



## CITY OF TACOMA

### Tacoma Rail

**ADDENDUM NO. 1**

**DATE:** July 27, 2021

**REVISIONS TO:**

**Specification No. TR21-0548F**

**East Locomotive Servicing Facility**

**NOTICE TO ALL :**

This addendum is issued to clarify, revise, add to or delete from, the original specification documents for the above project. This addendum, as integrated with the original specification documents, shall form the specification documents. The noted revisions shall take precedence over previously issued specification documents and shall become part of this contract.

**REVISIONS TO THE SUBMITTAL DEADLINE:**

The submittal deadline remains the same.

**REVISIONS TO THE BID PROPOSAL FORMS:**

***Change #1***

**Division 0 Bid Proposal Forms**

*Replace Item #8 in its entirety.*

The Statement of Qualifications form has been replaced with the attached form labeled "Statement of Qualifications for Rail Contractors Addendum #1.

**REVISIONS TO THE GENERAL REQUIREMENTS:**

***Change #2***

**Section 01 10 10, Subsection 1.7**

*Insert the following paragraph after the second paragraph.*

Tacoma Rail's Regulated Contractors are required to establish their own 49CFR Part 219 Program and provide the railroad with documentation of their compliance. As it relates to random testing, the contractors certify that their regulated employees are subject to random testing in accordance with CFR 49 Part 219 subpart G. The contractor's Part 219 plans are submitted directly to the railroad's Designated Employer Representative (DER.) This is included in part of the contractor's contractual agreement while working for Tacoma Rail.

**Change #3**

**Section 01 12 00 – PERMITS AND FEES:**

*Insert the following to the end of the paragraph in Subsection 1.2 B.*

The City has received an electrical permit approval for the project the approval to obtain the electrical permit is attached to this Addendum.

**REVISIONS TO THE TECHNICAL SPECIFICATIONS:**

**Change #4**

**Section 02 41 13 – SELECTIVE SITE DEMOLITION:**

*Delete the following:*

All references to Section 01 74 19 throughout this section, including articles 1.03.A.2, 2.02.A. 1 and 2.02.A.2.

**Change #5**

**Section 02 41 13 - SELECTIVE SITE DEMOLITION:**

*Replace Article 2.01 in its entirety with the following:*

**2.01 SALVAGE ITEMS FOR TACOMA RAIL**

A. All materials designated to be salvaged to Tacoma Rail shall be placed within Contractor Laydown area(s) as indicated on the Drawings, where Tacoma Rail staff will load and haul the materials from the site. All salvaged materials delivered to Tacoma Rail shall be stacked on Contractor supplied pallets where practical, or stored by blocking larger items on Contractor supplied dunnage in a neat and orderly manner. Contractor shall salvage the following materials to Tacoma Rail:

1. Rail
2. Ties
3. All joint bars

**Change #6**

**Section 02 41 13 - SELECTIVE SITE DEMOLITION:**

*Delete Article 2.03.B in its entirety.*

**Change #7**

**Section 11 05 00 – COMMON WORK RESULTS FOR EQUIPMENT:**

*Insert the attached section.*

**Change #8**

**Section 22 05 23 – GENERAL DUTY VALVES FOR PLUMBING PIPES:**

*Replace Article 3.03.A. in its entirety with the following:*

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

**Change #9**

**Section 26 00 00 – ELECTRICAL GENERAL CONDITIONS:**

*Delete Article 1.04.B.*

**Change #10**

**Section 26 24 19 – MOTOR CONTROLLERS:**

*Insert the attached section.*

**Change #11**

**Section 32 13 00 – RIGID PAVEMENT:**

*Insert the attached section.*

**REVISIONS TO THE PLAN SHEETS:**

**Drawing G2: REPLACE** entire sheet with attached sheet.

**Drawing CD1: REPLACE** entire sheet with attached sheet.

**Drawing C3: REPLACE** entire sheet with attached sheet.

**Drawing C4: REPLACE** entire sheet with attached sheet.

**Drawing C17: REPLACE** entire sheet with attached sheet.

**Drawing C18: REPLACE** entire sheet with attached sheet.

**Drawing S8: REVISE** Section A, **Provide** #9 rebar @ 6 inches o.c. for bottom longitudinal reinforcing.

**Drawing Q2: REPLACE** entire sheet with attached sheet.

**Drawing E5: REVISE** electrical service from overhead to underground. See ESK-1.

**Drawing E1: REVISE** electrical service from overhead to underground. See ESK-2.

**Drawing E4: ADD** Construction Note 4. See ESK-3.

**Drawing E6: REVISE** AIC Minimum for Panel MDB from 65,000 to 35,000.

**Drawing E6: REVISE** AIC Minimum for Panel H1 from 65,000 to 35,000.

**Drawing E6: REVISE** circuit for Air Dryer remove from Panel L1. Circuit to Panel H1-10,12,14. **Provide** 20A/3P Circuit Breaker. Provide Raceway per equipment schedule.

**Drawing E7: REVISE** Equipment Connection Schedule. See ESK-4.

## ANSWERS TO QUESTIONS RECEIVED:

1. Will the qualifications for Rail Contractors as defined in Division 1, Section 01 10 10, subsection 1.7 apply to the prime contractors or rail scope subcontractors only? *The prime contractors are expected to have worked on five projects of similar complexity in the last three years and as a member of their team (prime or sub) to have an on-site supervisor with 49 CFR Part 213 and 214 experience/qualifications as laid out the Statement of Qualifications for Rail Contractors Addendum #1 form.*
2. How much space is available for laydown area? *The area immediately east of the Facility outside the fence (as shown on Sheet G2) is available but must allow access from the gate adjacent to Frontage Road. Further, space could be made available near the Port of Tacoma Road Bridge, north of the tracks. Otherwise, the contractor will need to determine their own laydown area.*
3. Will security access through the gates be provided? *Access to the site will be provided. The contractor will need to supply a list of all employees working on the project to Tacoma Rail and access will be coordinated.*
4. Which Tracks will be active during the project? *Track 1 will be active throughout the project. Tracks 2 and 3 will also be active but temporary closures can be coordinated during the project.*
5. How long does a fueling operation last each day? *It depends on the number of engines arriving each day but approximately 40 minutes per locomotive consist.*
6. How much time can a track be taken out of service? *An outage in general can be for 8 hours, specifically Track 1. Weekly one-week (Monday thru Friday) outages on Tracks 2 and 3 would be approved with advanced notice. However, Tacoma Rail operations will govern outage lengths depending on need. Close coordination will be required and sufficient notice to must be as stated in Section 01 10 40 Project Coordination, Subsection 1.4A.*
7. Is groundwater expected and if so what depth? *Groundwater is anticipated to be encountered 4 to 5 feet below existing site surface. Deeper excavations for the larger tanks should anticipate encountering water.*
8. Is groundwater contaminated? *Tacoma has no analytical data on this.*
9. Are dewatering discharge permits for project already in hand? *Contractors will be responsible for acquiring discharge permits.*
10. Who is providing the RR Flagging? *The contractor is responsible for the RR flagging.*

11. Are the RR insurance requirements clearing shown? ***The RR Protective Insurance can be found in Division 0, Section C, "Contract Forms", Item 2.***
12. On the drawings Bay three show 100 feet of rebuild on either side of the facility but the work is not shown in the Demo drawings. Where would this effort be paid for? ***Track demolition will be paid as part of the Demolition. Drawings have been revised to show this track demolition on Sheet CD1.***
13. Are Pandrol plates to new or can they be used? ***Pandrol plates shall be new.***
14. Will the sign in sheet for the pre-bid meeting be made available to bidders? ***The attendee list has been posted on the City's website.***
15. Where is the fuel management unit to be located? ***Per specification 22 70 13, section 1.03.A.9, the fuel management system shall be located at the fuel cranes. The final location shall be approved by Tacoma Rail.***
16. Are track panel lengths all 5 feet, and how does that length relate to the overall island length of 87'-8"? ***Track panels, including end panels, are all 5 feet long. Each track will have 17 panel sections for a length of 85 feet, and two trench intermediate drain crossings, each adding 1'-4" along the length of the track. End to end length of track panels will be 87'-8".***
17. Are there any sealing requirements between track panels? ***Track panel joints shall be sealed with BUNA-N/Nitrile rubber sealant, Ruscoe Permanent Sealer 983 or approved equal.***
18. Drawing M8 shows a lube oil dispensing system that draws from 330 gallon totes and is located inside of a building. Snyder Equipment manufactures tote cabinets that pump from totes, include containment, pump and heater. This drawing also shows a 120 gpm pump, whereas the dispensing nozzle is only rated for 20 gpm. Can our tote Cabinet be considered for this project. ***These totes are acceptable as long as any resulting site or building changes are included at no additional cost.***
19. Substitution Request. Section 22 33 13, page 2, Line 2.01A. Product EEmax tankless elec. Water heater. Proposed Substitution Chronomite ERB-L ***Proposed Chromomite ERB-L substitution is acceptable ensuring it meets the combination emergency eye/face wash station manufacturer's requirements and conforms to ANSI Z3581.1.***
20. Substitution Request. Section 33 40 00, page 2, Line 2.03. Zurn Z886. Proposed Substitution Eric'sons Dura Trench. ***Eric'sons Dura Trench is acceptable, trench body shall be vinyl ester, 4 inch width. Frame and grates shall be stainless steel conforming to the specifications. Match trench inverts as indicated on the Drawings.***

