E	46.00'
L25	S88°46'01"E	8.00'
L26	S88°46'01"E	91.12'
L27	N17°57'2"E	8.22'
L28	S88°46'01"E	25.11'
L29	S88°46'01"E	28.83'
L30	S88°46'01"E	111.20'
L31	S88°46'01"E	65.48'
L32	S88°46'01"E	14.03'
L33	S88°46'01"E	142.49'
L34	S88°46'01"E	14.03'
L35	S88°46'01"E	137.64'
L36	S88°46'01"E	21.65'
L37	S88°46'01"E	45.41'
L38	S88°46'01"E	112.25'
L39	S47°18'37"E	1.52'
L40	N17°13'59"E	9.11'

LINE TABLE		
LINE	BEARING	LENGTH
L41	S88°46'01"E	25.11'
L42	S88°46'01"E	28.83'
L43	S88°46'01"E	111.20'
L44	S88°46'01"E	65.48'
L45	S88°46'01"E	14.03'
L46	S88°46'01"E	142.49'
L47	S88°46'01"E	14.03'
L48	S88°46'01"E	137.64'
L49	S88°46'01"E	21.65'
L50	S88°46'01"E	45.41'
L51	S88°46'01"E	112.25'
L52	N17°13'59"E	23.44'
L53	S88°46'01"E	18.54'
L54	N17°13'59"E	5.62'
L55	N17°13'59"E	30.34'
L56	N17°13'59"E	26.79'
L57	N17°13'59"E	28.95'
L58	N17°13'59"E	16.49'
L59	N17°13'59"E	8.39'



MATCHLINE - SEE SHEET C-3.2

LEGEND

- PROPERTY LINE
- AC PAVEMENT (1,2) C-8.2
- DEEP LIFT (4) C-8.2
- CONCRETE SIDEWALK (3) C-8.2
- PLANTING, S.L.D. FOR DETAILS
- BIO-TREATMENT AREA (1) C-8.1
- DECOMPOSED GRANITE, S.L.D. FOR DETAILS
- RIP-RAP, S.L.D. FOR DETAILS
- ADD ALTERNATE - FITNESS STATION SYNTHETIC RUBBER SURFACING, S.L.D. FOR DETAILS

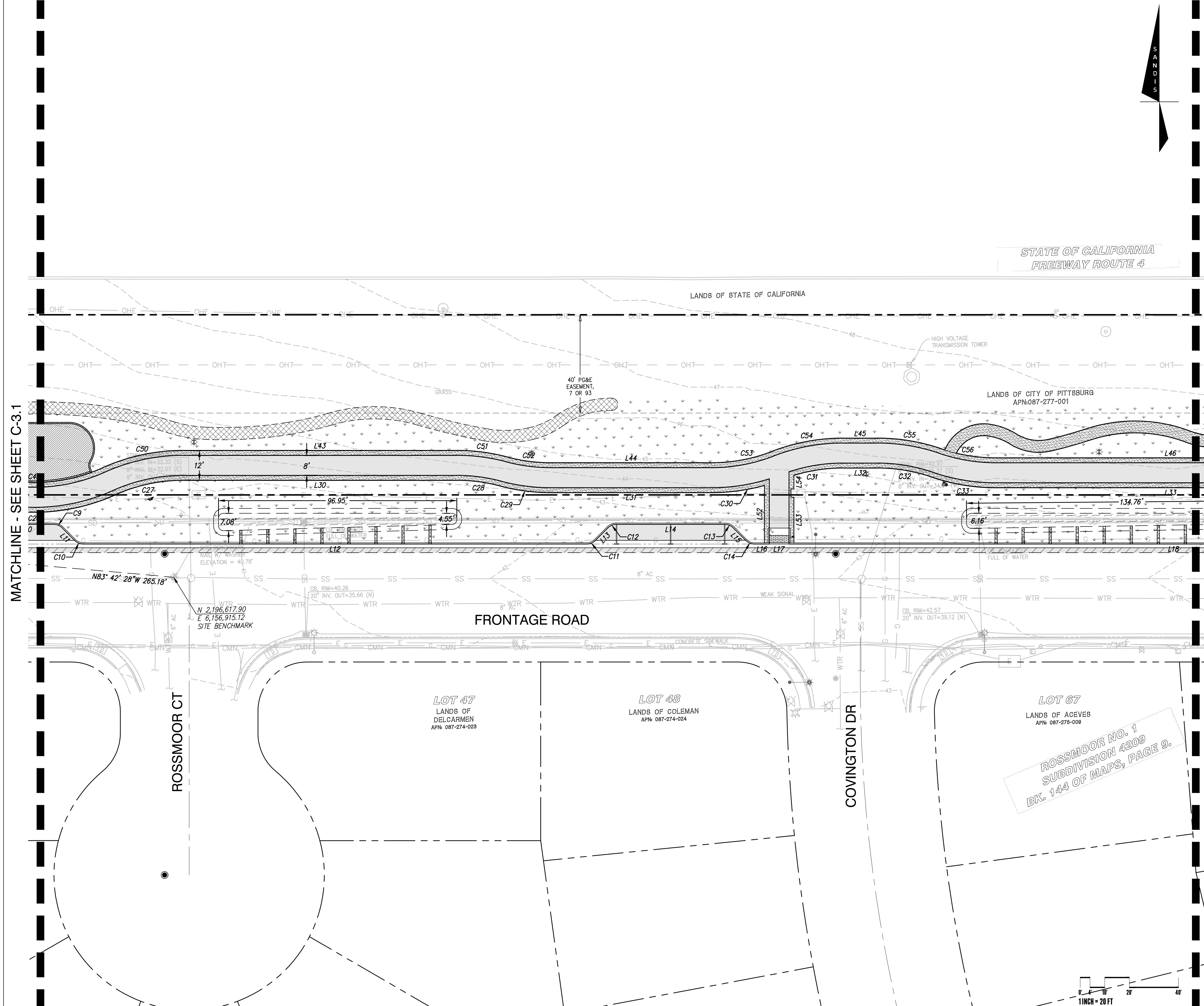
BENCHMARK

THE ELEVATION REFERENCE FOR THIS SURVEY IS A CONTRA COSTA COUNTY BENCHMARK, BM ID 171, SET ON AN EBMUD BOX ON THE EAST SIDE OF RAILROAD AVENUE AT THE INTERSECTION OF RAILROAD AVENUE AND ALVARDO STREET.
ELEVATION= 105.39 FEET NAVD 88

SITE BENCHMARK

MAG NAIL WITH WASHER SET IN ASPHALT AT THE INTERSECTION OF ROSSMOOR COURT AND FRONTAGE ROAD
ELEVATION=40.78 FEET NAVD 88

<p>City of Pittsburg</p>		<p>ACCEPTED FOR USE:</p> <p>JOHN SAMUELSON City Engineer</p>	<p>PREPARED UNDER THE DIRECTION OF:</p> <p>CHAD J. BROWNING P.C. NO. 65315 EXPIRES 9-30-23</p>
<p>FRONTAGE ROAD</p> <p>LIVING GREEN TRAIL DESIGN</p> <p>HORIZONTAL CONTROL PLAN</p>		<p>CONTRACT NAME:</p> <p>CONTRACT NUMBER:</p>	
BY	DRAWN: CW	CHECKED: SC	REVIEWED: CB
DATE	REV	DATE: 09/05/23	SCALE: AS NOTED
<p>SHEET NO.</p> <p>6 OF 63</p>		<p>DWG. NO.</p> <p>C-31</p>	



LEGEND

- PROPERTY LINE
- AC PAVEMENT (1,2) C-8.2
- DEEP LIFT (4) C-8.2
- CONCRETE SIDEWALK (3) C-8.2
- PLANTING, S.L.D. FOR DETAILS
- BIO-TREATMENT AREA (1) C-8.1
- DECOMPOSED GRANITE, S.L.D. FOR DETAILS
- RIP-RAP, S.L.D. FOR DETAILS
- ADD ALTERNATE - FITNESS STATION SYNTHETIC RUBBER SURFACING, S.L.D. FOR DETAILS

BENCHMARK

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MAG NAIL WITH WASHER SET IN ASPHALT AT THE INTERSECTION OF ROSSMOOR COURT AND FRONTAGE ROAD

ELEVATION=40.78 FEET NAVD 88

PREPARED UNDER THE DIRECTION OF:
CHAD J. BROWNING
P.C.E. NO. 65315
EXPIRES 9-30-23
DATE: _____

ACCEPTED FOR USE:
JOHN SAMUELSON
City Engineer
Date: _____

City of Pittsburg

**FRONTAGE ROAD
LIVING GREEN TRAIL DESIGN
HORIZONTAL CONTROL PLAN**

CONTRACT NAME:
CONTRACT NUMBER:

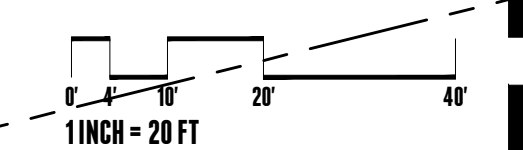
BY	DESCRIPTION	DATE	REV	SCALE	NOTED

DRAWN: CW
CHECKED: SC
REVIEWED: CB
DATE: 09/05/23
SCALE: AS NOTED

SHEET NO.
7 OF 63

DWG. NO.
C-3.2



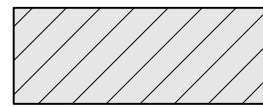
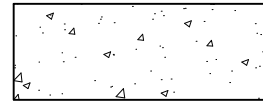
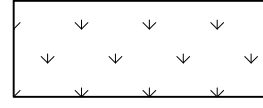
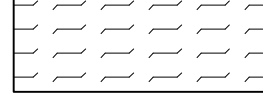
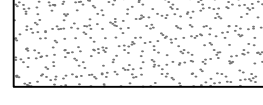
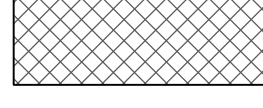
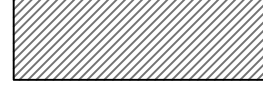
ROSSMOOR NO. 1
 SUBDIVISION 4209
 BK. 144 OF MAPS, PAGE 9.



MATCHLINE - SEE SHEET C-3.3

MATCHLINE - SEE SHEET C-3.4

LEGEND

-  PROPERTY LINE
-  AC PAVEMENT $\frac{1,2}{C-8.2}$
-  DEEP LIFT $\frac{4}{C-8.2}$
-  CONCRETE SIDEWALK $\frac{3}{C-8.2}$
-  PLANTING, S.L.D. FOR DETAILS
-  BIO-TREATMENT AREA $\frac{1}{C-8.1}$
-  DECOMPOSED GRANITE, S.L.D. FOR DETAILS
-  RIP-RAP, S.L.D. FOR DETAILS
-  ADD ALTERNATE - FITNESS STATION SYNTHETIC RUBBER SURFACING, S.L.D. FOR DETAILS

BENCHMARK

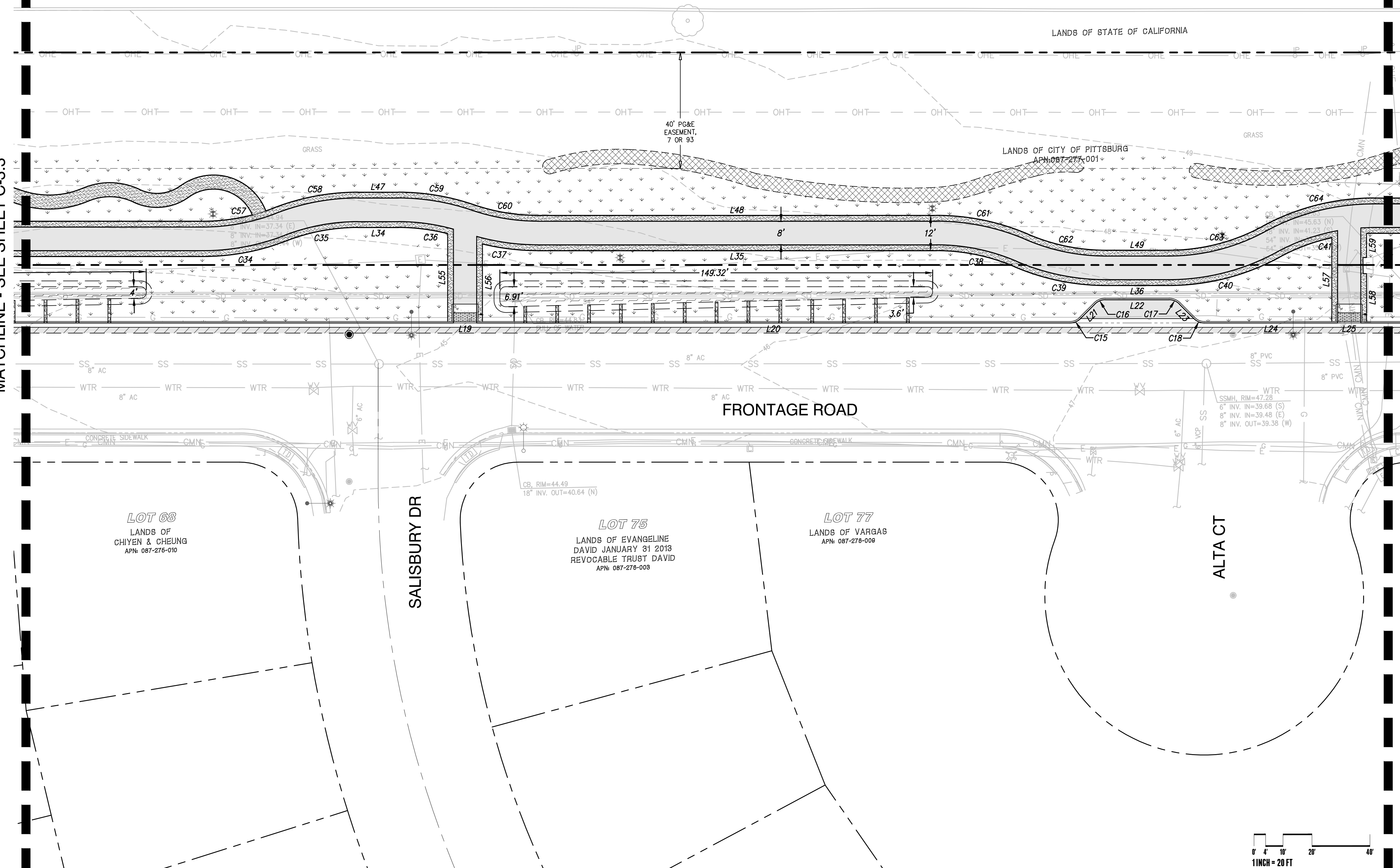
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ELEVATION= 105.39 FEET NAVD 88

SITE BENCHMARK

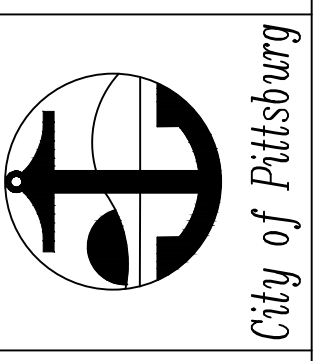
MAG NAIL WITH WASHER SET IN ASPHALT AT THE INTERSECTION OF ROSSMOOR COURT AND FRONTAGE ROAD

ELEVATION=40.78 FEET NAVD 88



PREPARED UNDER THE DIRECTION OF:

ACCEPTED FOR USE:



**FRONTAGE ROAD
LIVING GREEN TRAIL DESIGN
HORIZONTAL CONTROL PLAN**

CONTRACT NAME:
CONTRACT NUMBER:

DATE	REV	DESCRIPTION	BY	DRAWN: CW	CHECKED: SC	REVIEWED: CB	DATE: 09/05/23	SCALE: AS NOTED

SHEET NO. 8 OF 63

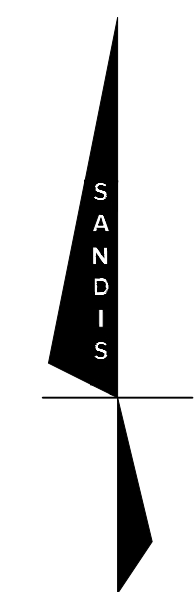
DWG. NO. C-3.3

CHAD J. BROWNING
P.C. NO. 65515
EXPIRES 9-30-23

DATE:

JOHN SAMUELSON
City Engineer
Date:

STATE OF CALIFORNIA
FREEWAY ROUTE 4



LEGEND

- PROPERTY LINE
- AC PAVEMENT 1,2
C-8.2
- DEEP LIFT 4
C-8.2
- CONCRETE SIDEWALK 3
C-8.2
- PLANTING, S.L.D. FOR DETAILS
- BIO-TREATMENT AREA 1
C-8.1
- DECOMPOSED GRANITE, S.L.D. FOR DETAILS
- RIP-RAP, S.L.D. FOR DETAILS
- ADD ALTERNATE - FITNESS STATION
SYNTHETIC RUBBER SURFACING,
S.L.D. FOR DETAILS

BENCHMARK

THE ELEVATION REFERENCE FOR THIS SURVEY IS A CONTRA COSTA COUNTY BENCHMARK, BM ID 171, SET ON AN EBMUD BOX ON THE EAST SIDE OF RAILROAD AVENUE AT THE INTERSECTION OF RAILROAD AVENUE AND ALVARDO STREET.

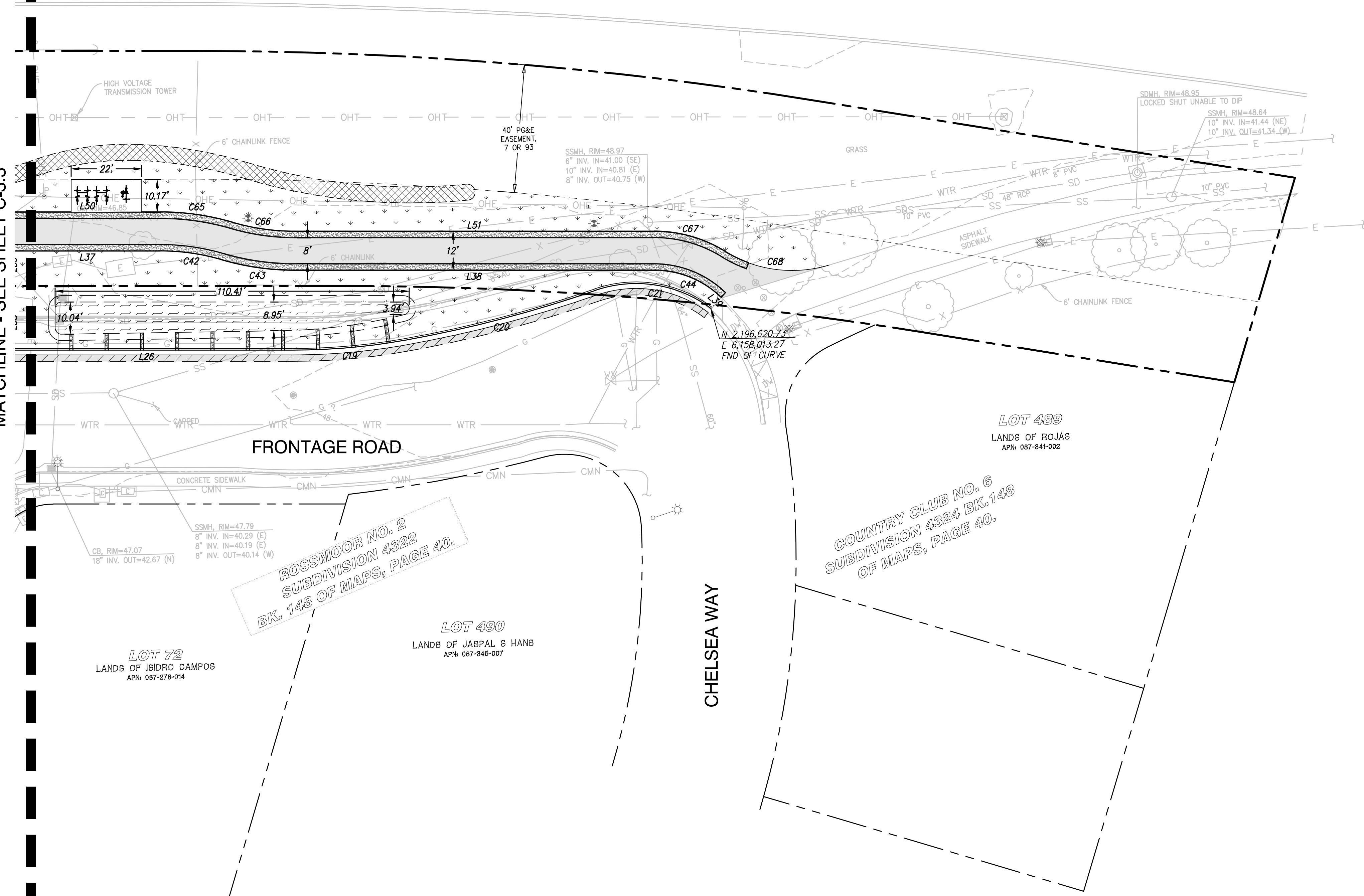
ELEVATION= 105.39 FEET NAVD 88

SITE BENCHMARK

MAG NAIL WITH WASHER SET IN ASPHALT AT THE INTERSECTION OF ROSSMOOR COURT AND FRONTAGE ROAD

ELEVATION=40.78 FEET NAVD 88

MATCHLINE - SEE SHEET C-3.3



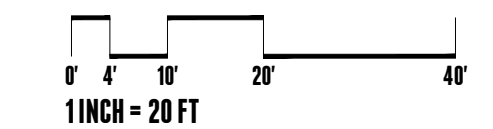
ROSSMOOR NO. 2
SUBDIVISION 4322
BK. 148 OF MAPS, PAGE 40.

COUNTRY CLUB NO. 6
SUBDIVISION 4324 BK. 148
OF MAPS, PAGE 40.

LOT 72
LANDS OF ISIDRO CAMPOS
APN: 087-278-014

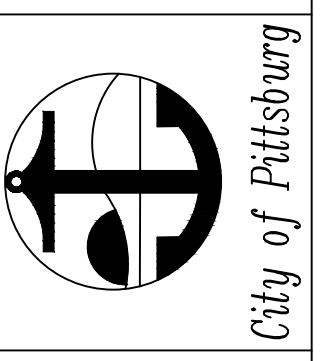
LOT 490
LANDS OF JASPAL S HANS
APN: 087-346-007

LOT 489
LANDS OF ROJAB
APN: 087-841-002



PREPARED UNDER THE DIRECTION OF:

ACCEPTED FOR USE:



**FRONTAGE ROAD
LIVING GREEN TRAIL DESIGN
HORIZONTAL CONTROL PLAN**

CONTRACT NAME:
CONTRACT NUMBER:

BY	DRAWN: CW
DESCRIPTION	CHECKED: SC
DATE	REVIEWED: CB
REV	DATE: 09/05/23
	SCALE: AS NOTED

SHEET NO.
9 OF 63

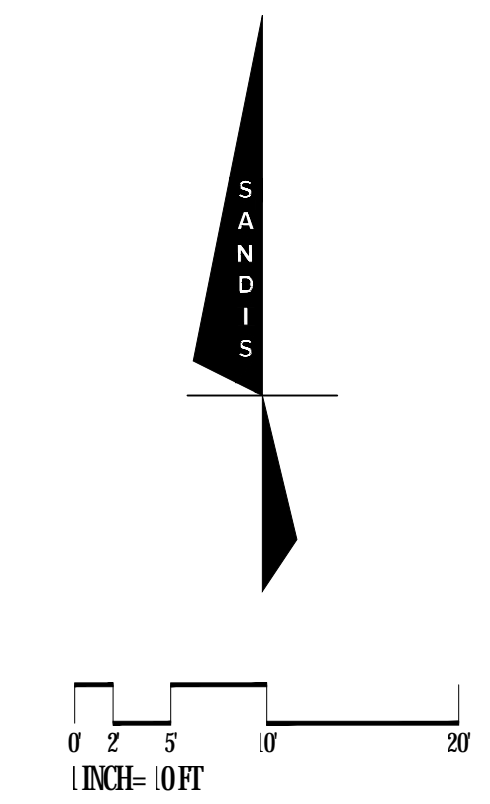
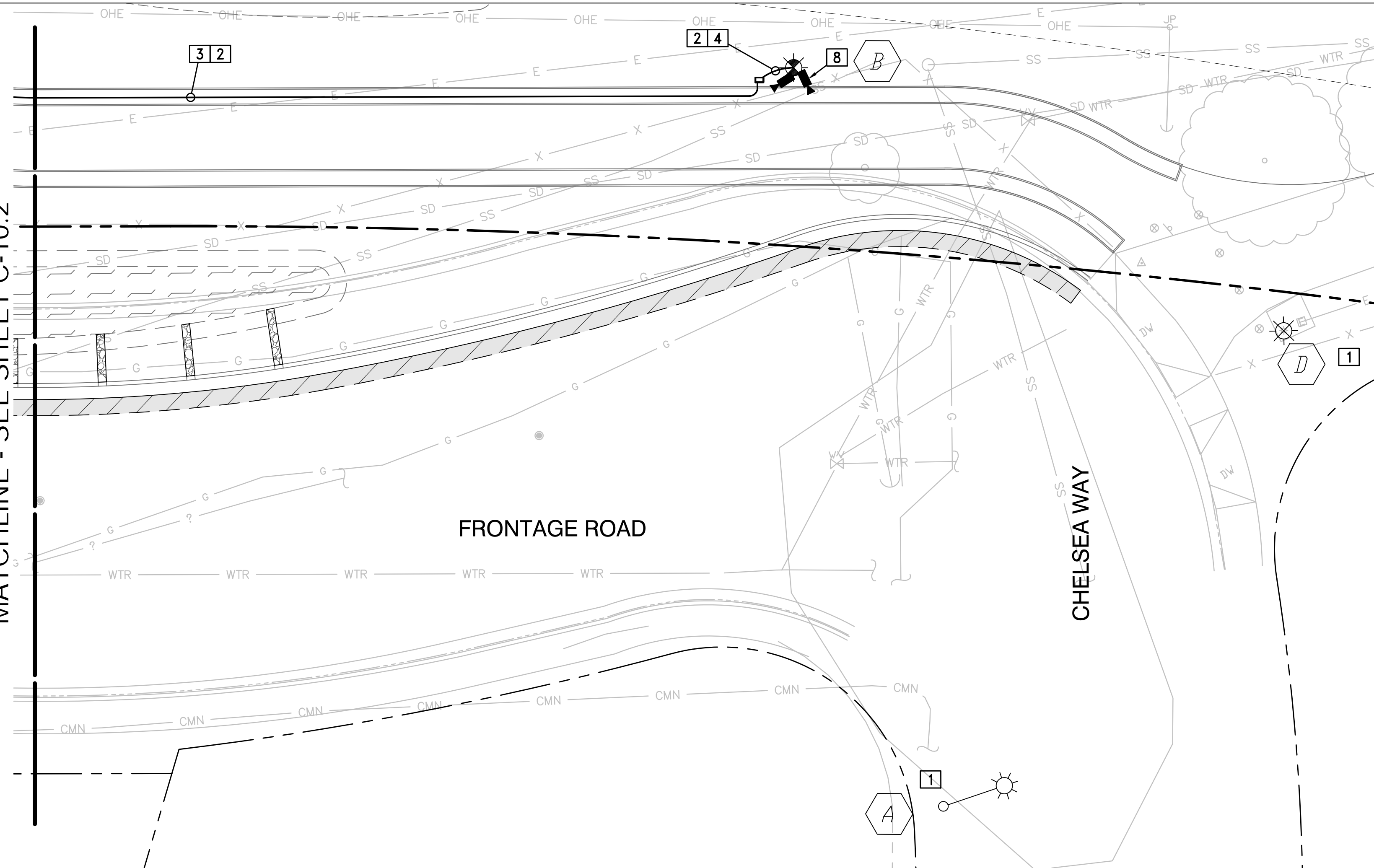
DWG. NO.
C-34

CHAD J. BROWNING
P.C. NO. 65515
EXPIRES 9-30-23

JOHN SAMUELSON
City Engineer

Date:

MATCHLINE - SEE SHEET C-10.2



LEGEND

- STREET LIGHT CONDUIT
- PROPOSED ELECTRICAL PULL BOX
- CITY FURNISHED AND INSTALLED CCTV CAMERA

PROPOSED LIGHTING FIXTURE SCHEDULE								
TYPE	SYMBOL	DESCRIPTION	POLE HEIGHT	LAMP	WATTAGE	VOLTAGE	QUANTITY	NOTES
A		EXISTING CREE RSWL SERIES ON EXISTING POLE	32'	LED	29W	120-277	1	-
B		CITY FURNISHED CREE ARE SERIES TYPE 3 ON CITY FURNISHED POLE	20'	LED	67W	120-277	1	CONTRACTOR TO INSTALL CITY FURNISHED LUMINAIRES AND POLES. CONTRACTOR TO PROVIDE NECESSARY COMPONENTS AS NEEDED TO PROVIDE A FUNCTIONAL LIGHTING SYSTEM.
D		EXISTING POST TOP CYCLONE LIGHTING PRESTIGE SERIES ON EXISTING POLE	12'	LED	50W	120-277	1	-

LIGHTING NOTES

- 1 EXISTING LUMINAIRE AND POLE TO REMAIN.
- 2 INSTALL TWO(2) 3/4" CONDUITS FOR CCTV CAMERA COMMUNICATION LINES AND 120 VAC POWER, AS REQUIRED BY THE CITY FOR "CCTV MAKE-READY." ONE(1) POWER CIRCUIT IN THE SERVICE ENCLOSURE SHALL BE DEDICATED TO CAMERA AND COMMUNICATIONS.
- 3 INSTALL 2" CONDUIT WITH 2-#8 AWG CONDUCTOR (SL) AND 1-#8 BARE GROUND WIRE.
- 4 INSTALL 1 1/2" CONDUIT WITH 2-#8 AWG CONDUCTOR (SL) AND 1#4 BARE COPPER GROUND WIRE.
- 8 CITY TO FURNISH AND INSTALL 2.4MM CCTV CAMERAS ON LIGHT POLE.

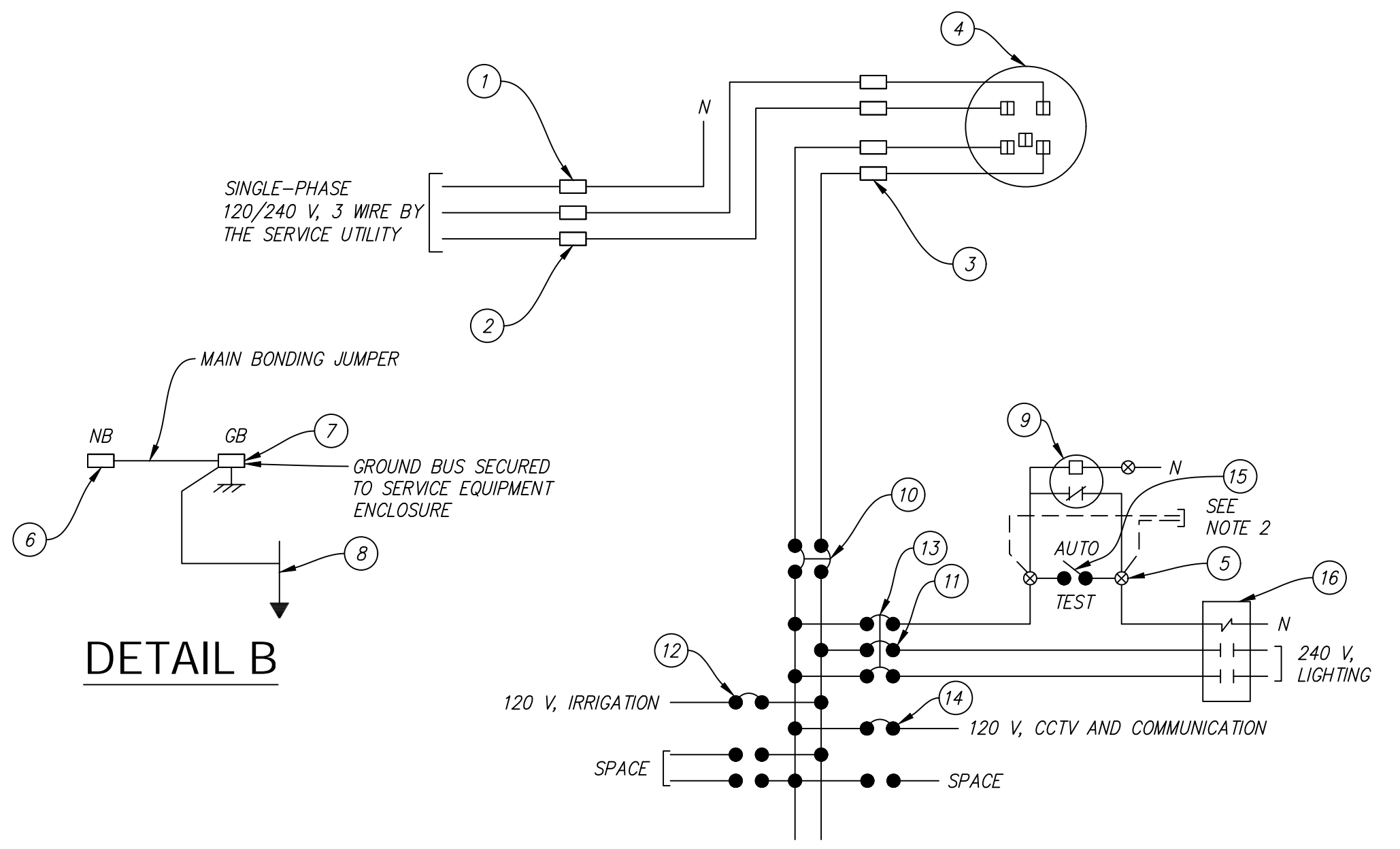
WIRING NOTES

1. UNLESS OTHERWISE INDICATED ON THE PLANS, SERVICE EQUIPMENT SHALL BE PROVIDED FOR EACH SERVICE EQUIPMENT ENCLOSURE AS SHOWN.
2. CONNECT TO REMOTE TEST SWITCH MOUNTED ON LIGHTING STANDARDS, SIGN POST, OR STRUCTURE, OR WHEN REQUIRED.
3. ITEMS 1 AND 6 SHALL BE ISOLATED FROM THE SERVICE EQUIPMENT ENCLOSURE.
4. TYPE V PHOTOELECTRIC CONTROL SHALL BE USED UNLESS OTHERWISE INDICATED ON THE PLANS.
5. ITEM 20 SHALL BE GANGED OPERATED CB.
6. THE PLAN SHOWS THE APPROXIMATE LOCATION OF THE DEVICES WITHIN THE ENCLOSURE. COMPONENTS MAY BE REARRANGED, HOWEVER THE "WORKING CLEARANCE WITHIN THE SERVICE EQUIPMENT ENCLOSURE SHALL BE MAINTAINED.