21. In Section 02 41 13 Selective Demo, Paragraph 1.03.2 references Section 01 74 19 Construction Waste Management and Disposal, this section does not appear in the table of contents or in the specifications please clarify. ***The reference will be removed. See changes listed in the Revisions to Specifications Section of this addendum.***
22. In the City of Tacoma Modifications to the GC for Washington State Facility Construction, Section 5.15 Testing & Inspection indicates contractor responsible for cost of testing and inspection. Section 01 14 00 Quality Control Paragraph 1.2.B.1 indicates City will pay. Is the intent that the City will pay for inspections required for the building permit and the contractor pays for site work? ***The intent is to have the contractor pay for permit inspections per Section 01 12 00 Permits and Fees, Subsection 1.3 and the City to pay for specialty inspections for site work.***
23. General Requirements 01 15 00 paragraph 1.1.A indicates no on-site, is the gravel area west of the Tacoma Rails paved lot available for contractor use or is it the intent for bidders to include cost of offsite parking and employee transportation costs? ***Contractor personal vehicles will have parking made available on site. The exact location will be determined at the pre-construction meeting.***
24. Substitution Request. Section 13 34 23, page 2-14, Line G. Product Nixalite bird control netting. Proposed Substitution Bird X Netting. ***The City was unable to make a determination on this request prior to bidding, please bid as specified.***
25. Disposal costs vary for Type A, B and C regulated soils. Only bid item 24 exists for payment of the varying materials. Please provide information that will allow us to quantify the various types of regulated materials to allow accurate pricing of this work. ***For bidding purposes assume all contaminated soil will be non-hazardous contaminated soils, Type B.***
26. Plan Sheets S-3 & S-9 show 32" and 28" diameter foundation shafts. These are unusual diameters that may require special drill tooling (costly). Please clarify if 36" and 30" diameter shafts can be used in lieu of the diameters shown, and if so can the shaft rebar remain as sized in the Plans. ***For bidding purposes these diameters are acceptable, the reinforcement details shall remain as shown in the plans.***
27. 33 30 00 is titled "Sanitary Sewer Utilities". Part 2 contains two different subsections 2.04 and 2.05, one each for Oil Retention Tanks and one each for Sewage Holding Tanks. Section 33 40 00 is titled "Storm Drain Utilities". Subsections 2.07 thru 2.11 address items unrelated to Storm Drainage, including Waste Oil. 11 11 53 is titled "Lube Oil Distribution Equipment", but addresses Main Engine Oil and Waste Oil. This section includes System Designer and System Installer experience requirements, including on waste oil facilities, but doesn't specifically address the waste oil system. Sections 33 30 00 and 33 40 00, which partially address waste oil piping and storage facilities, include no

designer or installer requirements. Please provide clear specification requirements for the waste oil/ORT features. ***Waste oil/ORT elements include the ORT discharge points, ORT gravity drain lines, waste oil holding tank and associated work. The requirements for these components are specified in Division 33 specification sections. System designer and system installer requirements such as those detailed in specification section 11 11 53 do not apply to the ORT system elements.***

28. Detail 4 on Plan Sheet C18 and the right side of Section 2 on Plan Sheet R3 both include the note "...14.75" Concrete Depth required as indicated on Plan..." The standard thickness for the referenced sections is 8". Detail 4 on C18 references Sheet C12, but no reference to 14.75" pavement is noted. Please clarify where the 14.75" depth concrete pavement is required. ***Area of 14.75 inch pavement depth is shown on Sheet C2.***
29. Plan Sheet S8, Section A (Fuel Tank Foundation), shows longitudinal #9 rebar at 6" OC, "top and bottom". Another callout shows longitudinal #6 rebar in the bottom mat. Please clarify if the longitudinal bottom rebar is to be #9 or #6. ***Refer to addendum revision listed for Sheet S8 for clarification.***
30. Specification Section 01 35 43.19 1.02B states that **all soils** excavated within the project are considered "regulated materials". Section 01 35 43.19 1.03 segregates the materials into Regulated Types A, B, and C, and Type D Soil for disposal requirement purposes. Please confirm that Type D Soils are considered "contaminated" materials and thus will be included for payment in Bid Item 24, "Disposal & Haul of Contaminated Materials. If so, please check the Item No. 24 Bid Quantity as it appears to be an order of magnitude low. If not, please clarify how the offhaul and disposal of the Type D material is to be quantified and paid. ***Tacoma Rail will sample the soil prior to construction beginning and provide the analytical analysis to assist the contractor with appropriate disposal activities per Subsection 3.01 of the referenced Section. For bidding purposes assume contaminated soils will be disposed of at LRI. Contaminated soils are anticipated to be Type B and disposal will be paid for under Line Item 24. Type D soils will be paid for under the Line Item #4 and are the contractor's responsibility to dispose of per Subsection 3.02 D of the same Section.***
31. Specification Sections 01 35 43.19 and 31 00 00 note that all excavated soils and aggregates are expected to be contaminated and offhauled/disposed offsite. All testing is to be done by Tacoma Rail. Per 01 35 43.19 3.03A, upon approval of the engineer, Type A, B, or C Regulated Soil may be temporarily stockpiled within the construction area. No mention is made of Type D Soil. Please clarify how testing of existing soils will proceed so that the disposition of soil (Type D or other) is known prior to excavation commencing. ***See answer to question 30.***

32. Specification Section 11 11 29 1.05 C outlines requirements for installers. The manufacturer was unaware of the need for providing a installation quote and needs 2 weeks to generate one, can a delay to the bid be provided to allow for this pricing? Additionally, can this requirement be waived if the manufacturer inspects the installation and certifies it? ***Please bid this issue as you see fit. Tacoma Rail does not anticipate a delay in the bid opening per the time line listed.***

NOTE: Acknowledge receipt of this addendum by initialing the corresponding space as indicated on the signature page . Vendors who have already submitted their bid/proposal may contact the Purchasing Division at 253-502-8468 and request return of their bid/proposal for acknowledgment and re-submittal. Or, a letter acknowledging receipt of this addendum may be submitted in an envelope marked Request for Bids Specification No. TR21-0548F Addendum No. 1. The City reserves the right to reject any and all bids, including, in certain circumstances, for failure to appropriately acknowledge this addendum.



**STATEMENT OF QUALIFICATIONS FOR  
RAIL CONTRACTORS ADDENDUM #1**

This form shall be completed in its entirety and submitted with the bid. **Failure to submit and meet the requirements as stated in Division 1, Section 01 10 10, Subsection 1.7 of the Special Provisions may be grounds for rejection of the bid.**

**The City of Tacoma will be the sole judge in determining if the prospective contractor meets the minimum experience requirements.**

The successful contractor shall have completed at least five self-performed projects of similar scope and purpose within the past three years. The site supervisor in charge of the rail construction and rail road flagging shall also have at least three years of railroad construction experience. Complete the project experience summary below and identify the on-site supervisors, one or more of which will be assigned to the project.

**Contractor:**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Contact Person: \_\_\_\_\_

**Project Experience**

**#1 Project Name:** \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Person: \_\_\_\_\_

Description of Work (including size of area treated): \_\_\_\_\_

\_\_\_\_\_

Completion Date: \_\_\_\_\_

**#2 Project Name:** \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Person: \_\_\_\_\_

Description of Work (including size of area treated): \_\_\_\_\_

\_\_\_\_\_

Completion Date: \_\_\_\_\_

**#3 Project Name:** \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Person: \_\_\_\_\_

Description of Work (including size of area treated): \_\_\_\_\_

\_\_\_\_\_

Completion Date: \_\_\_\_\_

**#4 Project Name:** \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Person: \_\_\_\_\_

Description of Work (including size of area treated): \_\_\_\_\_

\_\_\_\_\_

Completion Date: \_\_\_\_\_

**#5 Project Name:** \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Person: \_\_\_\_\_

Description of Work (including size of area treated): \_\_\_\_\_

\_\_\_\_\_

Completion Date: \_\_\_\_\_

**STATEMENT OF QUALIFICATIONS FOR  
RAIL CONTRACTORS ADDENDUM #1**

**On-Site Supervisor for Rail Construction and Railroad Flagging:**

The on-site supervisor shall have at least three years of railroad construction experience.  
Provide the name of the project on-site supervisor.

**On-Site Supervisor:** \_\_\_\_\_ **Years employed by contractor:** \_\_\_\_\_

**#1 Project Name/Date:** \_\_\_\_\_

**Owner:** \_\_\_\_\_ **Contact Person:** \_\_\_\_\_

**Description of Work:** \_\_\_\_\_  
\_\_\_\_\_

**Completion Date:** \_\_\_\_\_

**#2 Project Name/Date:** \_\_\_\_\_

**Owner:** \_\_\_\_\_ **Contact Person:** \_\_\_\_\_

**Description of Work:** \_\_\_\_\_  
\_\_\_\_\_

**Completion Date:** \_\_\_\_\_

**Alternate On-Site Supervisor** \_\_\_\_\_ **Years employed by contractor:** \_\_\_\_\_

**#1 Project Name/Date:** \_\_\_\_\_

**Owner:** \_\_\_\_\_ **Contact Person:** \_\_\_\_\_

**Description of Work:** \_\_\_\_\_  
\_\_\_\_\_

**Completion Date:** \_\_\_\_\_

# TRANSMISSION & DISTRIBUTION



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<b>To:</b>	Jason Bordash	<b>From:</b>	Marshall Swayze
<b>Email:</b>	Jason.bordash@bceengineers.com	<b>Date :</b>	March 17, 2020
<b>Phone:</b>	253-922-0446	<b>PR #:</b>	2020-018
<b>Re :</b>	Tacoma Rail Locomotive Facility Upgrades	<b>Permit # :</b>	40000315363

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Thank you for the opportunity to review plans for the Tacoma Rail Locomotive Facility Upgrades. Although we check the plans for Code compliance with National, State, City and Utility Standards, the main focus of plan review is the load on the electrical system. Plan review is not a substitute for field inspections. Plans are approved contingent on notes below.

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## Comments:

Plans approved based on an engineer's design and specifications are to be installed meeting the design & standard. Any request to change design or deviate from the engineer's Standard shall be with the engineer's permission. Design changes are to be resubmitted to plan review by the engineer for approval at the inspector and plan review's discretion.

Conductor type not identified on plans are considered to be copper consistent with NEC 110.5

Grounding meeting the requirements of 250.118 and sized per 250.122 and bonding as covered in 250.102 is not part of the plan review process and must be verified during the field inspections.

New or altered services shall be in conformity with the requirements of New Service's Customer Service Policies and the Letter of Agreement when used.

Installation requirements and standards from the utility system to the utility transformer may be found at: [http://www.tacomapower.com/construction\\_standards.htm](http://www.tacomapower.com/construction_standards.htm)

Customer requirements and procedures may be found at: <http://www.tacomapower.com/ElectricalPermits/NewServiceHandbook.pdf>

Metering equipment shall match the appropriate EUSERC Drawing for the service size requested.

All equipment must have suitable ratings for the available fault current. Limited energy and telecommunication system are not part of this approval.

Approved plans can be picked up at our inspection counter when a permit for the project is purchased.

Thank you,

*Marshall Swayze*

Inspector/Electrical Plans Examiner  
marshall.swayze@cityoftacoma.org  
Phone: 253-396-3301

## **PART 1 - GENERAL**

### **1.01 DESCRIPTION**

- A. Provide where shown on drawings equipment as specified, complete and ready for operation. Each item shall be specifically designed for the intended function. Provide necessary accessories, items of equipment, mechanical, electrical, and structural items, whether specified or not, for properly installed and functional equipment.
- B. Equipment shall be suitable for installation in the space allocated on the drawings and operation with the available building utilities. Any modification or redesign of the building structure or utilities because of an alternate equipment selection by Contractor shall be provided by Contractor at no additional cost to Owner, only after approval of Engineer.
- C. Where a device or part of the equipment is referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.
- D. The following items are specified in other sections of the specifications.
  - 1. Section 03 10 00 - Concrete Forming and Accessories
  - 2. Section 03 20 00 - Concrete Reinforcing
  - 3. Section 03 30 00 - Cast-in-Place Concrete
  - 4. Section 26 00 00 – Electrical General Conditions
  - 5. Section 33 10 00 – Water Utilities
- E. Remove, relocate, and repair any items necessary for the proper installation of the equipment at no extra cost to Owner.

### **1.02 REFERENCES**

- A. Equipment shall be manufactured and set up in accordance with all industrial and safety standards that apply to the work.
- B. Industry Standards:
  - 1. AISC - American Institute of Steel Construction.
  - 2. AWS - American Welding Society.
- C. Safety and Governmental Standards:
  - 1. OSHA - Occupational Safety and Health Administration.
  - 2. ANSI - American National Standards Institute.
- D. Applicable federal, state, and local codes and regulations.
  - 1. If there is a conflict between codes and the manufacturer's standards, the most stringent requirements shall take precedence and the best quality as to materials and workmanship shall be supplied and applied.
  - 2. For components not manufactured in the United States of America (USA), materials shall comply with ISO 9001-2000 quality standards. This includes but it

is not limited to nuts, bolts, threads and heads for the same, pipes, conduits, and electrical connectors

### 1.03 NOT USED

### 1.04 SUBMITTALS

#### A. Submit the following for approval:

1. Shop drawings
2. Product data.
3. Samples, if requested.
4. Installation instructions.
5. Acceptance test procedure.
6. Training program.
7. Spare parts list.
8. Certificates as specified under "Quality Assurance and Quality Control" in this section.
9. Warranty signed by Contractor and installer and executed by manufacturer for equipment, materials, and workmanship against defects agreeing to repair or replace equipment and materials and correct workmanship according to this section.
  - a. Unless specifically noted elsewhere, the warranty period shall be a minimum of one year, commencing at the date of Final Acceptance.

#### B. Sequence of Approval:

1. Conditional Approval of Equipment: Before submitting shop drawings, submit for approval drawings, specifications, and lists of equipment to be incorporated in the work. This list shall include catalog numbers, catalog cuts, and such other descriptive data as may be required to ensure compliance with these specifications. No consideration will be given to partial lists submitted from time to time. Approval of equipment will be conditional and subject to submittal of complete shop drawings indicating compliance with the contract documents.
2. Final Approval of Equipment: After receiving conditional approval of the equipment lists, submit shop drawings, product data, and installation instructions for final approval.
3. Submit test procedure a minimum of 60 days prior to equipment test and checkout.

#### C. Shop Drawings: Shop drawings and diagrams shall be prepared using and showing scales and dimensions in United States customary units (non-metric); metric conversions may be provided in parentheses. Shop drawings may include exploded-view diagrams and shall include the following as applicable:

1. Drawings showing equipment layout, elevations, conduit runs, utility layout and hook-ups, and all required dimensions including clearances and tolerances.

2. Fabrication drawings, including bill of materials.
  3. Detail drawings.
  4. Foundation with drainage requirements and structural support drawings including loads, embedded items, and elevations.
  5. Utility connection plan showing utility requirements. Include:
    - a. Locations of existing utility services.
    - b. Location of required utility connections.
    - c. Required sizes of pipes and conduits.
    - d. Inverts and elevations.
    - e. Required water pressure, velocity (cfs), and flow (gpm).
    - f. Required gas pressure and cfh (cubic feet per hour).
    - g. Required compressed air pressure and cfh (cubic feet per hour).
    - h. Required steam pressure and flow.
    - i. Required size of electric service.
    - j. Required size of wires.
    - k. Required voltage and amperage (full load).
    - l. Required insulation and/or insulators.
  6. Electrical control diagram.
  7. Electrical wiring diagram. Include:
    - a. Locations of existing utility services.
    - b. Location of required utility connections.
    - c. Required sizes of conduits.
    - d. Inverts and elevations.
    - e. Required size of electric service.
    - f. Required size of wires.
    - g. Required voltage and amperage (full load).
    - h. Required insulation and/or insulators.
  8. Electrical equipment layout, with all motors, limit switches, solenoid valves, disconnects, control panels, etc., located and labeled.
- D. Product Data: Manufacturer's literature including catalog cuts, pamphlets, descriptive literature, color charts (for selection by Engineer), equipment specifications, performance and test data, and brochures that adequately describe the piece of equipment or product of all purchased components of the specified system. Specific items included or specific items excluded in this installation shall be indicated on the product data sheets.

2. Fabrication drawings, including bill of materials.
  3. Detail drawings.
  4. Foundation with drainage requirements and structural support drawings including loads, embedded items, and elevations.
  5. Utility connection plan showing utility requirements. Include:
    - a. Locations of existing utility services.
    - b. Location of required utility connections.
    - c. Required sizes of pipes and conduits.
    - d. Inverts and elevations.
    - e. Required water pressure, velocity (cfs), and flow (gpm).
    - f. Required gas pressure and cfh (cubic feet per hour).
    - g. Required compressed air pressure and cfh (cubic feet per hour).
    - h. Required steam pressure and flow.
    - i. Required size of electric service.
    - j. Required size of wires.
    - k. Required voltage and amperage (full load).
    - l. Required insulation and/or insulators.
  6. Electrical control diagram.
  7. Electrical wiring diagram. Include:
    - a. Locations of existing utility services.
    - b. Location of required utility connections.
    - c. Required sizes of conduits.
    - d. Inverts and elevations.
    - e. Required size of electric service.
    - f. Required size of wires.
    - g. Required voltage and amperage (full load).
    - h. Required insulation and/or insulators.
  8. Electrical equipment layout, with all motors, limit switches, solenoid valves, disconnects, control panels, etc., located and labeled.
- D. Product Data: Manufacturer's literature including catalog cuts, pamphlets, descriptive literature, color charts (for selection by Engineer), equipment specifications, performance and test data, and brochures that adequately describe the piece of equipment or product of all purchased components of the specified system. Specific items included or specific items excluded in this installation shall be indicated on the product data sheets.



- E. Installation Instructions and Acceptance Test Procedure: Manufacturer's recommended installation instructions with manufacturer's installation drawings and acceptance test program.

#### 1.05 QUALITY ASSURANCE AND QUALITY CONTROL

A. General:

1. Articles, materials, fittings, equipment, and machinery incorporated in the work shall be new and unused, of recent manufacture, free from defects and imperfections, and shall as far as practicable be the manufacturer's standard make and shall be of first grade industrial quality, from reputable manufacturers, suitable for the purpose intended and subject to approval by Owner.
2. Components used in the assembly of the system shall be standard, commercially available components and shall be manufactured by companies regularly engaged in the manufacture of the components. The design shall provide for the interchangeability of items of piping, equipment, sub-assemblies, motors, starter, relays, and other devices.
3. Mixing of metric and United States customary units (non-metric) standards on the same equipment is not permitted.
4. Products or composite materials containing asbestos shall not be utilized.
5. When two or more items of equipment are required, they shall be products of a single manufacturer.
6. Work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards.
7. For purposes of designating type and quality of work under Divisions 05, 11, 22, 26, and 33, the contract documents are based on products by manufacturers listed in Part 2 – Products of each Section. This is not intended to limit competition but to clearly communicate the design intent and the characteristics and features required.
8. The language of text for documents shall be English.
9. Dimensions shall be displayed in U.S. customary units.
10. Electrical apparatus shall be UL listed and bear UL label.
11. A corrosion-resistant identification plate clearly marked and stamped with the manufacturer's name and address, model number, serial number, date of manufacture, and pertinent utility or operating data (or ratings) shall be attached in a prominent location to each major piece of equipment.

B. Qualifications of Manufacturer:

1. Manufacturer shall be a reputable manufacturing firm, regularly engaged in the design and manufacture of the type of equipment specified. Manufacturer shall operate an installation and repair department, and shall maintain a reasonable supply of spare parts.

2. Manufacturer shall demonstrate at least five years' experience designing, manufacturing, installing, and providing product support for specialized equipment of this type. Manufacturer may be requested to submit a list of at least five locations where similar equipment is installed and operating. Manufacturer shall be responsible for providing equipment of highest quality and workmanship, which will perform specified functions reliably and safely, and shall permit required maintenance procedures with minimum interference of service or degradation of reliability. In addition, commercial literature or drawings of these models shall be furnished for illustration.
3. Manufacturer shall employ a quality assurance program that meets the requirements of the current ANSI ISO 9001 and that satisfies all safety-related quality assurance requirements imposed by applicable government regulatory agencies.

C. Qualifications of Installers:

1. If the installer is other than the manufacturer, the installation shall be carried out under the direction of a qualified supervisor who is employed by Contractor, approved by equipment manufacturer, and who is thoroughly experienced and trained in the pertinent crafts, and who shall be present at the site who will work with the installer and direct the installation work.
2. The installer shall employ an adequate number of specialists who are skilled workmen and who are thoroughly trained and experienced in the methods and requirements necessary for the proper execution of work under this section.

D. Substitutions: Where products or manufacturers are listed, make submittals for proposed comparable products or substitutions to the Engineer for approval.

E. Permits and Tests: Obtain all necessary permits from the State and other authorities having jurisdiction, make application and file all drawings required for such permits, and pay all permit fees. Arrange inspections and tests required by governing authorities and by Owner, and pay all costs connected therewith. Obtain and file with Owner written evidence that the above requirements have been met.

F. Applicable Codes:

1. Work shall conform to Federal, State, and local governing rules and regulations and ordinances including OSHA and NFPA, and shall pass inspection by authorities having jurisdiction.
2. For components not manufactured in the United States of America, materials shall comply with the current ISO 9001 quality standards. If there is a discrepancy between the non-USA standards and the USA standards the most stringent shall apply and shall be approved by Engineer.
3. Furnish all materials and labor required to meet these specification requirements and to obtain approvals of inspections and tests required by the jurisdictional authorities.

G. Certificates:

1. Furnish an affidavit certifying that all materials and workmanship comply with the applicable code requirements.

2. Before final acceptance, furnish certificates of the authorities having jurisdiction.
- H. Certificates of Compliance: Upon delivery of the equipment, submit certificates of compliance. Each certificate shall be signed by an authorized representative of the manufacturer stating that the equipment complies in all respects with contract requirements.
- I. Warranty: All equipment shall be warranted in accordance with the contract documents and the following provisions:
  1. Contractor warrants that the work performed, and all materials and equipment furnished hereunder by Contractor or his subcontractors or suppliers will be free from defects in design, material, workmanship and operation for a period of one year from the date of final acceptance except for special warranties as specified in the individual sections.
  2. Contractor shall remedy any such defect at his own expense.
  3. Work that has been abused or neglected by Owner is excluded from this warranty.
  4. Contractor shall furnish written warranties required by the respective sections of the specifications for terms required therein. These warranties shall be in writing, on Contractor's or supplier's letterhead and shall be included in the operations and maintenance manual(s) as specified in this section.
  5. Major equipment components (as required by the respective sections of the specifications), specifically those manufactured by other than the primary equipment supplier, shall be covered by their own respective warranties, which shall not be less than the supplier's standard warranty. These warranties shall also be included in the operations and maintenance manual(s).
  6. Nothing in these requirements, conditions, or specifications including Owner's right to a complete inspection shall constitute a disclaimer to or limit, negate, exclude, or modify in any way any warranty created hereunder.