ELECTRICAL LIGHTING NOTES

1. ALL WORK SHALL BE DONE IN CONFORMANCE WITH THE LATEST EDITION OF THE CITY OF PITTSBURG STANDARD DETAILS.
2. CONTRACTOR TO CONFIRM EXISTING STREET LIGHT CIRCUITS PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL LOCATE AND PROTECT EXISTING UTILITIES FROM DAMAGE UNLESS SPECIFIED OTHERWISE.
4. ALL PULLBOXES SHALL BE SIZE #5 UNLESS SPECIFIED OTHERWISE.

TYPE III-A SERVICE EQUIPMENT ENCLOSURE LEGEND (120/240 V)		
ITEM	COMPONENT	NAMEPLATE DESCRIPTION
1	NEUTRAL LUG	
2	LANDING LUG	
3	TESTING BYPASS FACILITY	
4	METER SOCKET AND SUPPORT	
5	TERMINAL BLOCKS	
6	NEUTRAL BUS	
7	GROUND BUS	
8	GROUNDING ELECTRODE	
9	PHOTOELECTRIC UNIT (NOTE 4)	PEU
10	100 A, 240 V, 2P, CB	MAIN BREAKER
11	30 A, 240 V, 2P, CB	LIGHTING
12	20 A, 240 V, 2P, CB	IRRIGATION
13	30 A, 240 V, 2P, CB	LIGHTING CONTROL
14	20 A, 240 V, 2P, CB	CCTV AND WIRELESS LINK RADIO COMMUNICATION
15	15 A, 1P, TEST SWITCH	LIGHTING TEST SWITCH
16	60 A, 2P, NO CONTACTOR	LIGHTING



120/240 V SERVICE WIRING DIAGRAM
DETAIL A

PREPARED UNDER THE DIRECTION OF:

DATE: 9/20/23

ACCEPTED FOR USE:

DATE:

JOHN SAMUELSON
City Engineer

CHAD J. BROWNING
P.E. No. C68315
EXPIRES 9-30-25

FRONTAGE ROAD

LIVING GREEN TRAIL DESIGN

LIGHTING PLAN

CONTRACT NAME:

CONTRACT NUMBER:

DATE	REV	DESCRIPTION	BY	SCALE	NOTED

SHEET NO.
29 OF 59

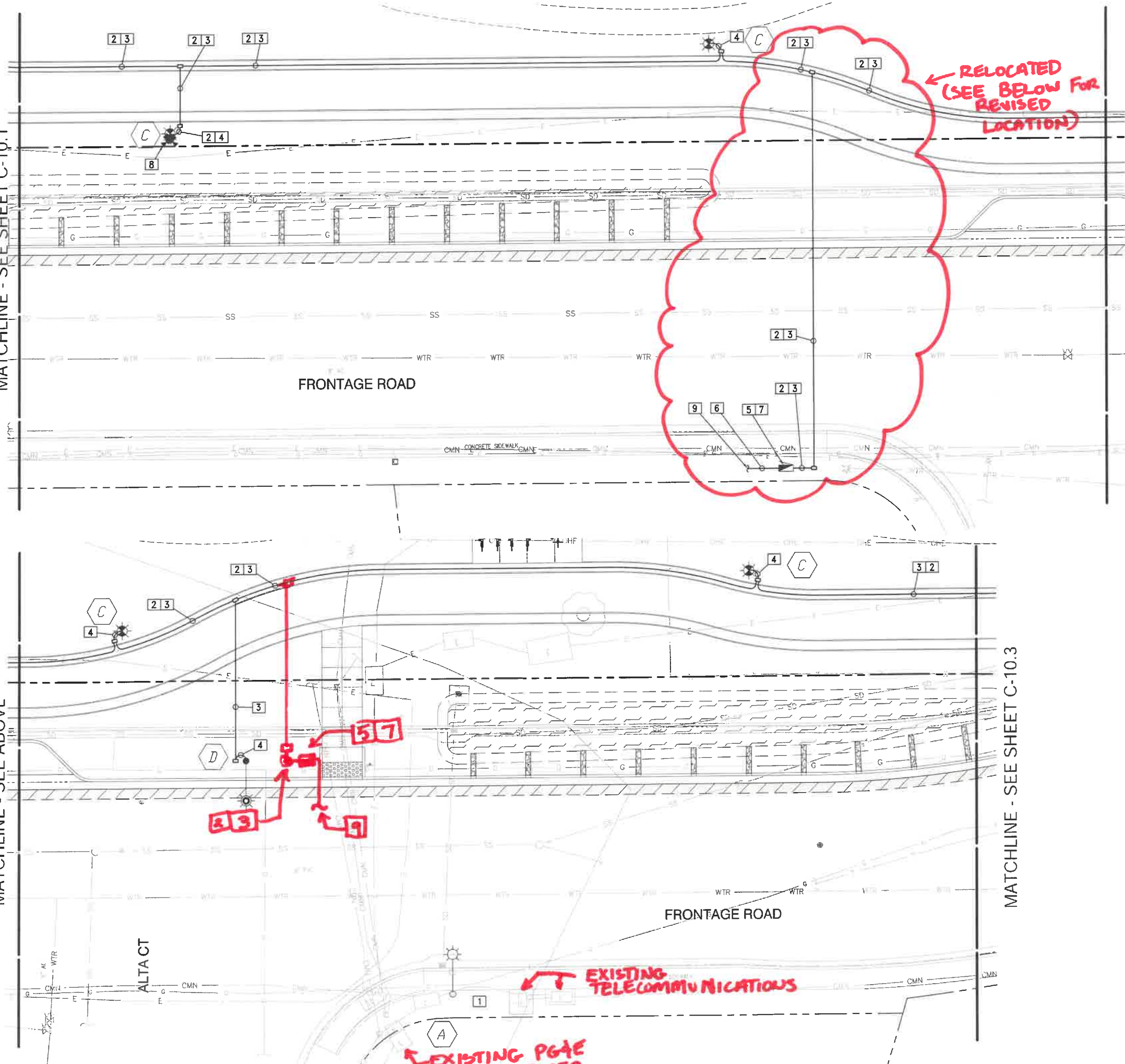
DWG. NO.
C-11.3

MATCHLINE - SEE SHEET C-10.1

MATCHLINE - SEE BELOW

MATCHLINE - SEE ABOVE

MATCHLINE - SEE SHEET C-10.3



LEGEND

- STREET LIGHT CONDUIT
- PROPOSED ELECTRICAL PULL BOX
- CCTV CAMERA
- TYPE III-AF SERVICE CABINET

PROPOSED LIGHTING FIXTURE SCHEDULE

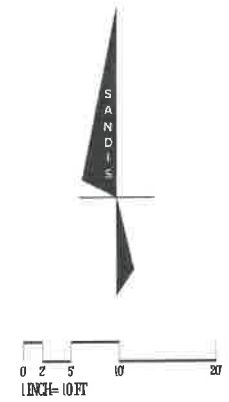
TYPE	SYMBOL	DESCRIPTION	POLE HEIGHT	LAMP	WATTAGE	VOLTAGE	QUANTITY
A		EXISTING CREE RSWL SERIES ON EXISTING POLE	32'	LED	29W	120-277	1
C		PROPOSED CREE RSWL SERIES TYPE 3 ON PROPOSED POLE	20'	LED	67W	120-277	4
D		PROPOSED CREE RSWL SERIES TYPE 3 ON PROPOSED POLE	32'	LED	47W	120-277	1

LIGHTING NOTES

- 1 EXISTING LUMINAIRE AND POLE TO REMAIN.
- 2 INSTALL TWO(2) 3/4" CONDUITS FOR CCTV CAMERA COMMUNICATION LINES AND 120 VAC POWER. ONE(1) POWER CIRCUIT IN THE SERVICE ENCLOSURE SHALL BE DEDICATED TO CAMERA AND COMMUNICATIONS.
- 3 INSTALL 2" CONDUIT WITH 2-#8 AWG CONDUCTOR (SL) AND 1-#8 BARE GROUND WIRE.
- 4 INSTALL 1 1/2" CONDUIT WITH 2-#8 AWG CONDUCTOR (SL) AND 1-#4 BARE COPPER GROUND WIRE.
- 5 INSTALL TYPE III-AF SERVICE EQUIPMENT ENCLOSURE PER CALTRANS SHEET ES-20 WITH LIGHTING CIRCUIT, IRRIGATION CIRCUIT, AND CCTV AND COMMUNICATIONS CIRCUIT. SEE WIRING DIAGRAM ON SHEET E-4 FOR REFERENCE.
- 6 INSTALL 3" CONDUIT FOR PG&E SECONDARY LINE. CONNECT SECONDARY LINE TO PG&E POINT OF CONNECTION PER PG&E INSTRUCTION.
- 7 CITY TO INSTALL WIRELESS RADIO LINK TO CONNECT CCTV CAMERAS BACK TO CITY HALL.
- 8 CITY TO INSTALL 2.4MM CCTV CAMERAS ON LIGHT POLE.
- 9 COORDINATE WITH PG&E FOR POC AND SERVICE LOCATION BASED ON THE CITY PROVIDED PG&E APPLICATION.

ELECTRICAL LIGHTING NOTES

1. ALL WORK SHALL BE DONE IN CONFORMANCE WITH THE LATEST EDITION OF THE CITY OF PITTSBURGH STANDARD DETAILS.
2. CONTRACTOR TO CONFIRM EXISTING STREET LIGHT CIRCUITS PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL LOCATE AND PROTECT EXISTING UTILITIES FROM DAMAGE UNLESS SPECIFIED OTHERWISE.
4. ALL PULLBOXES SHALL BE SIZE #5 UNLESS SPECIFIED OTHERWISE.



PREPARED UNDER THE DIRECTION OF:

 CHAD J. BROWNING
 R.C.E. NO. C66315
 Exp. 8/30/25

ACCEPTED FOR USE:
 JOHN SAMUELSON
 City Engineer
 Date: _____



FRONTAGE ROAD
 LIVING GREEN TRAIL DESIGN
 LIGHTING PLAN
 CONTRACT NAME: _____
 CONTRACT NUMBER: _____

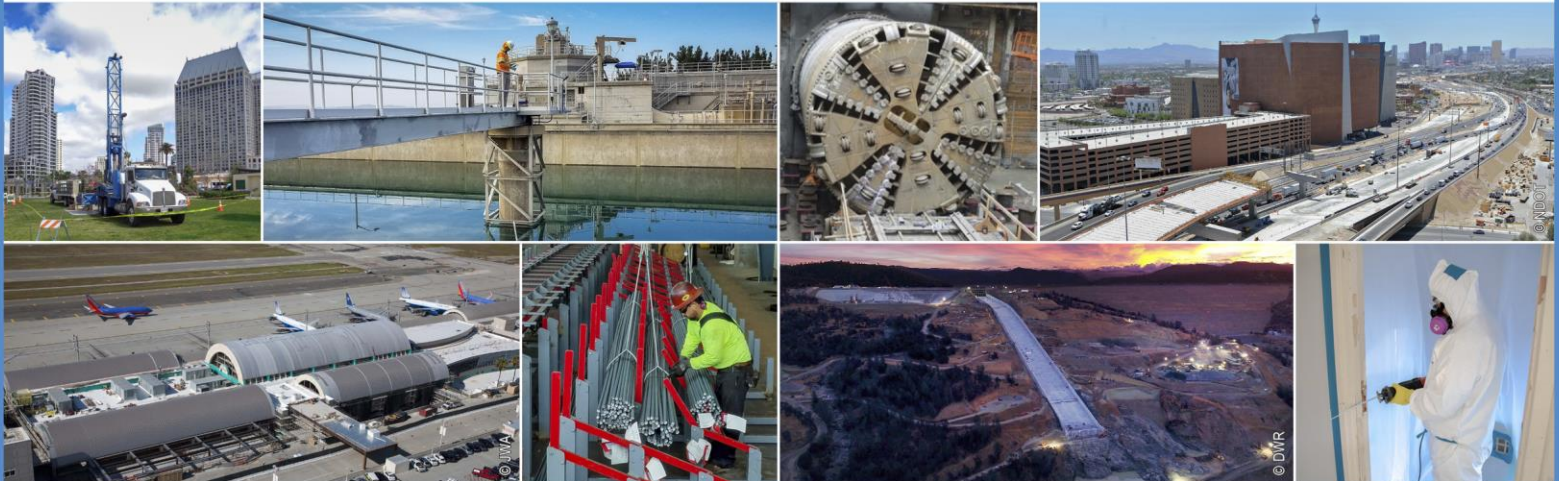
DATE	REV	DESCRIPTION	BY	DRAWN: CW	CHECKED: SC	REVIEWED: CB	DATE: 09/05/23	SCALE: AS NOTED

Geotechnical Evaluation
City of Pittsburg
Frontage Road Living Green Trail
Pittsburg, California
Pittsburg RFQ 2022-23

Sandis

39550 Liberty Street | Fremont, California 94538

December 20, 2022 | Project No. 404408001



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Geotechnical Evaluation City of Pittsburg Frontage Road Living Green Trail Pittsburg, California

Mr. Steve Yasutake
Sandis
39550 Liberty Street | Fremont, California

December 20, 2022 | Project No. 404408001



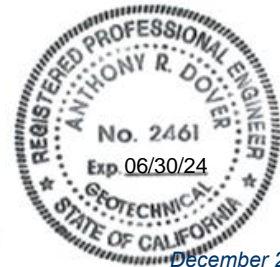
Chad Stellern, PG
Senior Staff Geologist



December 20, 2022



Anthony Dover, PE, GE
Principal Engineer



December 20, 2022

CDS/ARD/rk

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APPENDICES

A	Boring Logs
B	Laboratory Test Results
C	Percolation Testing

1 INTRODUCTION

In accordance with your authorization, we have conducted a geotechnical evaluation for the Frontage Road Living Green Trail project located adjacent to the Frontage Road between Dover Way to Chelsea Way in Pittsburg, California. We understand that the proposed improvements will include approximately 1,400 linear feet of a Class I Trail along the Frontage Road, bioretention facilities, landscaping, underground utility connections, storm drainage, irrigation, lighting and other park features and amenities. Caltrans (2020) describes a Class I Trail as a bike path that serves as a corridor that is not offered by the general road system and to close gaps to bicycle travel caused by highways or other barriers. The purpose of our services was to evaluate the subsurface conditions for the project and provide recommendations for the design and construction of the proposed improvements.

2 SCOPE OF SERVICES

Our scope of services included the following:

- Reviewed readily available geologic and seismic literature pertinent to the project area, including geologic maps and reports, regional fault maps, aerial photographs, and seismic hazard maps.
- Conducted an engineering reconnaissance to observe the general site conditions and to mark the proposed locations for subsurface exploration.
- Conducted a subsurface exploration consisting of drilling, logging, and sampling five (5) auger borings using hand augers. The borings were advanced to depths of up to 10 feet below the existing grade to evaluate the subsurface conditions. A representative of Ninyo & Moore logged the subsurface conditions exposed in the borings and collect bulk and relatively undisturbed samples for laboratory testing. The borings were backfilled with grout and soil cuttings upon completion.
- Performed field infiltration testing at two locations at approximately 1.5 feet below the existing grade to evaluate near-surface soil permeability.
- Laboratory testing on selected soil samples to evaluate soil gradation and Atterberg limits.
- Compilation and engineering analysis of the field and laboratory data, and the findings from our background review.
- Preparation of this geotechnical evaluation report presenting our findings and conclusions, and recommendations for the design and construction of the proposed improvements.