#### 1.06 DELIVERABLES

- A. Operation and maintenance manuals.
- B. Training program.
- C. Certificates.
- D. Special Tools: Two of each special tool, and instruments if any, required for operation or maintenance, packed in two appropriate steel tool boxes.
- E. Approved spare parts.
- F. Matching touch-up paint for each color used to permit retouching.

#### 1.07 VERIFICATION OF DIMENSIONS

- A. Contractor shall be responsible for coordination and proper relation of work with the site and with the work of all trades.

- B. Contractor and Manufacturer shall verify dimensions of the site and related equipment as they relate to the equipment to be fabricated and notify Engineer of any discrepancy before fabrication and delivery of the item to the site.
- C. Surfaces to receive metal fabrications shall be sound, square, and true. Such surfaces shall be examined prior to installation of the fabrications and all defects which might impair the operability or shorten the life of any part of the item shall be corrected.

#### 1.08 OPERATION AND MAINTENANCE MANUALS

- A. Manuals shall be submitted for each equipment item as follows:
  - 1. A minimum of three copies of sample formats and outline of contents in draft form 90 days prior to the earliest scheduled equipment delivery to be submitted to Engineer for approval.
  - 2. A minimum of three copies of complete manual in final form for Engineer approval 30 days before equipment initial delivery date.
  - 3. A minimum of five copies of approved manual after the equipment is installed, ready for acceptance test and to perform training.
  - 4. A minimum of five copies of final approved manual after the equipment is installed, the acceptance test has been approved, and training has been performed and completed. The manuals shall be updated based on input from Owner and Engineer during acceptance testing and training, for all sections of the manual. The manuals shall show final as-built installed material, conditions, procedures, and drawings. One of the copies shall be configured for the harsh shop environment by inserting all single pages in plastic laminate and foldout pages individually enclosed in clear plastic pockets.
- B. Manuals shall be prepared from the following materials:
  - 1. Loose leaf, on minimum 24-pound, punched paper.
  - 2. Entire length of margin with holes reinforced with plastic.
  - 3. Page Size: 8-1/2 inches by 11 inches.
  - 4. Foldout diagrams and illustrations.
  - 5. Reproducible by dry copy xerography method.
  - 6. Oil-, moisture-, and wear-resistant plastic covers.
  - 7. Protruding plastic coated tabbed dividers, cross-referenced by number or color to sections identified on the table of contents shall separate sections.
  - 8. One electronic PDF file of all manual contents.
- C. General Requirements for Manuals:
  - 1. Manufacturer's operating manuals giving complete instruction relative to assembly, installation, operation, adjustment, lubrication, and maintenance, and complete parts list shall be furnished by Contractor for every item of machinery and equipment furnished by Contractor. The information shall be presented in a clear manner such as:

- B. Contractor and Manufacturer shall verify dimensions of the site and related equipment as they relate to the equipment to be fabricated and notify Engineer of any discrepancy before fabrication and delivery of the item to the site.
- C. Surfaces to receive metal fabrications shall be sound, square, and true. Such surfaces shall be examined prior to installation of the fabrications and all defects which might impair the operability or shorten the life of any part of the item shall be corrected.

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- a. For operating type procedures, the nomenclature for control positions, document test points, and indicating devices having panel nomenclature as it appears on the equipment panel, placard, or structure (i.e., "Set Master Switch to 'OFF'").
    - b. Enumerate and describe every component and its related parts, including identifying numbers and commercial equivalents where applicable.
    - c. Include cut away and exploded view drawings for identification of all parts.
  2. Manuals furnished may be manufacturer's standard publications in regard to size and binding provided they comply with specified requirements relative to quantity and quality of information and data.
  3. Manuals shall include copies of all approved shop drawings submitted.
  4. Manuals shall be bound in hard plastic covers. Illustrations shall be clear, and printed matter, including dimensions and lettering on drawings, shall be easily legible. If reduced drawings are incorporated into manuals, original lines and letters shall be heaved-up as necessary to retain their legibility after reduction. Larger drawings may be folded into manuals to page size.
  5. All material shall be in the English language. Sheets with English and another language on the same sheet shall be acceptable.
- D. Format manuals as follows:
1. Title page: Include the name and function of the equipment, manufacturer's identification number, and project specifications section number and title.
  2. Table of contents, in numerical order listing each section and subsection title with reference to the page on which each starts and a list of included diagrams and drawings.
  3. Index, in alphabetical order.
  4. Frontispiece: Recognition illustration of the equipment described in the manual.
  5. Manufacturer's literature describing each piece of equipment, including major assemblies and subassemblies, and giving manufacturer's model number and drawing number. Specific items included in this installation shall be indicated on the product data sheets. Excluded items may be crossed out if this configuration is more logical.
  6. Operation instructions including step-by step preparation for starting, operation, shutdown and draining, and emergency requirements.
  7. Control diagrams, as installed by the manufacturer.
  8. Sequence of operation by the control manufacturer.
  9. Wiring diagrams (as-installed) and color codes of electrical motor controllers, connections, and interlock connections.
  10. Diagrammatic location, function, and tag numbers of each valve.
  11. Maintenance instructions: Include step-by step procedures for inspection, operation, checks, cleaning, lubrication, adjustments, repair, overhaul,

disassembly, and re-assembly of the equipment for proper operation of the equipment. Include list of special tools which are required for maintenance with the maintenance information.

12. Possible breakdowns and repairs. Troubleshooting flow charts shall be included for diagnosis of any major system or control.
13. Manufacturer's parts list of functional components, control diagrams, and wiring diagrams, giving manufacturer's model number and manufacturer's part number.
14. "Long-Lead-Time" spare parts list for spare parts not readily available on the open market or for which it is anticipated ordering and delivery time will exceed 10 days.
15. List of nearest local suppliers of all equipment parts.
16. Recommended preventive maintenance schedule for major system components including lubrication schedule indicating type and frequency of lubrication.
17. Manufacturer's warranty and guarantee data.
18. Spare parts data as follows:
  - a. Complete lists of parts and supplies, with current unit prices and sources of supply.
  - b. List of additional items recommended by manufacturer to ensure efficient operation for period of 120 days.
19. Appendix: Include safety precautions, a glossary, and when available, copies of acceptance test reports and other relevant materials not previously specified to be submitted.
20. Delete from the manual information on material or equipment not used in the work.
21. The acceptance testing documents shall be included with the final manual.

E. Operating Diagrams:

1. Piping systems, electrical wiring diagrams, fuel oil, lubricating oil, water capacity diagrams, and other diagrams necessary for operation of machinery and equipment shall be furnished and installed where designated by Owner.
2. No single diagram shall show more than one system, or parts thereof.
3. Diagrams shall be reproduced by photographic process to a size not to exceed 18 inches by 24 inches and shall be complete and legible in all respects. Systems shall be subdivided into portions which are operable from location where diagrams are installed, and to provide intelligible information within specified size. They shall be made on white paper and vacuum-sealed in transparent plastic material impervious to moisture and oil and resistant to abrasion. Other formats, which are equal in clarity, sharpness, durability, and permanence, will be considered.

## 1.09 TRAINING PROGRAM

- A. Contractor shall be responsible for training as outlined in this section.

1. Maintenance management classes shall take place prior to use of the equipment by Owner.
  2. Mechanics training shall commence only after installation of the equipment is complete and acceptance tested.
  3. Training shall be conducted at the project site.
  4. Hours for training shall be between 7:00 am and 3:00 pm unless specifically permitted otherwise by Owner.
  5. Approved operation and maintenance manuals shall be used in the training.
- B. Ensure that the instructors teaching the training courses are familiar with technical information and able to utilize proper methods of instruction, training aids, audiovisuals, etc., to ensure effective presentations.
- C. Provide training aids, audiovisual equipment and visual aids for the conduct of the classes.
- D. Training materials will become property of Owner at conclusion of training.
- E. Submittal and Approval of Training Plans:
1. Meet with the Owner at least four weeks prior to the start of formal training. At that time, submit lesson plans and an outline of the training program and demonstrate training aids involved. Handouts shall be presented for approval and provided later in a ratio of one per student. Each location shall receive a complete set of prints and schematics.
  2. Submit in writing a plan for meeting the specification training requirements. The Owner will approve and then coordinate and schedule all training involved.
- F. Outline specific objectives for each of the courses.
1. The course shall include sessions in safety, machine operation, and a comprehensive seminar on learning basic skills/knowledge of each operation. The course shall include both classroom and practical exercise sessions and shall provide the mechanic with the basic knowledge necessary to utilize all training materials. Provide a detailed schedule outlining the length and content of each of these sessions in accordance with the guidelines established.
  2. The training program shall include familiarization with equipment operation and performance and detailed instruction in operation, maintenance, and test procedures, and shall as applicable provide a minimum of: Engineering and Management: 8 hours; Operating Personnel: 40 hours; Maintenance Personnel: 40 hours.

#### 1.10 GENERAL DESIGN AND FABRICATION REQUIREMENTS

- A. Equipment shall be designed, fabricated, installed, and adjusted to secure the best results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance and operation, and the highest standards of safety.
- B. All components used in the assembly of the system shall be standard, commercially available components and shall be manufactured by companies regularly engaged in the manufacture of the components. The design shall provide for the interchangeability



of items of piping, equipment, sub-assemblies, motors, starter, relays, and other devices.

- C. It is not the intent of these specifications to detail the design and fabrication of the several parts of the equipment, but it is expected that the type, material, design, workmanship, and fabrication of every part shall be fully adequate for the service required, durable, properly coordinated with all other parts, in accordance with the best industrial standards, and of the highest efficiency. The components of electric circuits shall be of ample and proper size, design, and material to avoid injurious heating, arcing, and all other objectionable effects which may reduce the efficiency of operation and economy of maintenance and upkeep below the best commercially available results. Minimum requirements are given herein for certain parts of equipment. Equivalent requirements approved by Owner shall apply to such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as whole shall also be considered as establishing proportionate general minimum standards for all parts of the equipment.
- D. Owner may permit variations from the requirements of these specifications to permit the use of the manufacturer's standard equipment, provided in his opinion such standard equipment is in every way adequate for the intended use and meets the full intent of these specifications. All such variations proposed by Contractor shall be called to the attention of Owner in writing and shall be made only if Engineer approved in writing.
- E. Certain design limitations, tests, etc., are herein specified as a part check on the adequacy of design, fabrication, and materials. These requirements do not cover all features necessary to ensure satisfactory and approved operation of the equipment. Conformity with these requirements shall, in no way, supersede the general requirements as to satisfactory and efficient operation of the equipment.

#### 1.11 NOISE AND VIBRATION ISOLATION

- A. Noise and vibration isolation pads shall be provided where required and shall be an approved type equipped with necessary bearing plates and bolts. They shall be specifically designed for the weights, speeds, and vibration characteristics of the equipment supported. The pads shall provide proper weight distribution to avoid distortion of the bedplates.
- B. Noise Level shall be in compliance with NEMA MG 1 Section 9.6 – Sound Power Level, and OSHA §1910.95 when measured in accordance with OSHA §1910.95 or IEEE 85.
- C. Bolts and other fastening in connection with these pads shall be effectively isolated.

#### 1.12 SHOP PAINTING

- A. Equipment shall be given one shop prime coat of approved rust-inhibitive paint containing at least 50 percent rust-inhibitive pigments and manufacturer's standard finish coat system unless otherwise indicated. Shop drawings shall indicate brand and type of paint for both the prime coat and finish coat systems. Coating system shall be as approved by Engineer for all major equipment items, unless otherwise indicated. All color selections shall be approved by Engineer.

- B. Surfaces shall be free of rust, scale, dirt, and oil before painting. Matching touch-up paint shall be provided in the amount of one quart of each color used to permit retouching.

#### 1.13 DELIVERY, STORAGE AND HANDLING

- A. Pre-assemble system to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Re-assemble on site according to manufacturer's instructions.
- B. Equipment and components shall be suitably packed or crated to prevent damage in transit or during handling. Items shall be carefully stored as required in a manner to avoid misalignment or distortion, and shall be adequately protected against damage by weather, construction, exposure, or other cause.
- C. All materials shall be delivered to the site with their original manufacturer's markings and identification intact. Reject materials that are damaged, improperly identified, or not in conformance with reviewed shop drawings and catalog cuts. Owner reserves the right to also reject such materials.
- D. Upon completion of work, leave the site and premises in good order. This includes removal of manufacturer-owned materials and shipping and packaging materials used by the manufacturer in support of delivery of the equipment being provided under this section.

### PART 2 – PRODUCTS

#### 2.01 EQUIPMENT

- A. Equipment, machinery, and materials shall be as specified in the various Sections of Divisions 05, 11, 22, 26, and 33.
- B. Equipment shall be factory-finished unless otherwise specified.
- C. Starters, controllers, disconnect switches, and start-stop stations shall be provided for all equipment. Correct sizing of starters and disconnect switches shall be joint responsibility of Contractor and the equipment or apparatus manufacturer.
  - 1. Electrical enclosures shall be NEMA 12 for indoor units above the rail and NEMA 4 for outdoor and below the rail indoors units unless otherwise noted on drawings.
  - 2. Starters shall be complete with two sets of auxiliary contacts: one set normally open; one set normally closed.
  - 3. For motors 25 HP or greater provide autotransformer type reduced voltage starters unless otherwise noted.
- D. Control devices necessary for proper operation shall be provided and shall be located to permit efficient operation of the equipment, and where possible shall be grounded in a factory fabricated NEMA approved control panel complying with requirements specified in Division 26.
- E. Switches, lights, and control functions shall be identified with legend plates. The plates shall be constructed of polyvinyl chloride material of laminated multiple constructions, and rout engraved with appropriate legends. The size of letters, colors, and legend

shall be submitted for approval. The legend plates shall be submitted for approval. The legend plates shall be mounted on the equipment in an approved manner. No decals will be accepted.

- F. Provide piping, fittings, valves, connections, etc., of a type and size as recommended by the equipment manufacturer that will properly interface with the piped services provided for plumbing and HVAC.
- G. All piping, valves, fittings, conduits, and wiring required for equipment installation shall comply with the applicable portions of Division 26.

## 2.02 FABRICATION

- A. Fabrication shall comply with contract documents and shop drawings.
- B. Fabricate equipment from newly manufactured materials, products, and components. Do not utilize used, refurbished, or remanufactured materials, products, or components. Surfaces shall not be warped (unless by design) and free of dents and distortions.
- C. Pre-assemble units to greatest extent feasible for shipping. Grind exposed welds flush.
- D. Field check for clearance and interferences before fabrication and relocate material and equipment furnished as required (if approved by Engineer) to eliminate interferences.

## 2.03 ELECTRICAL REQUIREMENTS

- A. Power supply for equipment shall be a single 480 volts, 3-phase, 60 hertz feed unless otherwise indicated.
- B. Equipment grounding shall be accomplished by means of separate grounding conductor in each conduit sized according to code. The grounding conductor shall have green insulation.
- C. Provide transformers for equipment as required to step down the specified supply voltage to provide lower voltage for controls and accessories and to provide voltage compatible with equipment as required.
- D. Wiring shall be provided for complete installation of all equipment and accessories and shall be adequate for proper operation of equipment.
- E. Provide a disconnect switch for each equipment item requiring electric power. Disconnect switch shall meet the requirements of the respective equipment item manufacturer and Division 26. Permanently label each disconnect switch to identify corresponding equipment item; labeling method shall be subject to approval of Owner. Make connection to secondary side of disconnect switch and provide all wiring and conduit with supports from this point, including wiring to controller and starters. Provide 480 volt, 230 volt, and 208 volt equipment with electric fusible disconnecting means sized and fused as required for each equipment item. All disconnect switches shall be fused with 200,000 amp limiter fuses. Provide 120 volt equipment with electric thermal overload disconnecting means sized as required for each equipment item. Wire and cable for light, power, and signal circuits shall conform to those specified in the National Electrical Code and Washington State Electrical Code. In no case shall maximum current carried exceed that specified by the National Electrical Code or the Washington State Electrical Code for the type of conductor used.

- F. Provide conduit where required; all wiring and conduit shall be in accordance with the requirements of Division 26.

#### 2.04 GASKETS AND FASTENERS

- A. Provide new gaskets wherever gasketed mating equipment items or pipe connections have been dismantled. Gaskets shall be in accordance with manufacturer's recommendations.
- B. Replace all assembly bolts, studs, nuts, and fasteners of any kind, which are bent, flattened, corroded, or have their threads, heads or slots damaged.
- C. Furnish bolts, studs, nuts, and other fasteners for make-up of connections to equipment and replace any of these items damaged in storage, shipment, or moving. Bolts shall comply with applicable SAE requirements including manufacturer's identification and certification of testing.

#### 2.05 HOLES, OPENINGS, AND INSERTS

- A. Provide holes and openings in floors, walls, ceilings, and roofs as required.
- B. Core drill holes in existing work using dustless method. Grout in holes in concrete walls, floor, and roof slabs after installation of equipment, and leave them in a completely neat and sealed condition.
- C. Install concrete inserts and flashing as required.

#### 2.06 CONCRETE FOUNDATIONS

- A. Provide concrete foundations for equipment as indicated on the drawings or as specified.
- B. Concrete and reinforcement shall conform to Division 03.
- C. Provide anchor bolts as required for equipment to be mounted. Size anchors for embedding in concrete and expansion anchors as recommended by the equipment manufacturer.
- D. Provide grouting as necessary to stabilize equipment bases to concrete foundations.
- E. Provide hard rubber shims and dampening pads as recommended by the equipment manufacturer for leveling of equipment and dampening of equipment vibration transmission.

#### 2.07 MOTORS AND DRIVES

- A. Motors:
  - 1. Motors shall be TENV or TEFC, NEMA Design "D" high efficiency makes equipped with sealed bearings. The motor shall bear the UL label and be constructed to standards of NEMA, IEEE, ANSI, and AFBMA. Insulation shall be Class "F." Temperature rating of motors shall not exceed that permitted by Class "B" insulation.
  - 2. The motors shall be brake motors and the brake shall be designed to 100 percent of the motor rating.

3. Horsepower ratings and sizes shall be selected at 104 deg F (40 deg C) ambient temperature for open motors, with service factor of 1.15 for open motors and unity for service factor for totally enclosed or drip-proof motors. Provide motors with epoxy encapsulated for severe usage in a corrosive atmosphere.
  4. Motors rated one horsepower or greater shall have a full-load power factor of 85 percent or higher. Motors rated 25 horsepower and over shall be designed for reduced voltage starting.
  5. Noise level shall comply with NEMA MG 1, Section 9.6 –Sound Power Level and OSHA Article 1910.95 when measured in accordance with IEEE 85.
  6. Motors shall be suitable for operation on the electrical service indicated.
  7. Motors shall be protected by overload devices to permit operation within their rating under all design load conditions. Provide each individual motor circuit with branch circuit over current protection in all three phases via safety fuses or fusesetrons.
- B. Drives:
1. Guards shall be provided for each coupling and belt drive in conformance with applicable codes.
  2. Belt drives shall have adjustable motor drive pulleys, and pulleys shall be replaced by Contractor if required to properly operate the equipment.
  3. Belt drives shall be adjusted and work belts replaced in sets. Speed adjustment shall be subject to approval of Owner.
  4. Provide sliding motor bases where adjustable motor drive pulleys are provided.
- C. Motors and drives shall be checked carefully for correct rotation and alignment before placing equipment into operation.
- D. Couplings shall be disconnected and realigned before placing into service or testing.

### **PART 3 – EXECUTION**

#### **3.01 PREPARATION**

- A. Transmit submittals and deliverables required by this section.
- B. Furnish products as indicated.
- C. Ensure that substrates are in suitable condition to receive the work of this section.

#### **3.02 INSTALLATION**

- A. Ensure that all information regarding the scheduling, delivery, and preparations necessary for setting up the equipment to be supplied under this specification is verified with the equipment manufacturer and reviewed by Engineer and Owner prior to commencement of the work.
- B. Furnish common and skilled labor, tools, rigging equipment, scaffolding, shims, and other materials necessary to make complete installation of equipment as specified and indicated in the contract documents.

- C. Receive, unload, check, and store equipment in suitable facilities. All equipment should be kept clean, dry, and free from damage and be marked and tagged with equipment item numbers.
- D. Examine equipment for concealed damage and report any damage.
- E. Be responsible for safety and protection from loss or damage of equipment received until work is complete.
- F. Pay demurrage charges and claims for damage resulting from unloading operations.
- G. Reassemble equipment items that were dismantled for shipment or moving. Assemble items that are delivered knocked-down or disassembled.
- H. Coordinate installation of equipment with other trades.
- I. Install equipment in accordance with manufacturer's instructions and approved shop drawings.
- J. Protect equipment during storage and prior to start-up, which shall include covering of openings, protection against rust and other damage, etc. Equipment may be stored outdoors only with approval of Owner.
- K. Provide grout, shim material, and miscellaneous steel necessary for brackets, anchors, or supports required in installation of equipment.
- L. Accomplish field machining that might be required to fit equipment together or to install equipment.
- M. Lubricate apparatus before start-up.
- N. Field check for clearance and interferences before fabrication or installation and relocate material and equipment furnished as required to eliminate interferences.
- O. Details listed in these specifications are given for a better understanding of the work required by Contractor, and do not place a limitation on the amount of work to be done nor do they relieve Contractor of additional work that may be required for a complete installation.
- P. Perform mechanical and electrical work required to install the equipment in accordance with the requirements of the jurisdictional authorities and the current applicable codes and standards of practice employed by these trades.
- Q. Upon completion of work, leave the site and premises in good order. This includes removal of temporary installations, manufacturer-owned materials, and shipping and packaging materials used by the manufacturer in support of delivery of the equipment being provided under this section.