3 SITE AND PROJECT DESCRIPTIONS

The trail is located on the northside of Frontage Road between Chelsea Way and Dover Way in Pittsburg, California (Figure 1). The site is elongate in shape and is bounded to the north by

Highway CA-4, to the south by Frontage Road and a residential development, to the west by an open space. The site is relatively flat, gently sloping to the south and the west. The ground surface elevation ranges from about 46 feet to 35 feet above mean sea level (Google, 2022). Vegetation consists of low-lying grass and some scattered shrubs/trees. The proposed improvements will include approximately 1,400 linear feet of a Class I Trail along Frontage Road, bioretention facilities, landscaping, underground utility connections, storm drainage, irrigation, lighting and other park features and amenities.

4 FIELD EXPLORATION AND LABORATORY TESTING

Our subsurface evaluation at the site was conducted on November 16, 2022, and consisted of five hand auger borings excavated to depths of up to approximately 10 feet. A representative of Ninyo & Moore logged the subsurface conditions exposed in the borings and collected bulk soil samples from the borings. The samples were transported to our geotechnical laboratory for testing. The borings were backfilled with grout and soil cuttings after excavation. The boring logs are presented in Appendix A.

Laboratory testing of soil samples recovered from the borings included tests to evaluate grain size distribution and Atterberg limits. The results of the laboratory tests are presented in Appendix B.

Two 5-inch diameter borings were drilled to a depth of two feet below the ground surface for use in percolation testing on November 16, 2022 at the location shown on Figure 2. The percolation test procedure and test results are presented below in Section 6.5, and the test data are included in Appendix C. The test holes were backfilled with soil cuttings after testing.

5 GEOLOGIC AND SUBSURFACE CONDITIONS

Our findings regarding regional geologic setting, site geology, subsurface stratigraphy, and groundwater conditions at the subject site are provided in the following sections.

5.1 Regional Geologic Setting

The site is located north of Mount Diablo, which is part of the Coast Ranges geomorphic province of California. The Coast Ranges are comprised of northwesterly trending mountain ranges and structural valleys formed by tectonic processes commonly found around the Circum-Pacific belt. Basement rocks have been sheared, faulted, metamorphosed, and uplifted, and are separated by thick blankets of Cretaceous and Cenozoic sediments that fill structural valleys and line continental margins. The San Francisco Bay Area has several ranges that trend northwest, parallel to major strike-slip faults such as the San Andreas, Hayward, and Calaveras (Figure 3).

Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement.

5.2 Site Geology

Regional geologic mapping of the area by Dibblee (2006) indicates that the site is underlain by Pleistocene-aged and Holocene alluvial sediments described as undeformed gravel, sand and clay (Figure 4). Deposits were derived from nearby mountainous regions including the Oro Loma Formation, Pliocene-aged clastic marine sedimentary rocks such as a pebble conglomerate, sandstone and claystone. The project site is approximately 7.5 miles to the north east of the Concord Fault and the western extent of the project area is mapped as susceptible to liquefaction (ABAG, 2020).

5.3 Subsurface Conditions

The following sections provide a generalized description of the materials encountered during our subsurface evaluation. More detailed descriptions are presented on the logs in Appendix A.

5.3.1 Fill

Fill was encountered from ground surface to depths of up to 3 feet below the ground surface at the time of exploration. The fill, as encountered, generally consisted of brown, moist, medium dense, silty to clayey sand with gravel.

5.3.2 Alluvium

Alluvium was encountered immediately underlying fill to the depths explored, up to 10 feet. The alluvium, as encountered, consisted of a brown, moist, stiff to medium dense, sandy silt to silty sand with variable amounts of clay

5.4 Groundwater

Groundwater was not encountered during our subsurface exploration. Fluctuations in the groundwater level across the site and over time may occur due to seasonal precipitation, variations in topography or subsurface hydrogeologic conditions, or as a result of changes to nearby irrigation practices or groundwater pumping. In addition, seeps may be encountered at elevations above groundwater levels due to perched groundwater conditions, leaking pipes, preferential drainage, or other factors not evident at the time of our exploration.

6 GEOLOGIC HAZARDS AND CONSIDERATIONS

This study considered a number of issues relevant to the proposed construction, including seismic hazards, unsuitable materials, settlement of compressible soil layers from static loading, expansive soils, and infiltration characteristics. These issues are discussed in the following subsections.

6.1 Seismic Hazards

The seismic hazards considered in this study include the potential for ground rupture due to faulting, seismic ground shaking, liquefaction and, dynamic settlement. These potential hazards are discussed in the following subsections.

6.1.1 Historical Seismicity

The site is located in a seismically active region. Figure 3 presents the location of the site relative to the epicenters of historic earthquakes with magnitudes of 5.5 or more from 1800 to 2000. Table 1 summarizes the significant historic earthquakes with a magnitude of 6 or more that have occurred within 100 kilometers (km) of the site since 1900. Records of historic ground effects related to seismic activity (e.g. liquefaction, sand boils, lateral spreading, ground cracking) compiled by Knudsen et al. (2000), indicate that no ground effects related to historic seismic activity have been reported for the site.

Table 1 – Significant Historic Earthquakes

Date	Place	Location	Magnitude	Depth
1989-10-18	Loma Prieta	37.036°N 121.880°W	6.9	17.2 km
1984-04-24	Northern California	37.310°N 121.679°W	6.2	8.2 km
1926-10-22	Offshore Central California	36.725°N 122.180°W	6.3	10.0 km
1911-07-01	San Francisco Bay Area	37.250°N 121.750°W	6.6	-
1906-04-18	The 1906 San Francisco Earthquake	37.750°N 122.550°W	7.9	11.7

Reference: <https://earthquake.usgs.gov/earthquakes/search>

6.1.2 Faulting and Ground Surface Rupture

The site is not located within an Alquist-Priolo Earthquake Fault Zone established by the State Geologist (CGS, 2018) to delineate regions of potential ground surface rupture adjacent to active faults. As defined by the California Geological Survey (CGS), active faults are faults that have caused surface displacement within Holocene time, or within approximately the last 11,700 years (CGS, 2018). The closest fault rupture hazard zone is the one associated with the Concord, which is approximately 8.2 mile east from the study area.

Based on our review of the referenced geologic maps, known active faults are not mapped on the site and the site is not located within a fault-rupture hazard zone. Therefore, the probability of damage from surface fault rupture is considered to be low.

6.1.3 Strong Ground Motion

Table 2 presents the Risk-Targeted, Maximum Considered Earthquake (MCER) spectral response accelerations consistent with the 2019 California Building Code and corresponding site-adjusted and design level spectral response accelerations based on the USGS seismic design maps (SEAOC/OSHPD, 2022). The values provided in the table may be used for structures with a fundamental period of one half second or less presuming that the seismic response coefficient is calculated from equation 12.8-2 of ASCE Standard 7-16 in accordance with Exception 2 in Section 11.4.8 of ASCE Standard 7-16.

Table 2 – California Building Code Seismic Design Criteria	
Seismic Design Parameter Evaluated for 37.219198° North latitude, 121.936113° West longitude	Value
Site Class	D – Stiff Soil
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.7
Mapped Spectral Acceleration at 0.2-second Period, S_s	1.855
Mapped Spectral Acceleration at 1.0-second Period, S_1	0.632
Spectral Acceleration at 0.2-second Period Adjusted for Site Class, S_{MS}	1.855
Spectral Acceleration at 1.0-second Period Adjusted for Site Class, S_{M1}	1.074
Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	1.237
Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.716
Seismic Design Category for Risk Category I, II, or III	E

6.1.4 Liquefaction and Strain Softening

The strong vibratory motions generated by earthquakes can trigger a rapid loss of shear strength in saturated, loose, granular, or fine-grained soils of low plasticity (liquefaction) or in wet, sensitive, cohesive soils (strain softening). Liquefaction is generally not a concern at depths of more than 50 feet below ground surface. Liquefaction can result in a loss of foundation bearing capacity or lateral spreading of sloping or unconfined ground. Liquefaction can also generate sand boils leading to settlement at the ground surface.

The site has been designated as a Liquefaction Hazard Zone (CGS, 2003). The liquefaction potential is generally low, immediately to the west of the site is a small area identified as very high susceptibility (ABAG, 2020; Figure 5). Based on the site conditions and anticipated site

use and construction, liquefaction, strain softening, and associated hazards are not design considerations for this project.

6.2 Unsuitable Materials

Fill materials that were not placed and compacted under the observation of a geotechnical engineer, or fill materials lacking documentation of such observation, are considered to be undocumented fill and unsuitable as a bearing material below foundations due to the potential for differential settlement resulting from variable support characteristics or the potential inclusion of deleterious materials. Based on the findings from the limited soil investigation, the site is mantled with approximately 1 to 3 feet of undocumented fill.

Soil containing roots or other organic matter are not suitable as fill or subgrade material below structures. Surficial soil containing roots or other organic matter should be removed as part of the clearing and grubbing operations.

6.3 Static Settlement

The proposed improvements are anticipated to be relatively light and we anticipate that the grading operations will not increase site grades by more than about 2 feet. We estimate that the static settlement of the proposed construction will be approximately ½ inch or less presuming that the foundations and earthwork conform with the recommendations in this report.

6.4 Expansive Soils

Some clay minerals undergo volume changes upon wetting or drying. Unsaturated soils containing those minerals will shrink/swell with the removal/addition of water. The heaving pressures associated with this expansion can damage structures and flatwork. Laboratory testing was performed on a select sample of the near-surface soil to evaluate expansion potential. The Atterberg limits data from our laboratory tests show that the plasticity index for the near surface soil to be 20 (Appendix B). Based on studies by Holtz and Gibbs (1956) and Chen (1988), the expansion potential of the soil in this location can be classified as medium.

To reduce the potential for differential movement and distress to the proposed improvements due to shrink/swell behavior, pavements and flatworks should be designed for expansive soils. We anticipate that suitable subgrade preparation can be used to mitigate the expansive soil conditions.

6.5 Infiltration Characteristics

Ninyo & Moore performed percolation testing in the central portion of the site to evaluate the rate of infiltration on site for design of storm water management systems. The percolation test parameters that were used are presented in Appendix C. The test results, presented in Appendix C and summarized in Table 3, indicate that infiltration rate of the near surface soil is very slow.

Test	Test Depth (ft)	Subsurface Conditions	Percolation Rate (inch/hour)	Infiltration Rate ¹ (inch/hour)
P-1 (B-1)	1.5	Sandy Clay	2.0	0.67
P-2 (B-5)	1.5	Clayey Sand	0.5	0.17

¹Infiltration rate is percolation rate adjusted by a reduction factor to exclude percolation through sides of test holes.

7 CONCLUSIONS

Our geotechnical evaluation included a review of project documents provided by you and readily available background materials, engineering site reconnaissance, excavation of borings, and compilation and engineering analysis of the field and laboratory data. Our main conclusions are as follows:

- The subsurface exploration for this study encountered fill and alluvium to explored depth. The fill, as encountered, generally consisted loose to medium dense, silty to clayey sand. The alluvium, as encountered, generally consisted of moist and medium dense/stiff, clayey sand to sandy lean clay to sandy silt and silt with sand.
- Groundwater was not encountered in any of our borings to the maximum depth explored of 10 feet. Fluctuations in the groundwater level across the site and over time may occur due to seasonal precipitation, variations in topography or subsurface hydrogeologic conditions, or as a result of changes to nearby irrigation practices or groundwater pumping.
- The site could experience a relatively large degree of ground shaking during a significant earthquake event on a nearby fault.
- Atterberg limit testing indicates that the near-surface soil on site has a medium expansion characteristic. Recommendations are provided for remedial grading, foundation embedment depths, and subgrade preparation to reduce the potential for expansive soil movement below proposed improvements.
- Our percolation testing at a depth of 1.5 feet below the existing grade indicates that the infiltration rate of the near-surface soils is very slow. Percolation Tests, P-1 and P-2, were performed in B-1 and B-5, respectively.
- Liquefaction and liquefaction-related seismic hazards (e.g., dynamic settlement, ground subsidence, lateral spreading, or loss of side friction or lateral capacity of piers) are not design

considerations for the project based on the materials encountered, depth to groundwater, and expected light construction.

8 RECOMMENDATIONS

The following sections present our geotechnical recommendations for the design and construction of the proposed improvements. The project improvements should be designed and constructed in accordance with these recommendations, applicable codes, and appropriate construction practices.

8.1 Earthwork

The earthwork should be conducted in accordance with the relevant grading ordinances having jurisdiction and the following recommendations. The Geotechnical Engineer should observe earthwork operations. Evaluations performed by the Geotechnical Engineer during the course of field operations may result in new recommendations, which could supersede the recommendations in this section.

8.1.1 Pre-Construction Conference

We recommend that a pre-construction conference be held. The owner and/or their representative, the governing agencies' representatives, the civil engineer, Ninyo & Moore, and the contractor should be in attendance to discuss the work plan and project schedule and earthwork requirements.

8.1.2 Site Preparation

Site preparation should begin with the removal of vegetation, utility lines, debris and other deleterious materials from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside of proposed excavation and fill areas a minimum of 2 feet. Rubble and excavated materials that do not meet criteria for use as fill should be disposed of in an appropriate landfill. Existing utilities to be abandoned should be removed, crushed in place, or backfilled with grout.

Excavations resulting from removal of buried utilities, tree stumps, or obstructions should be backfilled with compacted fill in accordance with the recommendations in the following sections.

8.1.3 Subgrade Observations

Prior to placement of fill, or the placement of forms or reinforcement for foundations, the client should request an evaluation of the exposed subgrade by Ninyo & Moore. Materials that are considered unsuitable should be excavated under the observation of Ninyo & Moore in accordance with the recommendations in this section or supplemental recommendations by the geotechnical engineer.

Unsuitable materials include, but may not be limited to dry, loose, soft, wet, expansive, organic, or compressible natural soil, and undocumented or otherwise deleterious fill materials. Unsuitable materials should be removed from trench bottoms and below bearing surfaces to a depth at which suitable foundation subgrade, as evaluated in the field by Ninyo & Moore, is exposed. Based on the site history and materials encountered in our subsurface exploration, undocumented fill should be anticipated to a depth of up to about 1 to 3 feet. Undocumented fill, where encountered, should be removed from below paving and flatworks. Excavations should be backfilled with compacted select fill or controlled low strength material (CLSM) as per our Material Recommendations section. Alternatively, the foundation may be extended to bear on suitable alluvium. Undocumented fill that can be processed to meet the general criteria in our Material Recommendations section can be re-used as general fill.

8.1.4 Remedial Grading for Expansive Soils

Laboratory testing indicated that the near-surface soil on site has a medium expansion characteristic. To reduce the potential for differential movement and distress to the proposed improvements due to shrink/swell behavior, a zone of material with low expansion potential should be created by removing the existing soil, as-needed, and placing fill with low expansion characteristics below slabs-on-grade, flatwork, and pavement. The zone of low expansion fill should consist of select, low-expansion import fill conforming with the Material Recommendations section.

The lateral limits of over-excavations should extend a distance of 2 feet or more beyond the limits of the flatwork or pavement. The zone of low expansion material should extend to a minimum depth of 12 inches below exterior flatwork or pavement. The aggregate base or capillary break gravel under building slabs or exterior flatwork or pavement may be considered as part of the zone of low expansion material. The zone of exclusion/removal or lime treatment should be detailed on the construction plans to reduce the potential that these recommendations are overlooked during construction bidding.

8.1.5 Material Recommendations

Materials used during earthwork operations should comply with the requirements listed in Table 4. Materials should be evaluated by the Geotechnical Engineer for suitability prior to use. The contractor should notify the geotechnical consultant 72 hours prior to import of materials or use of on-site materials to permit time for sampling, testing, and evaluation of the proposed materials. On-site materials may need to be dried out before re-use as fill. The contractor should be responsible for the consistency of import material brought to the site.

Table 4 – Recommended Material Requirements		
Material and Use	Source	Requirements ^{1,2}
Select (Low Expansion) Fill: - below building slabs, pavement, or flatwork	Import	Close-graded with 35 percent or more passing No. 4 sieve and either: Expansion Index of 50 or less, Plasticity Index of 12 or less, or less than 10 percent, by dry weight, passing No. 200 sieve
General Fill: - for uses not otherwise specified	Import	As per Select (Low Expansion) Fill
	On-site borrow	No additional requirements ¹
Controlled Low Strength Material (CLSM)	Import	CSS ⁴ Section 19-3.02G
Permeable Aggregate - capillary break gravel	Import	Open-graded, clean, compactable crushed rock or angular gravel; nominal size ¾ inch or less
Aggregate Base	Import	Class II; CSS ⁴ Section 26-1.02
Asphalt Concrete	Import	Type A; CSS ⁴ Section 39-2
Pipe/Conduit Bedding and Pipe Zone Material -material below pipe invert to 12 inches above pipe	Import	90 to 100 percent (by mass) should pass No. 4 sieve, and 5 percent or less should pass No. 200 sieve
Trench Backfill - above bedding material	Import or on-site borrow	As per general fill and excluding rock/lumps retained on 4-inch sieve or 2-inch sieve in top 12 inches
Notes:		
¹ In general, fill should not consist of pea-gravel and should be free of rocks or lumps in excess of 6-inches diameter, trash, debris, roots, vegetation or other deleterious material.		
² In general, import fill should be tested or documented to be non-corrosive ³ and free from hazardous materials in concentrations above levels of concern.		
³ Non-corrosive as defined by the Corrosion Guidelines (Caltrans, 2018b).		
⁴ CSS is California Standard Specifications (Caltrans, 2018a).		

8.1.6 Subgrade Preparation

Subgrade in trenches and below slabs, flatwork, or fill, should be prepared as per the recommendations in Table 5. Prepared subgrade should be maintained in a moist (but not saturated) condition by the periodic sprinkling of water prior to placement of additional overlying fill or construction of flatworks.

Subgrade Location	Preparation Recommendations
Below Foundations (if needed)	<ul style="list-style-type: none"> • Check for unsuitable materials and remove as-needed per Sections 8.1.2 and 8.1.3. Replace overexcavated soil with CLSM or extend footing as-needed. • Scarify and moisture condition exposed subgrade as-needed to achieve a moisture content 2 points or more above the optimum as evaluated by ASTM D1557. Compact moisture-conditioned subgrade per Section 8.1.7. • Keep in moist condition by sprinkling water.
Below Flatwork	<ul style="list-style-type: none"> • After clearing and grubbing per Section 8.1.2, check for unsuitable materials as per Section 8.1.3. • Perform remedial grading as per Section 8.1.4. Scarify 8 inches then moisture condition and compact as per Section 8.1.7 if in-place lime treatment is not performed. • Keep in moist condition by sprinkling water.
Below Fill	<ul style="list-style-type: none"> • After clearing and grubbing per Section 8.1.2 check for unsuitable materials as per Section 8.1.3. • Scarify 8 inches then moisture condition and compact as per Section 8.1.7. • Keep in moist condition by sprinkling water.
Below Pavement	<ul style="list-style-type: none"> • After clearing and grubbing per Section 8.1.2, check for unsuitable materials as per Section 8.1.3. • Perform remedial grading as per Section 8.1.4. Scarify 8 inches then moisture condition and compact as per Section 8.1.7 if in-place lime treatment is not performed. • Proof roll compacted subgrade with loaded water truck under the observation of the geotechnical engineer. Mitigate yielding areas in accordance with the recommendations of the engineer. • Keep in moist condition by sprinkling water.
Utility Trenches	<ul style="list-style-type: none"> • After clearing per Section 8.1.2, check for unsuitable materials as per Section 8.1.3. • Remove or compact loose/soft material.

Subgrade that has been permitted to dry out and loosen or develop desiccation cracking, should be scarified, moisture-conditioned, and recompacted as per the requirements above. A thin layer (approximately 3 inches) of lean concrete or controlled low strength material (CLSM) may be poured over prepared subgrade for flatworks to maintain the appropriate moisture condition during erections of forms and placement of reinforcing steel.

8.1.7 Fill Placement and Compaction

Fill and backfill should be compacted in horizontal lifts in conformance with the recommendations presented in Table 6. The allowable uncompacted thickness of each lift of fill depends on the type of compaction equipment utilized, but generally should not exceed 8 inches in loose thickness.

Table 6– Fill Placement and Compaction Recommendations

Fill Type	Location	Compacted Density ¹	Moisture Content ²
Subgrade	Below pavement and foundation (within 2 feet of finished grade)	95 percent	+ 2 percent or above
	In locations not already specified	90 percent	+ 2 percent or above
Trench Backfill	Below pavement and foundation (within 2 feet of finished grade)	95 percent	+ 2 percent or above
	In locations not already specified	90 percent	+ 2 percent or above
Select or General Fill (not lime-treated)	Below pavement and foundation (within 2 feet of finished grade)	95 percent	+ 2 percent or above
	In locations not already specified	90 percent	+ 2 percent or above
Lime-or cement-treated subgrade or fill	In locations not already specified	95 percent	+ 2 percent or above
Aggregate Base	Pavement section or below hardscape	95 percent	Near Optimum
Asphalt Concrete	Pavement section	91 to 97 percent	Not Applicable

Notes:

¹ Expressed as percent relative compaction or ratio of field density to reference density (typically on a dry density basis for soil and aggregate and on a wet density basis for asphalt concrete and lime treated subgrade). The reference density of soil, lime-treated subgrade, and aggregate should be evaluated by ASTM D 1557. The reference density of asphalt concrete should be evaluated by ASTM D 2041.

² Target moisture content at compaction relative to the optimum as evaluated by ASTM D 1557.

Compacted fill should be maintained in a moist (but not saturated) condition by the periodic sprinkling of water prior to placement of additional overlying fill, flatworks or paving. Fill that has been permitted to dry out and loosen or develop desiccation cracking, should be scarified, moisture conditioned, and recompactd as per the requirements above.

8.1.8 Excavation Stabilization

Excavations, including vault and utility excavations, should be stabilized by shoring sidewalls or laying slopes back in accordance with the Excavation Rules and Regulations (29 Code of Federal Regulations [CFR], Part 1926) stipulated by the Occupational Safety and Health Administration (OSHA). Table 7 lists the OSHA material type classifications and corresponding allowable temporary slope layback inclinations for soil deposits that may be encountered on site. Alternatively, a shoring system conforming to the OSHA Excavation Rules and Regulations (29 CFR Part 1926) may be used to stabilize excavation sidewalls during construction. The lateral earth pressures listed in Table 8 may be used to design or select an internally-braced shoring system or trench shield conforming to the OSHA guidelines. Our recommendations for lateral earth pressures and allowable slope gradients are based upon the limited subsurface data provided by our exploratory borings and reflect the influence of the environmental conditions that existed at the time of our exploration. Excavation stability, material classifications, allowable slopes, and shoring pressures should be re-evaluated and revised, as-needed, during construction. Excavations, shoring systems and the surrounding areas should be evaluated daily by a competent person for indications of possible instability or collapse. Dewatering pits or sumps should be used to depress the groundwater level (if encountered) below the bottom of the excavation.

Table 7 – OSHA Material Classifications and Allowable Slopes

Formation	OSHA Classification	Allowable Temporary Slope ^{1,2,3}	Lateral Earth Pressure on Shoring ⁴ (psf)
Cohesive Soil (above groundwater)	Type B	1h:1v (45°)	45xD + 72
Granular Soil (above groundwater)	Type C	1½ h:1v (34°)	80xD + 72

Notes:

- ¹ Allowable slope for excavations less than 20 feet deep. Excavation sidewalls in cohesive soil may be benched to meet the allowable slope criteria (measured from the bottom edge of the excavation). The allowable bench height is 4 feet. The bench at the bottom of the excavation may protrude above the allowable slope criteria.
- ² In layered soil, layers shall not be sloped steeper than the layer below.
- ³ Temporary excavations less than 5 feet deep may be made with vertical side slopes and remain unshored if judged to be stable by a competent person (29 CFR, Part 1926.650).
- ⁴ 'D' is depth of excavation for excavations up to 20 feet deep. Includes a surface surcharge equivalent to two feet of soil.

The shoring system should be designed or selected by a suitably qualified individual or specialty subcontractor. The shoring parameters presented in this report are preliminary design criteria, and the designer should evaluate the adequacy of these parameters and make appropriate modifications for their design. We recommend that the contractor take appropriate measures to protect workers. OSHA requirements pertaining to worker safety should be observed.

The excavation bottoms may become unstable and subject to pumping under heavy equipment loads if the excavation subgrade is exposed to water. The contractor should be prepared to stabilize the bottom of the excavations. In general, unstable bottom conditions may be mitigated by scarifying the subgrade and aerating the soil to achieve a moisture content near the optimum, dewatering to depress groundwater levels below the bottom of the excavation, overexcavating to a suitable depth and replacing the wet material with suitable fill, compacting a layer of crushed rock fill into the subgrade, or using geogrid to stabilize additional fill. Specific recommendations for excavation stabilization will be influenced by the nature of the excavation and the conditions encountered during construction.

8.1.9 Rainy Weather Considerations

We recommend that the construction be performed during the period between approximately April 15 and October 15 to avoid the rainy season. In the event that grading is performed during the rainy season, the plans for the project should be supplemented to include a stormwater management plan prepared in accordance with the requirements of the relevant agency having jurisdiction. The plan should include details of measures to protect the subject property and adjoining off-site properties from damage by erosion, flooding or the deposition of mud, debris, or construction-related pollutants, which may originate from the site or result from the grading operation. The protective measures should be installed by the commencement of grading, or prior to the start of the rainy season. The protective measures should be maintained in good working order unless the project drainage system is installed by that date and approval has been granted by the building official to remove the temporary devices.

In addition, construction activities performed during rainy weather may impact the stability of excavation subgrade and exposed ground. Temporary swales should be constructed to divert surface runoff away from excavations and slopes. Steep temporary slopes should be covered with plastic sheeting during significant rains. The geotechnical consultant should be consulted for recommendations to stabilize the site as-needed. A thin layer (approximately 3

inches) of lean concrete or CLSM may be poured over prepared subgrade for flatworks to maintain the appropriate moisture condition during erections of forms and placement of reinforcing steel.

8.2 Pavements and Flatwork

Pavements should be sloped so that runoff is diverted to an appropriate collector (concrete gutter, swale, or area drain) to reduce the potential for ponding of water on or beneath the pavement. Concentration of runoff over asphalt pavement should be discouraged. Trail should be sloped sufficiently to facilitate surface water runoff to beyond the trail edges. From the trail paved edge outward to the surrounding ground we recommend 3 % or more slope. We also recommend that no irrigation be allowed within 20 ft of the new trail.

The Frontage Road Trail is expected to serve as a pedestrian and bicycle path and not to serve vehicles. Given the light loads of the trail, we recommend a minimum of 6 inches of aggregate base and 2 inches of asphalt concrete. Aggregate base for pavement should be placed in lifts of no more than 8 inches in loose thickness and compacted per Section 8.1.7. Asphalt concrete should be placed and compacted per Section 8.1.7. Per Section 8.14, low expansion material should extend to a minimum depth of 12 inches below exterior flatwork or pavement.

Concrete walkways and other exterior flatwork not subject to vehicular loading should be 4 inches thick (or more) over 6 inches of aggregate base. Appropriate jointing of concrete flatwork can encourage cracks to form at joints, reducing the potential for crack development between joints. Joints should be laid out in a square pattern at consistent intervals. Contraction and construction should be detailed and constructed in accordance with the guidelines of ACI Committee 302 (ACI, 2016). The lateral spacing between contraction joints should be 8 feet or less for a 4-inch thick slab.

Distributed reinforcing steel may be utilized to reduce the potential for differential slab movement, should cracking occur between joints. The distributed reinforcing steel should be terminated about 6 inches from contraction joints and should consist of No. 3 deformed bars at 18 inches on center, both ways. Slabs reinforced with distributed steel should be 5 inches thick (or more). To reduce the potential for differential slab movement across joints, the distributed steel may be extended through the joints. This improvement will be balanced by a reduction in the functionality of the contraction joint to encourage crack formation at joints. Masonry briquettes or plastic chairs should be used to maintain the position of the reinforcement in the upper half of the slab with 1½ inches of cover over the steel.

8.3 Concrete

Due to the variability in the on-site soil and the potential future use of reclaimed water at the site, we recommend that Type II/V or Type V cement be used for concrete structures in contact with soil. In addition, we recommend a water-to-cement ratio of no more than 0.45. A 3-inch thick, or thicker, concrete cover should be maintained over reinforcing steel where concrete is in contact with soil in accordance with the recommendations of ACI Committee 318 (ACI, 2016).

To reduce the potential for shrinkage cracks in the concrete during curing, concrete for slabs and flatwork should not contain large quantities of water or accelerating admixtures containing calcium chloride. Higher compressive strengths may be achieved by using larger aggregates in lieu of increasing the cement content and corresponding water demand. Additional workability, if desired, may be obtained by including water-reducing or air-entraining admixtures. Concrete should be placed in accordance with the appropriate guidance in the ACI Manual of Concrete Practice (MCP) and project specifications. Particular attention should be given to curing techniques and curing duration. Slabs that do not receive adequate curing have a more pronounced tendency to develop random shrinkage cracks and other defects.

8.4 Surface Drainage and Site Maintenance

Surface drainage on the site should generally be provided so that water is diverted away from structures and is not permitted to pond. Positive drainage consisting of a gradient of 2 percent or more should be established for a distance of 5 feet or more adjacent to structures, retaining walls, and slopes to divert surface water to an appropriate collector (graded swale, v-ditch, or area drain) with a suitable outlet. This may be reduced to the maximum allowable of 1½ percent under ADA regulations where necessary. Slope, pad, and roof drainage should be collected and diverted to suitable discharge areas away from structures or other slopes by non-erodible devices (e.g., gutters, downspouts, concrete swales, etc.). Drainage structures should be periodically cleaned out and repaired, as-needed, to maintain appropriate site drainage patterns.

8.5 Review of Construction Plans

The recommendations provided in this report are based on preliminary design information for the proposed construction. We recommend that a copy of the plans be provided to Ninyo & Moore for review before bidding to check the interpretation of our recommendations and that the designed improvements are consistent with our assumptions. It should be noted that, upon review of these documents, some recommendations presented in this report might be revised or modified to meet the project requirements.

8.6 Construction Observation and Testing

The recommendations provided in this report are based on subsurface conditions encountered in discrete exploratory borings. During construction, the Civil engineer should be retained to evaluate the exposed subsurface conditions and to check that the work conforms with our geotechnical recommendations. Specifically, the Civil engineer should be retained to:

- Observe removal of unsuitable materials and undocumented fills.
- Check foundation excavations for suitable bearing conditions.
- Observe preparation and compaction of subgrade.
- Check and test imported materials prior to use as fill.
- Observe placement and compaction of fill.
- Perform field density tests to evaluate fill and subgrade compaction.

The recommendations provided in this report assume that Ninyo & Moore will be retained as the geotechnical consultant during the construction phase of the project. If another geotechnical consultant is selected, we request that the selected consultant provide a letter to the architect and the owner (with a copy to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the recommendations contained in this report.

9 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore

should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project area. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

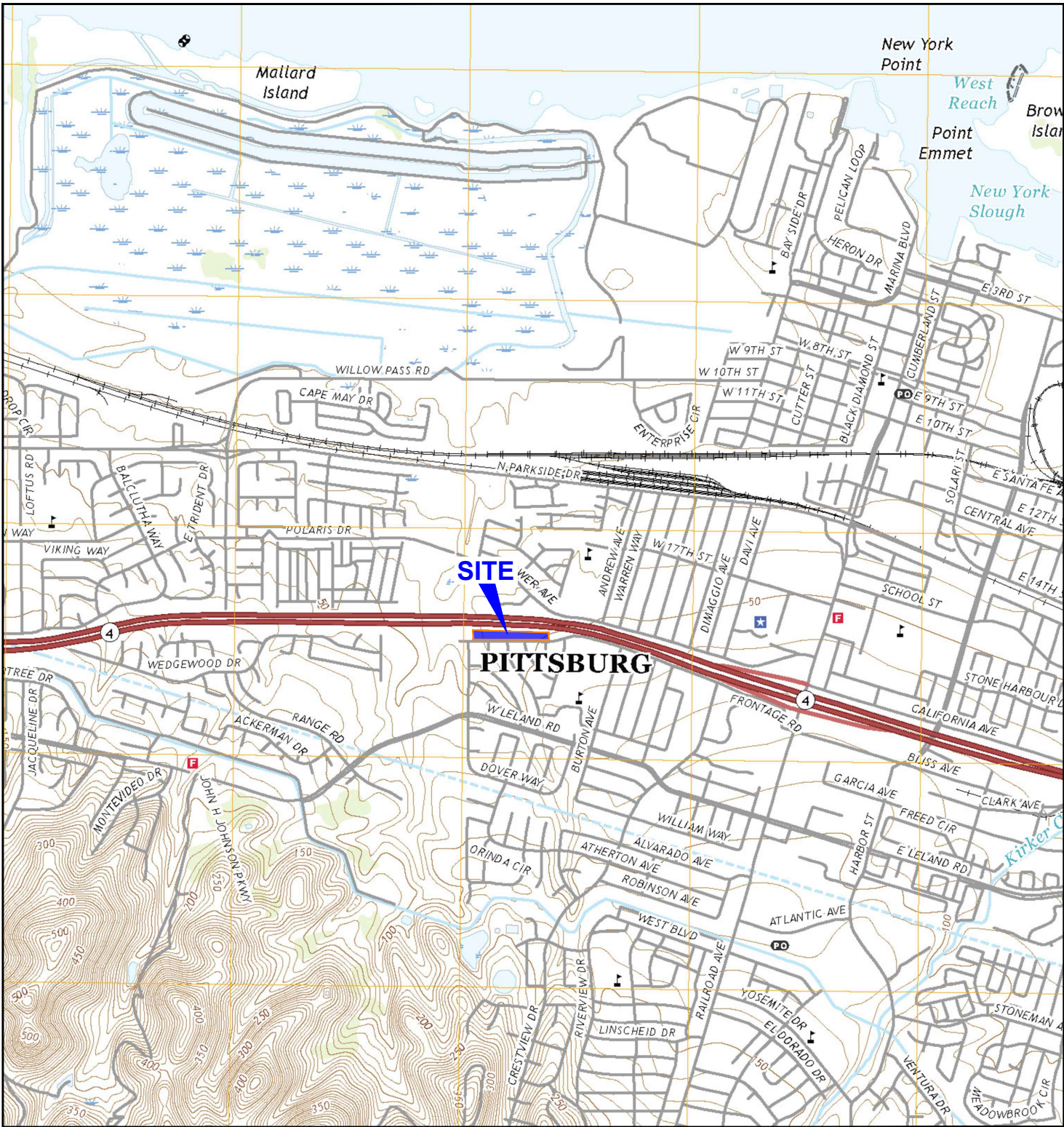
This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10 REFERENCES