### 3.03 SETTING AND ALIGNING EQUIPMENT

- A. Equipment shall be set and aligned in accordance with manufacturer's recommendations, approved shop drawings, and applicable standards of trade practice.
- B. Equipment shall be set true and level. Demonstrate adequate leveling of installed equipment.
- C. Retighten bolted connections after installation.

### 3.04 FIELD QUALITY CONTROL

- A. Engineer and Owner will periodically inspect work during the course of construction.
- B. Provide for inspections by all others having jurisdiction over the work performed under the various Sections of Divisions 05, 10, 11, and 33 during the progress of work.
- C. At time of final inspection, furnish certificate or certificates of final approval by all agencies having jurisdiction as applicable.

### 3.05 CLEANING AND PROTECTION

- A. Clean fabricated assemblies and equipment items thoroughly before and after operating and testing.
- B. Protect equipment from damage, deterioration, paint or coating spills or spots, corrosion, or harm from any source.

### 3.06 FIELD PAINTING

- A. Field painting equipment including touch-up painting, if any, is included under this section. Normally, equipment shall be factory-finished as previously specified.
- B. Where factory finishes are provided on equipment and no additional field painting is specified, all marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish at the time of final inspection.

### 3.07 EQUIPMENT TEST AND CHECKOUT

- A. Submit an acceptance test procedure to Engineer for approval a minimum of 60 days prior to the start of the equipment test and checkout.
- B. The manufacturer shall first demonstrate the acceptance test procedure to Contractor before it is demonstrated to Owner and Engineer. When the manufacturer has demonstrated compliance with all requirements of the procedure to Contractor's satisfaction, Contractor shall submit to Engineer the filled out test procedure. Upon review, only then can the Final Acceptance test by Owner and Engineer be scheduled.
- C. Before Final Acceptance, Contractor-furnished equipment shall be tested in the presence of Owner and Engineer and demonstrated to Owner's and Engineer's satisfaction to be correctly connected, functioning, and installed.
- D. Testing and checkout procedures of the manufacturer shall be carried out completely.
- E. The acceptance tests shall not only be performed to demonstrate that the equipment has been properly installed and connected and operates properly but also to demonstrate that the equipment performs the work for which it is intended. It shall also demonstrate the operation of all pertinent safety devices including but not limited to the operations of limit switches and warning devices.
- F. Tested equipment found to be defective or inoperable to any extent shall be reported to Owner immediately.
- G. Any operating difficulty or defective item shall be repaired or replaced and put into proper operation by Contractor immediately, at no additional expense to Owner.
- H. Protect equipment and surrounding areas from damage resulting from testing operations. Clean up spills or leakage from testing.

- I. All materials for acceptance testing shall be provided by the manufacturer with the exception of Owner's vehicle.
- J. Contractor shall bear the expense of all tests, including the furnishing of necessary instruments, lubricants, hydraulic fluids, supplies, data recorders, and operating personnel. Provide and bear all expenses for fuel/power required to operate the equipment during the tests.
- K. Owner will provide pertinent railroad vehicles and/or railroad vehicle components (e.g., wheelsets) required for acceptance testing, with the exception of calibrated vehicle components which are the responsibility of the Contractor.
- L. At the sole discretion of Owner, Contractor shall be required to repeat any test at no additional cost to Owner.
- M. Owner shall determine final acceptance of the installed equipment upon successful completion of the approved test program plan.
- N. Conformed copies of the acceptance test procedure shall be available at the start of acceptance testing.

### 3.08 START-UP AND INSTRUCTIONS

- A. Unless otherwise specified, all lubricants, cleaning compounds, and similar operating materials required for instruction of Owner's personnel will be furnished by Owner.
- B. After all equipment and systems have been installed, connected, and tested, proceed with the simultaneous start-up and initial operation of the entire facility as well as the instruction of Owner's personnel in the operation and maintenance of equipment. Provide sufficient personnel to adequately complement personnel made available by Owner.
- C. During this period, provide qualified representatives of equipment manufacturers for instruction of Owner's personnel in operation and maintenance of the equipment.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.01 RELATED DOCUMENTS**

- A. Section 26 00 00 – Electrical General Conditions

### **1.02 WORK INCLUDED**

- A. Work under this section includes all requirements for motor controls to be furnished under the electrical portion of the work on all electrical motor driven equipment. Individually mounted starters shall be provided by Division 26 Contractor. Motor controls shall conform to NEMA Standards for each specific purpose.
- B. The Division 26 Contractor shall furnish all motor controllers not included with equipment furnished under other divisions of these specifications or by Owner. The Division 26 Contractor shall install all motor controllers including all controllers not factory assembled into equipment furnished under other divisions of these specifications or by Owner.

### **1.03 MOTOR VOLTAGE INFORMATION**

- A. Voltages available are 480 Volt, 3 phase or 208 Volt, 3 Phase, and 115 Volt Single Phase.
- B. Circuits are designed (in general) for motors as follows:
  - 1. Smaller than 1/2 H.P. - 115 Volts, Single Phase 1/2 H.P. and larger - 460 or 200 Volts, 3 Phase
- C. Verify motor sizes and voltages provided under other divisions and notify General Contractor immediately if any discrepancies are noted.

### **1.04 REGULATORY REQUIREMENTS**

- A. Provide motor protection switches of the appropriate NEMA size. For units not using NEMA rating, use equivalent NEMA size.

## **PART 2 - PRODUCTS**

### **2.01 MOTOR STARTERS**

- A. Magnetic Motor Starters: Unless noted otherwise, shall be full voltage non-reversing with three overloads sized to suit nameplate amperes of motor served, motor "On" and "Off" pilot lights, "Hands-Off-Auto" switch, and auxiliary contacts for interlocking.
- B. Combination Motor Starter/Disconnect: Shall be fused switch type with all features of Paragraph A above. In addition, provide disconnect switch auxiliary contacts for disconnection of externally powered control circuits where applicable. Fuses shall be sized in accordance with motor manufacturer's requirements.

- C. Manual Starters: Shall be toggle switch or push-button type, lockable in the "Off" position, with overload relays, pilot light and enclosure pursuant to Paragraph D below. Manual starters shall only be used where specifically shown or called out on the drawings and only for single phase, fractional horsepower motors.
- D. Enclosures: All motor controllers shall be contained in an enclosure suitable for the environment in which the controller is mounted, and shall be weatherproof when exposed to weather.
- E. Overload Devices: Shall be melting alloy or bimetallic type. One overload shall be provided for each phase. Provisions shall be made for resetting the overload devices from outside the starter enclosure. Provide ambient compensated overload devices only when the motor is at a constant temperature and the controller is subject to a separate, varying temperature. Automatic reset overload devices are not permitted.

#### 2.02 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. Allen Bradley
- C. General Electric
- D. Cutler-Hammer
- E. Siemens

#### 2.03 NAMEPLATES

- A. Pursuant to Section 26 00 00, Paragraph 2.05, provide nameplates permanently attach (with screws on NEMA 1 enclosures) on each controller, nameplates with the following information: Load served, voltage, phase, short circuit rating, panel/circuit number and where applicable fuse size and type.

#### 2.04 POWER FACTOR CORRECTION

- A. Provide power factor correction capacitors for all motors 25 horsepower and above. Capacitor size when indicated on the drawings is an approximation only. Final size shall be determined by the Contractor based on the recommendations of the motor manufacturer to bring the power factor to between 0.9 and 0.95. All capacitors are to be fused, with blown fuse indicators mounted on the front of the unit. Provide discharge resistors when required by code.

### **PART 3 - EXECUTION**

#### 3.01 FINISHED AREAS

- A. In finished areas, mount motor protection switches flush and install suitable coverplates.

#### 3.02 HEATERS

- A. Install heaters co-related with full-load current of motors provided.

#### 3.03 OVERLOADS

- A. Set overload devices to suit motors provided.

3.04 SUPPORTS

- A. Securely mount to equipment, wall or acceptable mounting frame.

3.05 FAN SHUTDOWN WIRING

- A. Provide wiring interlock connections for all (over 2000 cfm) fan starter control circuits via Division 23 furnished fan shutdown relay to shutdown fans upon receipt of Fire Alarm.

3.06 CONNECTION TO MECHANICAL EQUIPMENT ON ROOFS

- A. The Contractor shall coordinate all roofing penetrations with the general contractor and roofing contractor to assure that the roofing warranty is maintained.
- B. Attachment of conduits to the roof to serve mechanical equipment and devices shall comply with Section 26 05 33.

3.07 MECHANICAL EQUIPMENT NAMEPLATE RATINGS

- A. The Division 26 Contractor shall verify that the nameplate ratings of the mechanical equipment, when they arrive on site, are consistent with the ampacity called out on the drawings. The Contractor shall bring any discrepancies to the Engineers attention prior to installation of conduit and wiring.

END OF SECTION

## **PART 1 - GENERAL**

### **1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. The provisions and intent of the Contract, including the General Conditions and General Requirements, apply to this work as if specified in this section. Work related to this Section is described in the following sections:
  - 1. Section 02 41 13 – Selective Site Demolition
  - 2. Section 31 00 00 – Earthwork
  - 3. Section 34 11 16 – Field Welding
  - 4. Section 34 11 32 – Timber Ties

### **1.02 DESCRIPTION OF WORK**

- A. The Work consists of pavement composed of unreinforced and reinforced Portland cement concrete, constructed on a prepared subgrade or subbase course in accordance with these specifications and conforming to the lines, grades, thicknesses and typical cross sections indicated on the drawings.

### **1.03 SUBMITTALS:**

- A. Submit the following in accordance with Section 01 13 00 – Submittals and Shop Drawings:
  - 1. Product Data: Submit the proposed design mixes for the concrete required for this portion of the Work. Also, submit the manufacturer's name and catalog number of items, such as membranes; all admixtures; and the name and address of the proposed concrete supplier.

### **1.04 PRODUCT HANDLING**

- A. Ready-mix concrete shall be placed in its final position within one hour after adding cement.
- B. Retempering: Mix concrete only in such quantities as are required for immediate use and as will be used while fresh before initial set has taken place. Concrete which has developed initial set shall not be used. Concrete which has partially hardened shall not be retempered or remixed.
- C. Protection: Use all means necessary to protect concrete materials before, during, and after installation and to protect the installed work and materials of all other trades.

## **PART 2 - PRODUCTS**

### **2.01 CONCRETE:**

- A. General:
  - 1. All concrete shall be batched and mixed at an approved plant.
  - 2. The control of concrete production shall be under supervision of a recognized testing laboratory, selected and paid for by the Contractor, who shall design the mixes and furnish inspection of batched aggregates at the mixing plant.

B. Quality:

1. The paving concrete shall have a minimum flexural strength of 650 psi and a minimum allowable cement content of 5.2 sacks of cement per cubic yard.
2. The minimum flexural strength specified is the strength at seven days for high-early-strength concrete. For plant-mix concrete, a certificate showing proportions and the three day strength of the concrete mix being furnished shall be obtained from the supplier and furnished to the Engineer.

C. Cement:

1. All cement shall be Portland cement conforming to ASTM Designation C150, (Type II) (Type III), and shall be the product of one manufacturer.

D. Aggregate:

1. General: Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, crushed slag, or natural sand. The aggregate shall be composed of sound, tough, durable particles and shall not exceed the limits for deleterious substances given in ASTM C33. The aggregate in a size group shall not contain more than eight percent by weight of flat or elongated pieces. A flat or elongated particle is one having a ratio between the maximum and the minimum dimensions of a circumscribing rectangular prism exceeding 5 to 1.
2. The percentage of wear shall not exceed 40% when tested in accordance with ASTM C131.

- E. Fine Aggregate: Fine aggregate for Portland cement concrete shall consist of sand or other inert Materials, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Coarse aggregate shall be washed thoroughly to remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious Material. Gradation of fine aggregate shall be as indicated in the following table:

TABLE 32 13 00 – A, Fine Aggregate Gradation		
Sieve Size	Percent Passing	
	Maximum	Minimum
US No. 4	100	95
US No. 8	95	85
US No. 16	80	45
US No. 30	60	40
US No. 50	30	10
US No. 100	10	2
US No. 200	2.5	0

- F. Coarse Aggregate: Coarse aggregate for Portland cement concrete shall consist of sand or other inert Material or combinations thereof approved by the Engineer, having hard, strong, durable pieces free from adherent coatings. Coarse aggregate shall be washed thoroughly to remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious Material. Gradation of coarse aggregate shall be as indicated in the following table:

TABLE 32 13 00 – B, Coarse Aggregate Gradation		
Sieve Size	Percent Passing	
	Maximum	Minimum
1" Square	100	-
3/4" square	100	80
3/8" square	40	10
US No. 4	4	0
US No. 200	0.5	0

- G. Water: Water used in mixing or curing shall be as clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product as possible. Water will be tested in accordance with the requirements of ASTM C94M Section 5.1.3, Tables 2 and 3. Water known to be of potable quality may be used without testing.

H. Admixtures:

1. General: All admixtures shall be supplied by one manufacturer approved by the Engineer.
2. Air-Entraining Agents: Shall meet the requirements of ASTM C260 and shall be added to the mixer in the amount necessary to produce 6% entrained air; plus or minus 1%.
3. Water-Reducing Agents: Shall be Fly-Ash, Master Builders' Pozzoloth, or approved equal, conforming to ASTM C494, Type A for water-reducing, Type D for water-reducing and retarding, and Type E for water-reducing accelerating.
4. Accelerators: Shall be approved by the Engineer prior to use.
5. Retarders: Shall be approved by the Engineer prior to their use.

2.02 COVER MATERIALS FOR CURING:

A. Curing materials shall conform to one of the following specifications:

1. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C309, Type 2.

2. White polyethylene film for curing concrete shall conform to the requirements of AASHTO M-171.
3. Waterproof paper for curing concrete shall conform to the requirements of ASTM AASHTO M-171.
4. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of AASHTO M-171.

#### 2.03 JOINT SEALER AND JOINT FILLER:

- A. Joint-sealing materials shall meet the requirements of WSDOT 9-04.1(2) and 9-04.10.
- B. Elastomeric joint sealant shall be BUNA-N/nitrile rubber sealant, Ruscoe Permanent Sealer 983 or approved equal.
- C. Joint filler shall be a semi-rigid, non-extruding, resilient type, closed-cell polypropylene foam, preformed joint filler with the following physical properties as tested to ASTM D545 Standard Test Methods. Joint filler diameter shall be in accordance with recommendations of joint filler and joint sealant manufacturer for the width of the joint.

### **PART 3 - EXECUTION**

#### 3.01 PREPARATORY WORK:

- A. Inspection:
  1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
  2. Verify that all items to be embedded in concrete are in place, properly oriented, located and secured.
  3. Verify that concrete may be placed to the lines and elevations indicated on the drawings with all required clearance for reinforcement.
- B. General:
  1. Thoroughly clean all areas in which concrete is to be placed. Clean and roughen existing concrete to provide a bondable surface. Concrete forms which have not been treated with oils, waxes, or other bond breakers shall be thoroughly wet prior to placing concrete.
  2. Clean transporting and handling equipment of all hardened concrete.

#### 3.02 EQUIPMENT:

- A. General: Equipment and tools necessary for handling materials and performing all parts of the Work shall be approved by the Engineer as to design, capacity and mechanical condition. Before the start of construction operations, have equipment at the job site for examination and approval.
- B. Batch Plant: Ready-mixed concrete plants shall be approved and certified by the NRMCA. Ready-mixed concrete shall be batched with equipment and in accordance with WSDOT M41-10, Section 5-05.3(3)B. Truck mixers used for mixing and hauling

concrete, and truck agitators used for hauling plant-mixed concrete, shall conform to the requirements of WSDOT M41-10, Section 6-02.3(4)A.

C. Finishing Equipment:

1. Finishing Machine: The finishing machine shall be equipped with one or more oscillating-type transverse screeds.
2. Vibrators: For side-form construction, vibrators shall be the internal type with either immersed tube or multiple spuds, for the full width of the concrete slab. They may be attached to the spreader or the finishing machine, or they may be mounted on a separate carriage. They shall not come in contact with the joint, load-transfer devices, subgrade, or side forms. The frequency shall not be less than 7,000 vibrations per minute for spud vibrators. When spud-type internal vibrators are used adjacent to the side forms, they shall have a frequency of not less than 3,500 vibrations per minute. Use hand vibrators to consolidate the concrete along forms and other isolated areas.

D. Concrete Saw: Provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions and at the required rate. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at the site of the Work at all times during sawing operations. Provide adequate artificial lighting facilities for night sawing.

E. Forms: Straight-side forms shall be made of steel having a thickness of not less than 7/32 inch and shall be furnished in sections not less than ten feet in length. Forms shall have a depth equal to the prescribed edge thickness of the concrete without horizontal joint, and a base width equal to the depth of the forms. Provide forms with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Flange braces shall extend outward on the base not less than two-thirds the height of the form. Remove forms with battered top surfaces and bent, twisted, or broken frames from the work site. Do not use repair forms until inspected and approved. Do not use built-up forms, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 inch in ten feet, and the upstanding leg shall not vary more than 1/4 inch. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting.

3.03 FORM SETTING:

- A. Set forms sufficiently in advance of the concrete placement to ensure a continuous paving operation. After the forms have been set to correct grade, tamp the grade thoroughly, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Stake forms into place with not less than three pins for each ten foot section. Place a pin at each side of every joint.
- B. Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/4 inch at any joint. Set forms so that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Clean and oil forms prior to the placing of concrete.



- C. Check the alignment and grade elevations of the forms and make corrections immediately before placing the concrete. When a form has been disturbed or the grade has become unstable, reset and recheck the form.
- D. Slip forms will not be allowed.

#### 3.04 CONDITIONING OF UNDERLYING COURSE, SIDE-FORM CONSTRUCTION:

- A. Without saturating, moisten the prepared grade with water immediately ahead of concrete placement, to prevent rapid loss of moisture from the concrete. Fill ruts or depressions in the subgrade or subbase caused by hauling or usage of equipment with suitable material (not with concrete or concrete aggregates) as they develop and thoroughly compact by rolling. Correct damage to the subbase, if any, at no additional expense to the Contractor. A multiple-pin template weighing not less than 1,000 pounds per 20 feet or other approved template shall be provided and operated on the forms immediately in advance of the placing of the concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. The templates shall be adjustable so that they may be set and maintained at the correct contour of the underlying course. The adjustment and operation of the template shall be such as will provide an accurate retest of the grade before placing the concrete thereon. Remove all excess material. Low areas may be filled and compacted to a condition similar to that of the surrounding grade, or filled with concrete integral with the pavement. In cold weather, protect the underlying subbase so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying material will not be permitted. Maintain the template in accurate adjustment at all times, and check daily. The work described under the foregoing paragraphs does not constitute a regular subgrading operation, but rather a final accurate check of the underlying course.

#### 3.05 PROPORTIONS:

- A. Prior to the start of paving operations and after approval of all material to be used in the concrete, submit test data showing the proportions and actual flexural strength obtained from the concrete. Flexural strength shall be as specified at seven days using test specimens prepared in accordance with ASTM C31 and tested in accordance with ASTM C78. The mix determined shall be workable concrete having a slump between one and two inches as determined by ASTM C143.
- B. The minimum cement content shall be maintained to produce concrete of suitable durability and workability. The maximum water-cement ratio specified for concrete shall not be exceeded. Entrained air shall be required to increase durability and provide workability.
- C. The cement content shall not be less than 5.2 sacks per cubic yard, nor shall the water-cement ratio, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates, be more than six gallons per sack of cement. The cement content shall be determined in accordance with ASTM C138.
- D. Add air-entraining admixture evenly to ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed, air-entrained concrete shall be based upon trial, mixed with the materials to be used in the work and adjusted to produce concrete of the required plasticity and workability. The percentage of air

entrainment in the mix shall be 6% plus or minus 1 percentage point. Air content will be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate.

- E. Pozzoloth or Fly-Ash admixture may not be added to the design mix without the prior approval of the Engineer.