- American Concrete Institute (ACI), 2016, ACI Manual of Concrete Practice.
- American Society of Civil Engineer (ASCE), 2016, Minimum Design Loads for Buildings and Other Structures, Standard 7-16.
- Association of Bay Area Governments (ABAG) 2020, Liquefaction Susceptibility Map, <https://mtc.maps.arcgis.com/home/item.html?id=b88a7506b3054189b2cbd475371b1199>
- Dibblee, T.W., 2006, Geologic Map of the Vine Hill and Honker Bay Quadrangles, Contra Costa and Solano Counties, Santa Barbara Museum of Natural History, Dibblee Geology Center Map DF-191, Scale 1:24,000.
- California Geological Survey (CGS), 2018, Special Publication 42 – Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California.
- California Department of Transportation (Caltrans), 2018a, Standard Specifications.
- California Department of Transportation (Caltrans), 2018b, Corrosion Guidelines, Version 3.0, Division of Engineering Services, Materials Engineering and Testing Services, Corrosion Branch: dated March.
- California Department of Transportation (Caltrans), 2020, Highway Design Manual, <https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm>.
- Google, 2022, Google Earth Pro 7.3.3.7786.
- Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., Helley, E.J., Nicholson, R.S., Wright, H.M., and Brown, K.H., 2000, Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California: a digital database: U.S. Geological Survey, Open-File Report OF-2000-444, Scale 1:275,000.
- Occupational Safety and Health Administration (OSHA), 1989, Occupational Safety and Health Standards – Excavations, Department of Labor, Title 29 Code of Federal Regulations (CFR) part 1926, dated October 31.
- Structural Engineers Association of California/Office of Statewide Health Planning and Development (SEAOC/OSHPD), 2020, Seismic Design Maps, <https://seismicmaps.org/>.



FIGURES



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NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: USGS, 2018

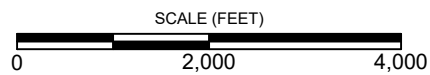
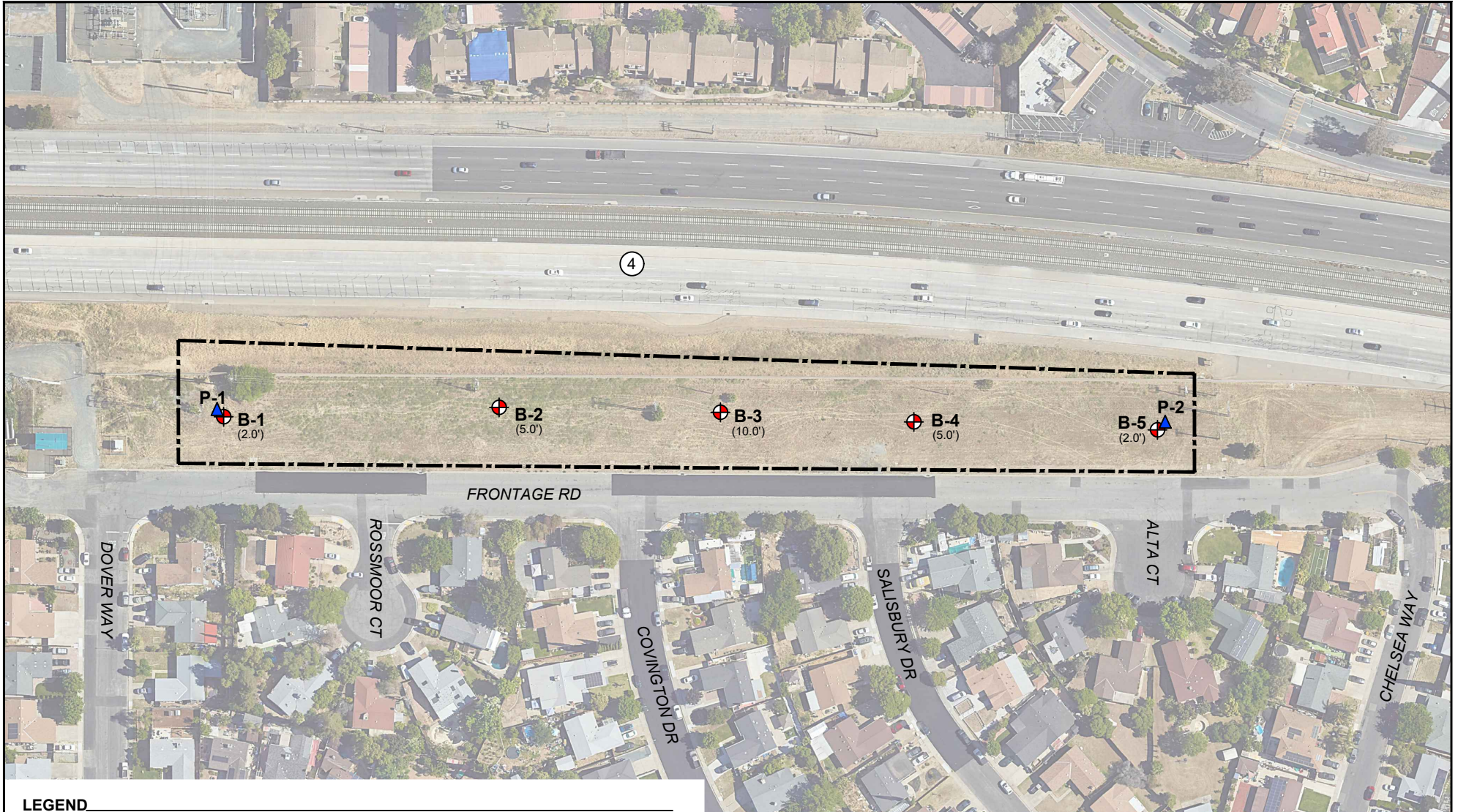


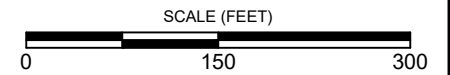
FIGURE 1



LEGEND

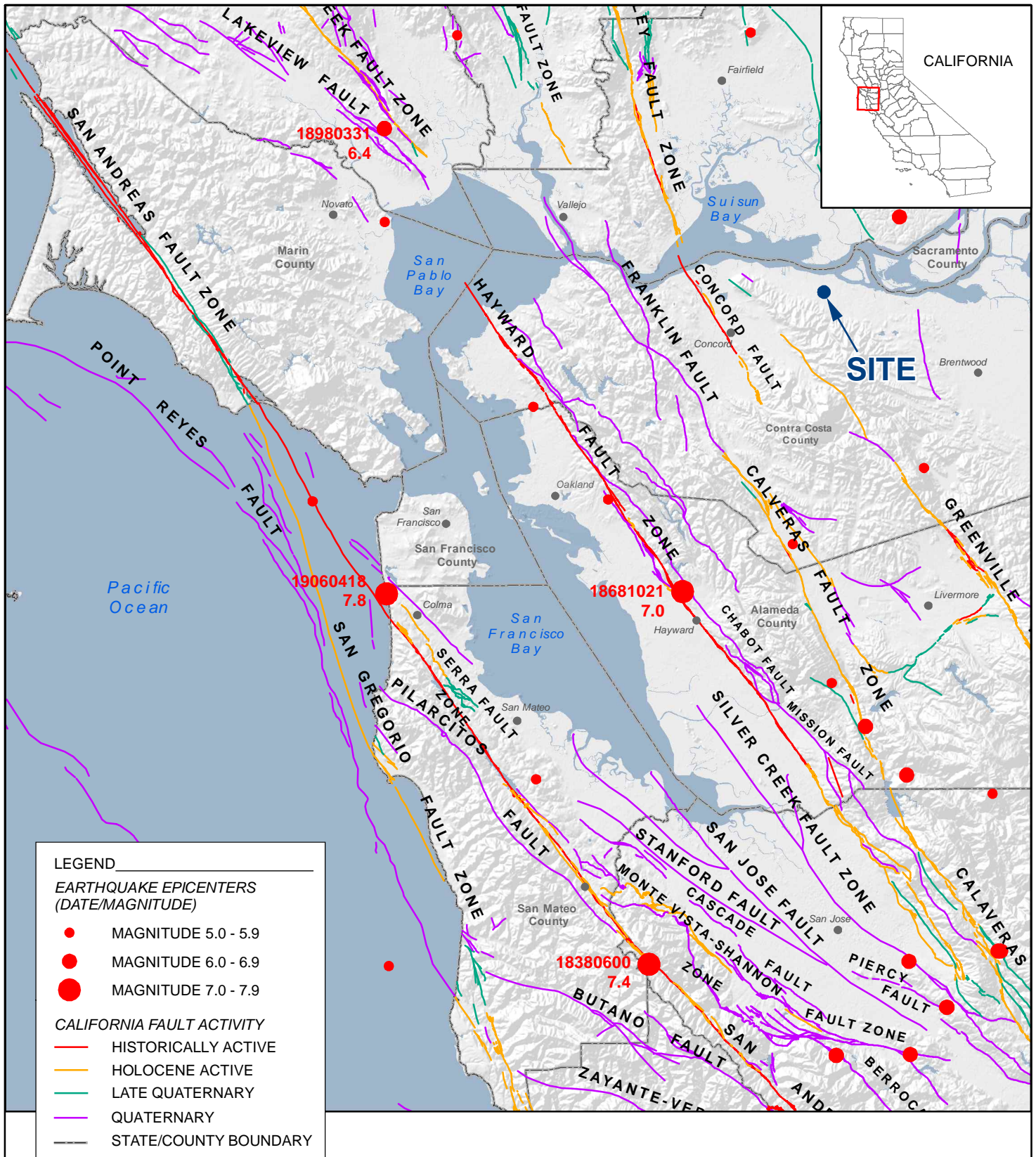
- PROJECT AREA
- B-1** BORING LOCATION (TOTAL DEPTH, IN FEET)
- P-1** PERCOLATION TEST

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: GOOGLE EARTH, 2022



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FIGURE 2



404408001_FL.pdf 12/09/2022 AEK

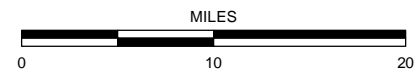
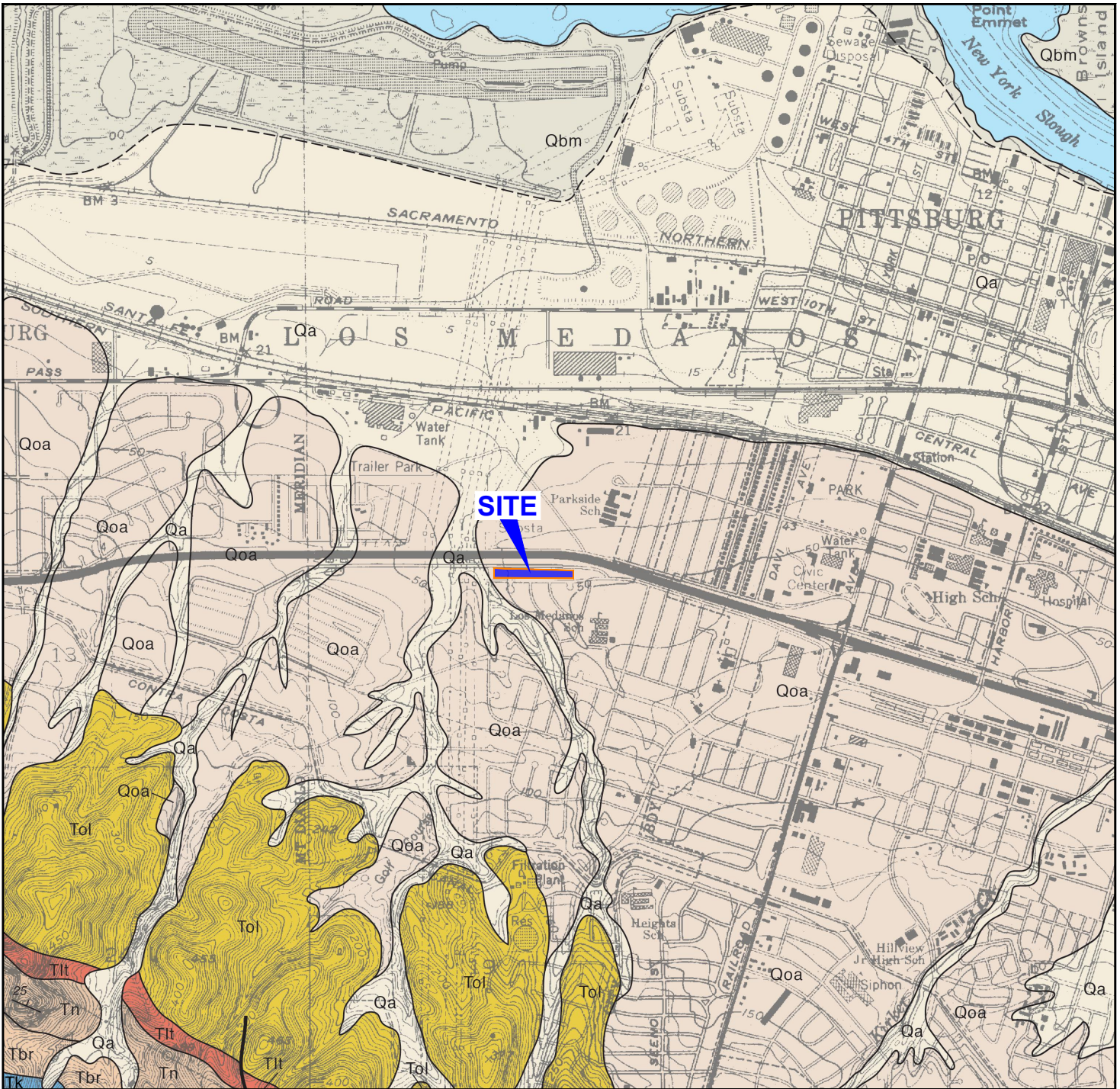


FIGURE 3

FAULT LOCATIONS AND EARTHQUAKE EPICENTERS

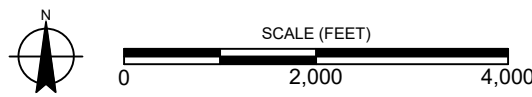
FRONTAGE ROAD LIVING GREEN TRAIL
 FRONTAGE ROAD, PITTSBURG, CALIFORNIA



LEGEND

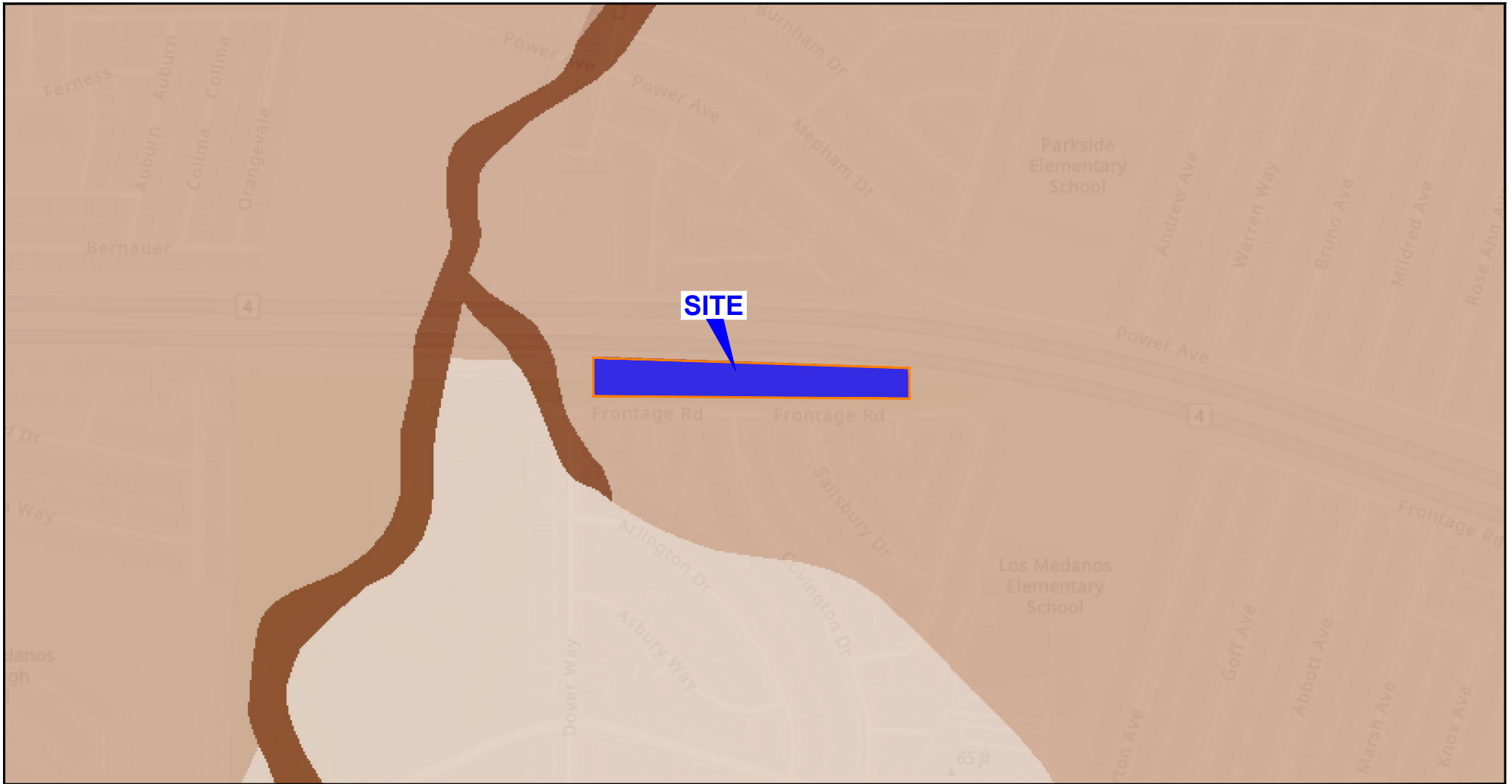
Qbm BAY MUD (HOLOCENE)	Tol ORO LOMA FORMATION (PLIOCENE)	Tbr MARINE SANDSTONE (MIOCENE)	▲▲▲▲ THRUST FAULT
Qa ALLUVIAL PEBBLE GRAVEL, SAND, & CLAY (HOLOCENE)	Tilt LAWLOR TUFF (PLIOCENE)	Tk CLAY SHALE OR SANDSTONE (MIOCENE)	— FAULT
Qoa ALLUVIAL GRAVEL, SAND, & CLAY (PLEISTOCENE)	Tn NEROLY FORMATION (MIOCENE)		- - - - - GEOLOGIC CONTACT
			┆ STRIKE AND DIP OF BEDDING

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: DIBBLEE, 2006



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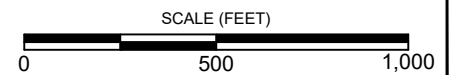
FIGURE 4



LIQUEFACTION SUSCEPTIBILITY :



NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE | REFERENCE: ESRI, 2022



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FIGURE 5



LIQUEFACTION SUSCEPTIBILITY

FRONTAGE ROAD LIVING GREEN TRAIL
FRONTAGE ROAD
PITTSBURG, CALIFORNIA

404408001 | 12/22



APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following method.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3.0 inches, was lined with 6-inch long, thin brass liners with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring log as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass liners, sealed, and transported to the laboratory for testing.

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
	Bulk	Driven						
0	█							Bulk sample. Modified split-barrel drive sampler. No recovery with modified split-barrel drive sampler. Sample retained by others. Standard Penetration Test (SPT). No recovery with a SPT. Shelby tube sample. Distance pushed in inches/length of sample recovered in inches. No recovery with Shelby tube sampler. Continuous Push Sample. Seepage. Groundwater encountered during drilling. Groundwater measured after drilling.
5	X		XX/XX					
10	○			○				
15						█	SM	MAJOR MATERIAL TYPE (SOIL): Solid line denotes unit change.
15						█	CL	Dashed line denotes material change. Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
20								The total depth line is a solid line that is drawn at the bottom of the boring.

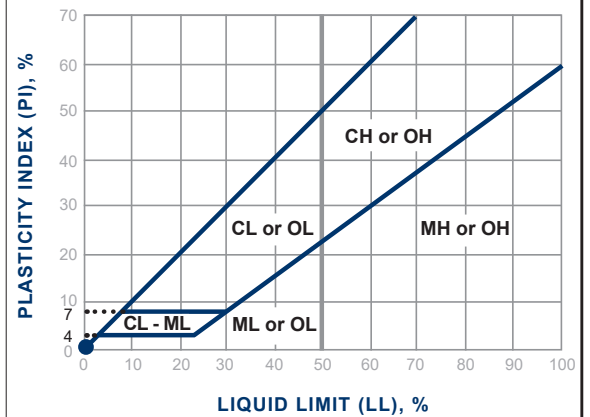
Soil Classification Chart Per ASTM D 2488

Primary Divisions		Secondary Divisions		
		Group Symbol	Group Name	
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVEL more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with
			GM	silty GRAVEL
			GC	clayey GRAVEL
		GRAVEL with FINES more than 12% fines	GC-GM	silty, clayey GRAVEL
			GM	silty SAND
	SC		clayey SAND	
	SC-SM		silty, clayey SAND	
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
			SM	silty SAND
			SC	clayey SAND
SAND with FINES more than 12% fines		SC-SM	silty, clayey SAND	
		CL	lean CLAY	
	ML	SILT		
	CL-ML	silty CLAY		
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	SILT and CLAY liquid limit less than 50%	INORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
		ORGANIC	CH	fat CLAY
			MH	elastic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
		ORGANIC	PT	Peat
			Highly Organic Soils	

Grain Size

Description	Sieve Size	Grain Size	Approximate Size
Boulders	> 12"	> 12"	Larger than basketball-sized
Cobbles	3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	Rock-salt-sized to pea-sized
	Medium	#40 - #10	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	Flour-sized to sugar-sized
Fines	Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consistency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

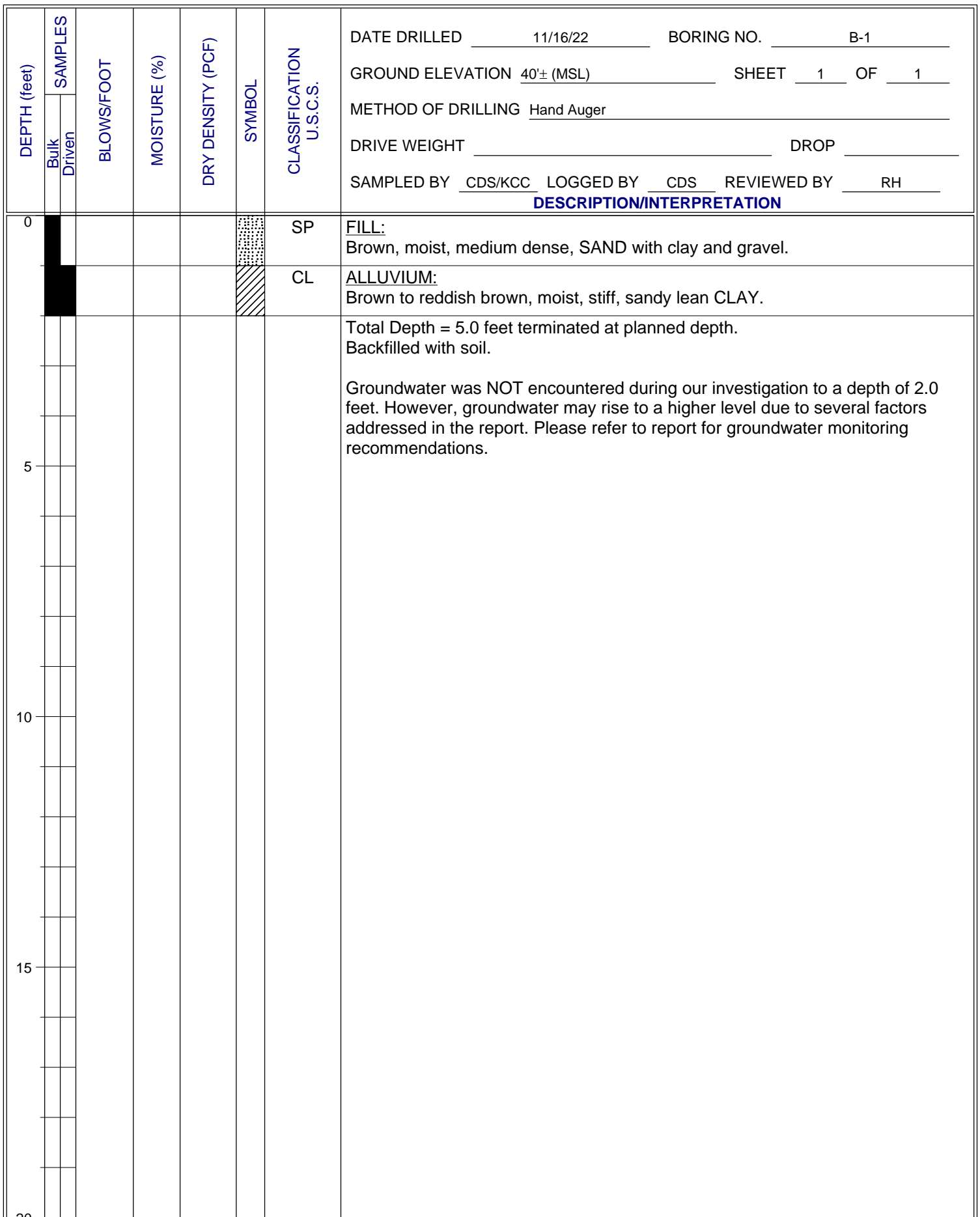


FIGURE A- 1

DEPTH (feet)	Bulk Driven SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>11/16/22</u> BORING NO. <u>B-2</u>
							GROUND ELEVATION <u>44± (MSL)</u> SHEET <u>1</u> OF <u>1</u>
							DESCRIPTION/INTERPRETATION
0						SC	<p>FILL: Brown, dry to moist, loose, clayey SAND with gravel. Concrete and asphalt fragments. Decrease in gravel content.</p>
						SM-ML	<p><u>Alluvium:</u> Light brown, moist, medium dense, SILT with fine-grained sand.</p>
5							<p>Total Depth = 5.0 feet terminated at planned depth. Backfilled with drill cuttings.</p> <p>Groundwater was NOT encountered during our investigation to a depth of 5.0 feet. However, groundwater may rise to a higher level due to several factors addressed in the report. Please refer to report for groundwater monitoring recommendations.</p>
10							
15							
20							

FIGURE A- 2

DEPTH (feet)	Bulk Driven SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>11/16/22</u> BORING NO. <u>B-3</u>
							GROUND ELEVATION <u>45± (MSL)</u> SHEET <u>1</u> OF <u>1</u>
							METHOD OF DRILLING <u>Hand Auger</u>
							DRIVE WEIGHT _____ DROP _____
							SAMPLED BY <u>CDS/KCC</u> LOGGED BY <u>CDS</u> REVIEWED BY <u>RH</u>
							DESCRIPTION/INTERPRETATION
0						SM	FILL: Light brown, moist, dense, silty SAND with gravel.
						CL	ALLUVIUM: Brown to reddish brown, moist, stiff, sandy CLAY.
5						ML	Reddish brown, moist, stiff, sandy SILT.
10							Total Depth = 10.0 feet terminated at planned depth. Backfilled with drill cuttings. Groundwater was NOT encountered during our investigation to a depth of 10.0 feet. However, groundwater may rise to a higher level due to several factors addressed in the report. Please refer to report for groundwater monitoring recommendations.
15							
20							

FIGURE A- 3



DEPTH (feet)	Bulk Driven SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>11/16/2022</u> BORING NO. <u>B-4</u>
							GROUND ELEVATION <u>45± (MSL)</u> SHEET <u>1</u> OF <u>1</u>
							METHOD OF DRILLING <u>Hand Auger</u>
							DRIVE WEIGHT _____ DROP _____
							SAMPLED BY <u>CDS/KCC</u> LOGGED BY <u>CDS</u> REVIEWED BY <u>RH</u>
							DESCRIPTION/INTERPRETATION
0						SM	FILL: Brown, moist, dense, silty SAND with trace gravel. Coarse sand surfacing.
						CL	ALLUVIUM: Brown, moist, stiff, sandy clay. Trace gravel.
5							Total Depth = 5.0 feet terminated at planned depth. Backfilled with drill cuttings. Groundwater was NOT encountered during our investigation to a depth of 5.0 feet. However, groundwater may rise to a higher level due to several factors addressed in the report. Please refer to report for groundwater monitoring recommendations.
10							
15							
20							

FIGURE A- 4

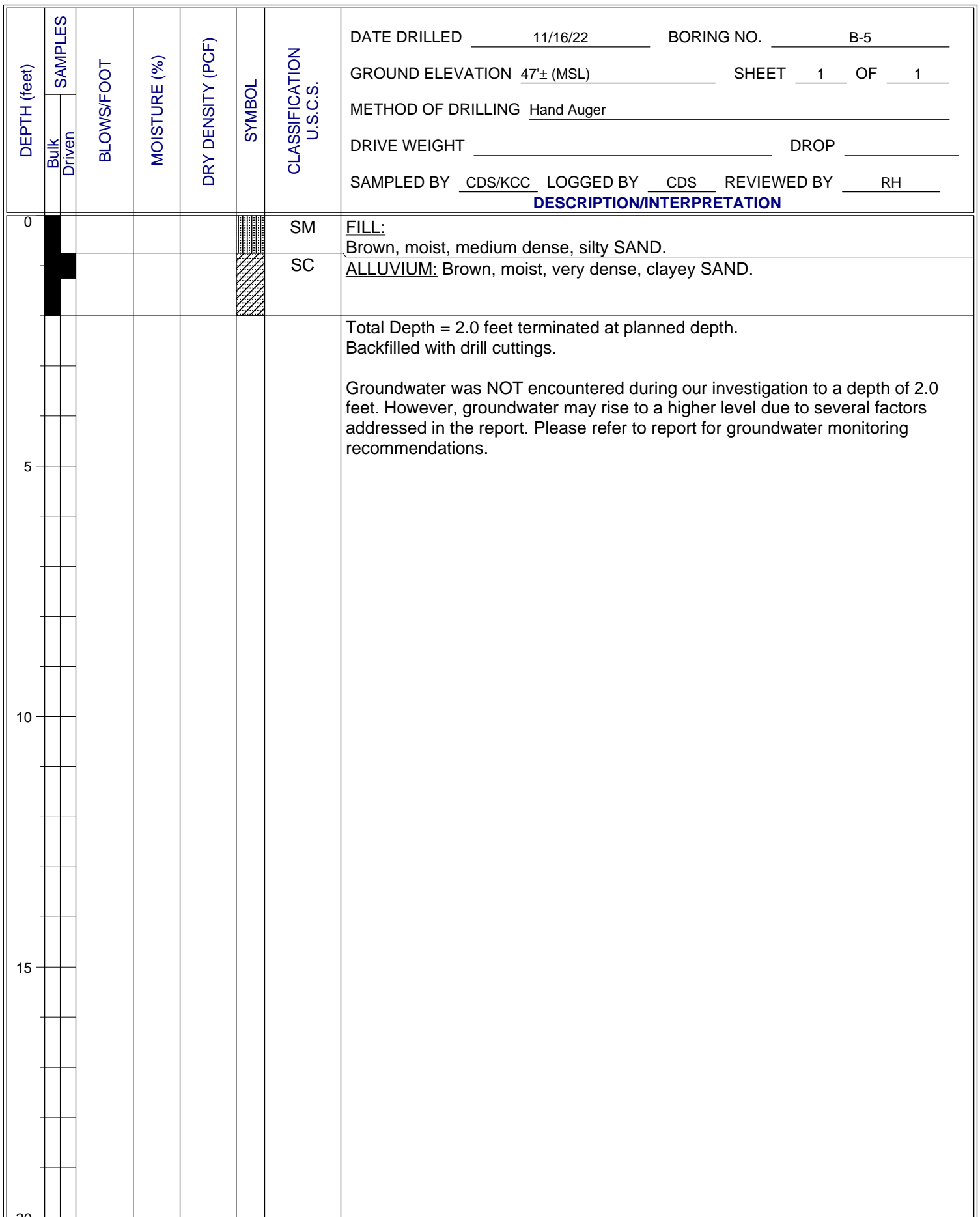


FIGURE A- 5



APPENDIX B

Laboratory Testing

APPENDIX B

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory borings in Appendix A.

Moisture Content

The moisture content of samples obtained from the exploratory borings was evaluated in accordance with ASTM D 2216. The test results are presented on the logs of the exploratory borings in Appendix A.

In-Place Density Tests

The dry density of relatively undisturbed samples obtained from the exploratory borings was evaluated in accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix A.

Gradation Analysis

A gradation analysis test was performed on a selected representative soil sample in accordance with ASTM D 422. The grain-size distribution curve is shown on Figures B-1. The test results were utilized in evaluating the soil classification in accordance with the Unified Soil Classification System (USCS).

Atterberg Limits

Tests were performed on a selected representative fine-grained soil sample to evaluate the liquid limit, plastic limit, and plasticity index in accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figure B-2.

Expansion Index Test

The expansion index of a selected material was evaluated in accordance with ASTM D 4829. The specimen was molded under a specified compactive energy at approximately 50 percent saturation (plus or minus 1 percent). The prepared 1-inch-thick by 4-inch diameter specimen was loaded with a surcharge of 144 pounds per square foot and inundated with tap water. Readings of volumetric swell were made for a period of 24 hours. The test results are presented on Figure B-3.

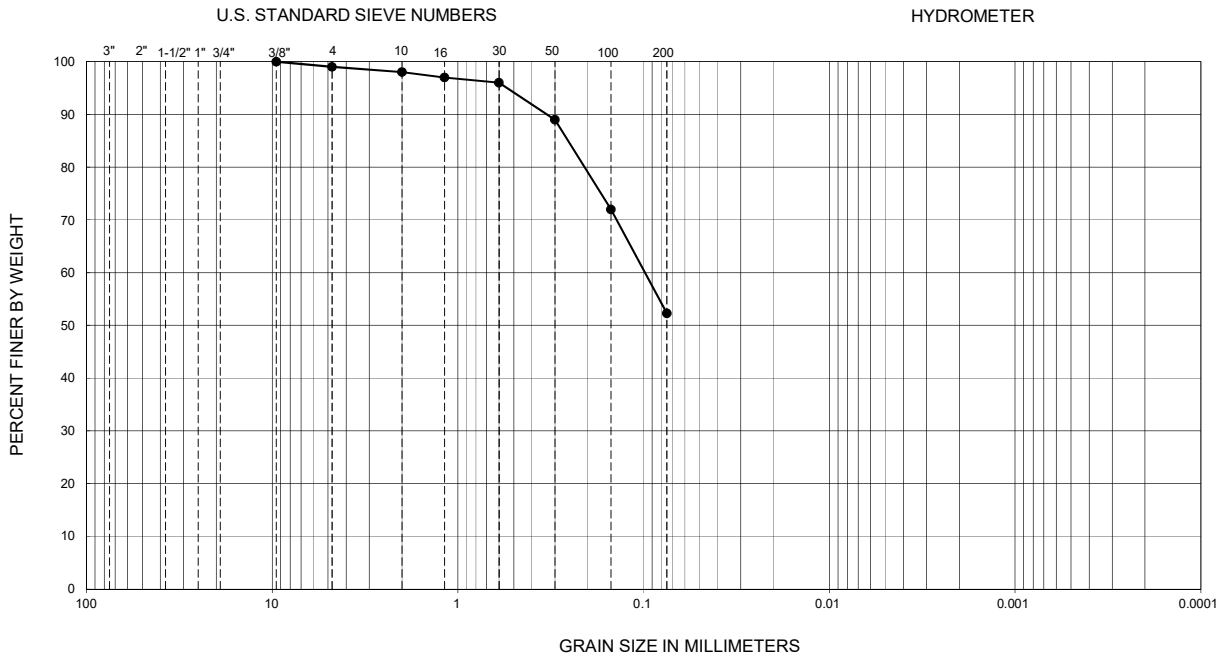
Unconfined Compression Test

An unconfined compression test was performed on relatively undisturbed samples in accordance with ASTM D 2166. The test results are shown on Figure B-4.

R Value

The resistance value, or R value, for site soils was evaluated in accordance with California Test (CT) 301. A sample was prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are shown on Figure B-5.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (percent)	USCS
●	B-2	1.0-2.0	--	--	--	--	--	0.10	--	--	52	CL

PERFORMED IN ACCORDANCE WITH ASTM D 422 / D6913

Group Name: Sandy CLAY

Soak Time: 2.0

% Gravel 1

% Sand 47

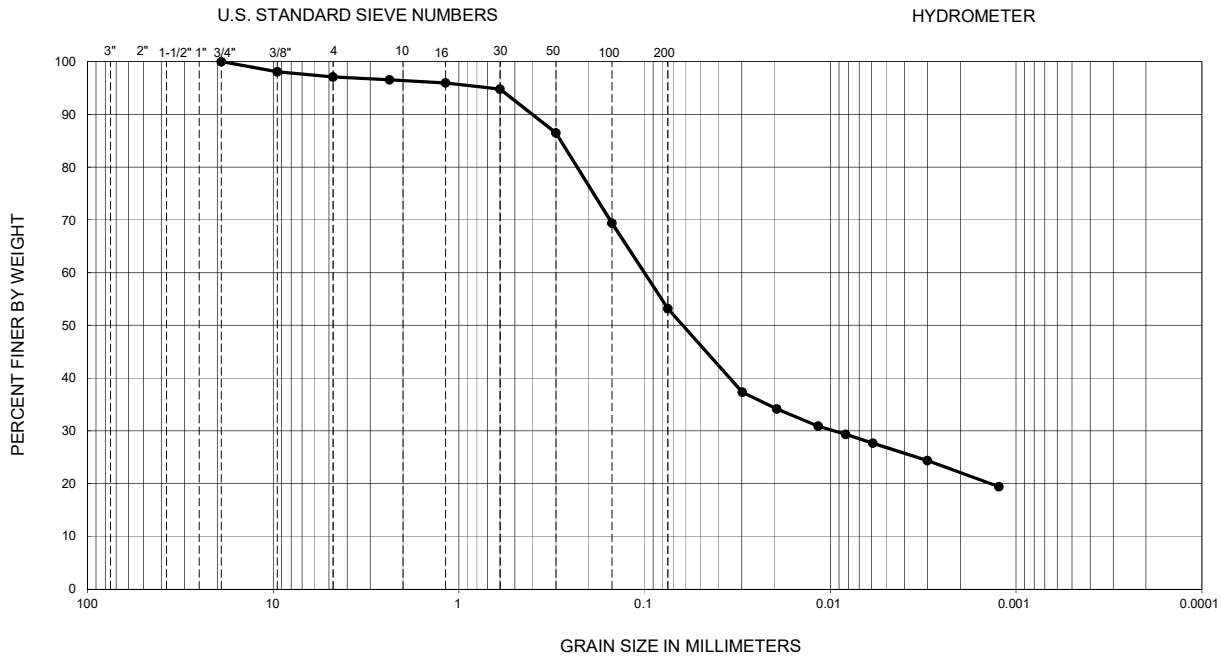
% Fines 52

FIGURE B-1

GRADATION TEST RESULTS

FRONTAGE ROAD LIVING GREEN TRAIL
FRONTAGE ROAD, PITTSBURG, CALIFORNIA

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (percent)	USCS
●	B-1	1.0-2.0	--	--	--	--	0.01	0.11	--	--	53	CL

PERFORMED IN ACCORDANCE WITH ASTM D 422

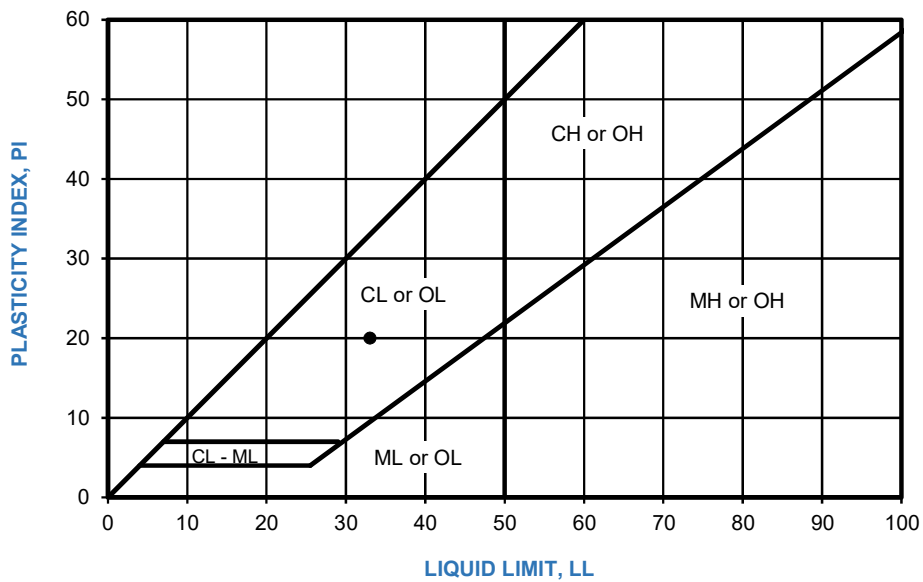
FIGURE B-2

GRADATION TEST RESULTS

FRONTAGE ROAD LIVING GREEN TRAIL
FRONTAGE ROAD, PITTSBURG, CALIFORNIA

404408001 | 12/22

SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-3	2.0-5.0	33	13	20	CL	CL



PERFORMED IN ACCORDANCE WITH ASTM D 4318

FIGURE B-3

ATTERBERG LIMITS TEST RESULTS

FRONTAGE ROAD LIVING GREEN TRAIL
FRONTAGE ROAD, PITTSBURG, CALIFORNIA

404408001 | 12/22



APPENDIX C

Percolation Testing

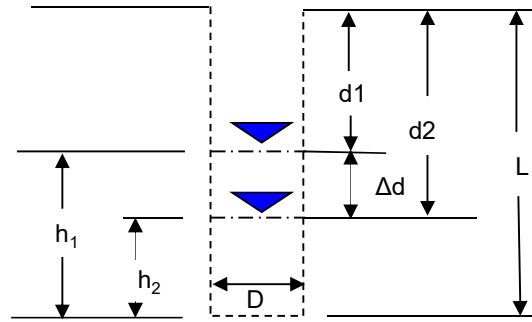
APPENDIX C

PERCOLATION TESTING

Field Procedure for Percolation Testing

The infiltration characteristics of the site soil were evaluated by field percolation testing. The test hole was excavated a depth of approximately 2 feet, with a diameter of about 6 inches. After cleaning the test hole of loose material, water was added to the test hole to achieve a water level approximately 18 inches below the top of the test hole. The drop in the water level was recorded over periodic intervals. Water was added to the test hole between measurement intervals to maintain sufficient water levels in the hole for percolation. The percolation rate reported is the percolation rate over the last measurement interval. The infiltration rate is the percolation rate adjusted by a reduction factor to exclude exfiltration occurring through the sidewalls of the test hole. The results of the percolation testing are presented on Figure C-1 and Figure C-2.

Project = Frontage Road Living Green Trail
 Project No. = 404408001
 Depth of Boring, L (ft) = 2.0
 Diameter of Boring, D (in) = 6.0
 Diameter of Pipe (in) = 6.0
 Initial Depth to Water, d1 (in), (Final Period) = 18.00
 Initial Height of Water, h1 (in), (Final Period) = 6.00
 Water Level Drop, Δd (in), (Final Period) = 0.00
 Reduction factor, Rf = 3.0
 $h1 = L - d1$ (in inches)
 $Rf = ((2h1 - \Delta d)/DIA) + 1$



Test No. (Hole No.)	Time (hr:min)	Elapsed Time (min)	Depth to Water, d (in)	Water Level, h (in)	Change in Water Level, Δd (in)	Time Interval (hour)	Percolation Rate (inch/hour)	Adjusted Percolation Rate (inch/hour)
P-1 (B-1)	8:45		18.00	6.00				
	9:15	30	19.50	4.50	1.00	0.50	2.0	0.67
	9:15		18.00	6.00				
	9:45	30	19.00	5.00	1.00	0.50	2.0	0.67
	9:45		18.00	6.00				
	10:15	30	19.00	5.00	1.00	0.50	2.0	0.67
	10:15		18.00	6.00				
	10:45	30	19.00	5.00	1.00	0.50	2.0	0.67
10:45		17.50	6.50					
11:15	30	18.50	5.50	1.00	0.50	2.0	0.67	
11:15		18.50	5.50					
11:30	30	19.50	4.50	1.00	0.50	2.0	0.67	

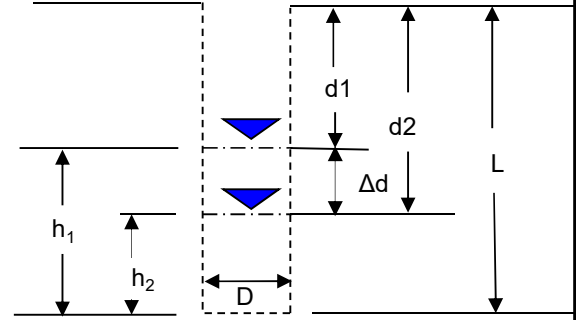
FIGURE C-1



Geotechnical & Environmental Sciences Consultants

PERCOLATION TEST RESULTS
 FRONTAGE ROAD LIVING GREEN TRAIL
 PITTSBURG, CALIFORNIA

Project = Frontage Road Living Green Trail
 Project No. = 404408001
 Depth of Boring, L (ft) = 2.0
 Diameter of Boring, D (in) = 6.0
 Diameter of Pipe (in) = 6.0
 Initial Depth to Water, d1 (in), (Final Period) = 18.00
 Initial Height of Water, h1 (in), (Final Period) = 6.00
 Water Level Drop, Δd (in), (Final Period) = 0.25
 Reduction factor, Rf = 3.0
 $h_1 = L - d_1$ (in inches)
 $Rf = ((2h_1 - \Delta d)/DIA) + 1$



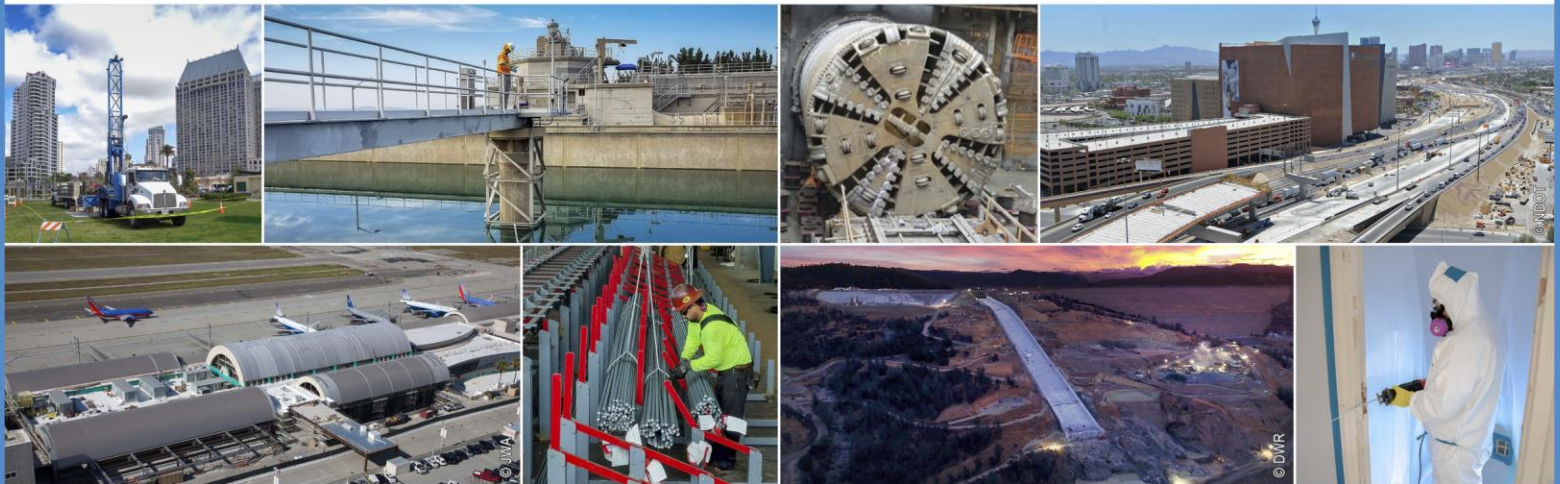
Test No. (Hole No.)	Time (hr:min)	Elapsed Time (min)	Depth to Water, d (in)	Water Level, h (in)	Change in Water Level, Δd (in)	Time Interval (hour)	Percolation Rate (inch/hour)	Adjusted Percolation Rate (inch/hour)
P-2 (B-5)	9:45		18.50	5.50				
	10:15	30	19.00	5.00	0.50	0.50	1.0	0.34
	10:15		18.00	6.00				
	10:45	30	18.25	5.75	0.25	0.50	0.5	0.17
	10:45		18.25	5.75				
	11:15	30	18.50	5.50	0.25	0.50	0.5	0.17
	11:15		18.50	5.50				
	11:45	30	18.75	5.25	0.25	0.50	0.5	0.17
	11:45		18.75	5.25				
12:15	30	19.00	5.00	0.25	0.50	0.5	0.17	
12:15		17.00	7.00					
12:45	30	17.25	6.75	0.25	0.50	0.5	0.17	

FIGURE C-2



Geotechnical & Environmental Sciences Consultants

PERCOLATION TEST RESULTS
 FRONTAGE ROAD LIVING GREEN TRAIL
 PITTSBURG, CALIFORNIA



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