### 3.06 FIELD TEST SPECIMENS:

- A. Furnish concrete samples taken in the field to determine the consistency, air content and strength of the concrete. Flexural test beams will be made each day that concrete is placed. Each group of test beams will be molded from the same batch of concrete and will consist of a sufficient number of specimens to provide two flexural strength tests at each test age. One group of specimens will be made during the first half of each shift and the other during the last portion of the shift. The specimens will be made in accordance with ASTM C31. However, at the start of paving operations and when the aggregate source, aggregate characteristics, or mix design is changed, additional groups of test beams may be required until the Engineer is satisfied that the concrete mixture being used complies with the strength requirements of these specifications. Test ages will be three days and seven days.
- B. The flexural strength of the concrete shall meet the following requirements:
  - 1. The average of any four consecutive strength tests, tested at the end of seven days, shall have an average flexural strength equal to or greater than the specified flexural strength.
  - 2. Not more than 20% of the beams tested at the end of seven days shall have a flexural strength less than the specified strength.
- C. Specimens which are obviously defective shall not be considered in the determination of the strength. When it appears that the test specimens will fail to conform to the requirements for strength, the Engineer shall have the right to order changes in the concrete sufficient to increase the strength to meet these requirements. When a satisfactory relationship between three day and seven day strengths has been established and approved, the three day test results may be used as an indication of the seven day strengths. However, the three day test results will not replace the results of the seven day tests if the seven day results fall below the requirement.
- D. Test Failure: If the three day (72-hour) test break does not indicate a flexural strength of 40.0%, or greater, of the design strength, then all the concrete of that mix lot shall be removed and wasted, unless otherwise directed by the Engineer.

### 3.07 MIXING CONCRETE:

- A. Ready-mixed concrete shall be mixed and delivered in accordance with the requirements of WSDOT M41-10, Section 6-02.3(4), 6-02.3(4)A and 6.02.3(4)B.

### 3.08 LIMITATIONS OF MIXING:

- A. Do not mix, place, or finish concrete when the natural light is insufficient, in the opinion of the Engineer, unless an adequate and approved artificial lighting system is operated.

- B. During periods of warm weather when air temperature exceeds 85°F., sprinkle the forms and the underlying material with water immediately before placing the concrete. Place the concrete at the coolest temperature practicable, and in no case shall the temperature of the concrete exceed 90°F. when placed. Cool the aggregates and mixing water as necessary to maintain the concrete temperature below the specified maximum.

### 3.09 PLACING CONCRETE:

- A. Deposit the concrete on the moistened grade to require as little rehandling as possible. Unless truck agitators are equipped with means for discharge of concrete without segregation of the materials, the concrete shall be unloaded into an approved spreading device and mechanically spread on the grade to prevent segregation of the materials. Placing shall be continuous between transverse joints without the use of intermediate bulkheads. Necessary hand spreading shall be done with shovels, not rakes. Do not allow workmen with boots or shoes coated with earth or foreign substances to walk in the freshly placed concrete.
- B. When concrete is to be placed adjoining a previously constructed lane of pavement and when mechanical equipment will be operated upon the existing lane of pavement, the concrete shall be at least three days old and at a flexural strength approved by the Engineer. If only finishing equipment is carried on the existing lane, and if approved by the Engineer, paving in adjoining lanes may be permitted after two days.
- C. Consolidate concrete against and along the faces of all forms and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete. Do not permit vibrators to come in contact with a joint assembly, the grade, or a side form. In no case operate the vibrator longer than 15 seconds in any one location, nor shall the vibrators be used to move the concrete.
- D. Deposit concrete as near to joints as possible without disturbing the joint, but do not dump from the discharge bucket or hopper onto a joint assembly unless the hopper is well centered over the joint assembly.
- E. If concrete material falls on or is worked into the surface of a completed slab, remove the material immediately by methods approved by the Engineer.

### 3.10 JOINTS:

- A. General:
  - 1. Longitudinal and Transverse Joints: Construct longitudinal and transverse joints as indicated on the drawings and in accordance with these requirements. Construct all joints true to line with their faces perpendicular to the surface of the pavement. Joints shall not vary more than 1/2 inch from a true line or from their designated position. Finish the vertical surface of the pavement adjacent to all expansion joints to a true plane and edge to a radius of 1/4 inch or as indicated on the drawings. Test the surface across the joints with a ten foot straightedge as the joints are finished, and correct all irregularities in excess of 1/4 inch before the concrete has hardened. Accurately form keyways, where required, with a template of metal or wood. The gauge or thickness of the material in the template shall be such that the full keyway, as specified, is formed and is in the correct

location. Place transverse joints at right angles to the centerline of the pavement, extending the full width of the slab. Place transverse joints in succeeding lanes in line with similar joints in the first lane. Prepare, finish, or cut all joints so as to provide a groove of the width and depth indicated on the drawings.

2. Tie Bars: Tie bars shall consist of deformed bars installed principally in longitudinal joints as indicated on the drawings. Place tie bars at right angles to the centerline of the concrete slab, spaced at intervals of 30 inches, unless otherwise specified. Position parallel to the pavement surface and midway between the surfaces of the slab. When tie bars extend into an unpaved lane, they may be bent at right angles against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. These bars shall not be painted, greased, or enclosed in sleeves.
3. Dowel Bars: Place dowel bars or other load-transfer units of an approved type across transverse joints in the manner noted on the drawings. They shall be of the dimensions and spacings indicated and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device that is to be left permanently in place. Rust-preventive paint, or an approved lubricant, applied to 2/3 of each dowel, shall prevent the concrete from binding to that portion of the dowel. If free-sliding plastic-coated or epoxy-coated steel dowels are used, employ a lubricating bond breaker except when approved pull-out tests indicate that it is not necessary. In lieu of using dowel assemblies at contraction joints, dowel bars may be placed in the full thickness of pavement by a mechanical device approved by the Engineer.

### 3.11 FINAL STRIKE OFF, CONSOLIDATION AND FINISHING:

#### A. Sequence:

1. The sequence of operations shall be the strike-off and consolidation, floating and removal of laitance; straight-edging; and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations generally will not be permitted. If the application of water to the surface is permitted, it shall be applied as fog spray by means of approved spray equipment.

#### B. Finishing at Joints:

1. The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material, under and around all load-transfer devices, joint assembly units and other features designed to extend into the pavement. Mechanically vibrate concrete adjacent to joints as required in paragraph 3.9. After the concrete has been placed and vibrated adjacent to the joints, the finishing machine shall be operated in such a manner as to avoid damage or misalignment of joints. If uninterrupted operation of the finishing machine to, over, and beyond the joints causes segregation of concrete or damage to or misalignment of the joints, stop the finishing machine when the screed is approximately eight inches from the joint. Remove the segregated concrete from the front of and off the joint; lift the screed and set directly on top of the joint; and resume the forward motion of the finishing machine. Thereafter, the finishing machine may be run over the joint without lifting the screed, provided

there is no segregated concrete immediately between the joint and the screed or on top of the joint.

C. Machine Finishing:

1. Spread the concrete as soon as it is placed, then strike off and screed with an approved finishing machine. Go over each area as many times and at such intervals as necessary to give the proper consolidation and to leave a surface of uniform texture. Avoid excessive operations over a given area. When side forms are used, keep the tops of the forms clean by an effective device attached to the machine and maintain the travel of the machine on the forms true without lift, wobbling, or other variation tending to affect the precision finish. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screed for its entire length. When the screed is in operation, move it forward with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing and manipulating so that neither end is raised from the side forms during the striking-off process. If necessary, repeat this procedure until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

D. Hand-Finishing:

1. Hand-finishing methods will not be permitted, except under the following conditions: In the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade and in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Strike off and screed concrete as soon as it is placed. Use an approved portable screed. Provide a second screed for striking off the bottom layer of concrete when reinforcement is used.

E. Floating:

1. After striking off and consolidating the concrete, further smooth, true, and consolidate by means of a longitudinal float using one of the following methods:
2. Hand Method: The hand-operated longitudinal float shall not be less than 12 feet in length and six inches in width, properly stiffened to prevent flexibility and warping. The longitudinal float, operated from footbridges resting on the side forms and spanning but not touching the concrete, shall be worked parallel to the pavement centerline with a sawing motion, while held in a floating position and passing gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or soupy material shall be wasted over the pavement edge on each pass.
3. Mechanical Method: The Contractor may use a machine composed of cutting and smoothing floats, suspended from and guided by a rigid frame. The frame shall be carried by four or more visible wheels riding on, and constantly in contact with, the side forms or pavement subgrade. If necessary, long-handled floats having blades not less than five feet in length and six inches in width may be used to smooth and fill in open-textured areas in the pavement. When strike-off and consolidation are done by hand and the crown of the pavement will not permit the

use of the longitudinal float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance shall be removed from the surface of the pavement by a straightedge ten feet or more in length. Successive drags shall be lapped one-half the length of the blade.

F. Straightedge Testing and Surface Correction:

1. After the pavement has been struck off and consolidated and while the concrete is still plastic, test for trueness with a 16 foot straightedge. For this purpose, use an accurate 16 foot straightedge swung from handles three feet longer than one-half the width of the slab. Hold the straightedge in contact with the surface in successive positions parallel to the centerline and go over the whole area from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Remove excess water and laitance from the surface of the pavement. Immediately fill depressions with freshly mixed concrete, strike off, consolidate, and refinish. Cut down and refinish high areas. Give special attention to ensure that the surface across joints meets the requirements for smoothness. Continue straightedge testing and surface corrections until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section. Confine the use of long-handled wood floats to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

3.12 SURFACE TEXTURE:

- A. Finish the surface of the pavement with a broom finish unless otherwise indicated on the Drawings. Apply the pavement surface finish when the water sheen has practically disappeared. Operate the equipment transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 1/16 inch in depth. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Correct imperfections resulting from the texturing operation.

3.13 SURFACE TESTS:

- A. As soon as the concrete has hardened sufficiently, test the pavement surface with a 16 foot straightedge or other specified device. Areas in a slab showing high spots of more than 1/4 inch but not exceeding 1/2 inch in 16 feet shall be marked and immediately ground down with an approved grinding machine to an elevation that will fall within the tolerance of 1/4 inch or less. Where the departure from the correct cross section exceeds 1/2 inch and when so directed by the Engineer, remove and replace the pavement at no additional expense to the City.
- B. An area or section so removed shall not be less than ten feet in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, remove and replace the remaining portion of the slab adjacent to the joints that is less than ten feet in length.

### 3.14 CURING:

- A. General: Immediately after the finishing operations have been completed and when marring of the concrete will not occur, cure the entire surface of the newly placed concrete in accordance with one of the methods below. In all cases in which curing requires the use of water, the curing shall have prior right to all water supply or supplies. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately satisfy both curing and other requirements, shall be cause for immediate suspension of concreting operations. Do not leave the concrete exposed for more than 1/2 hour during the curing period. The following are approved alternate methods for curing concrete pavements:
- B. Impervious Membrane Method: Uniformly spray the entire surface of the pavement with white-pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. Do not apply the curing compound during rainfall. Apply curing compound by mechanical sprayers under pressure at the rate of one gallon to not more than 150 square feet. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application, stir the compound continuously by effective mechanical means. Hand-spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. Do not apply curing compound to the inside faces of joints to be sealed, but use other approved means to ensure proper curing for 72 hours. The curing compound shall be of such character that the film will harden within 30 minutes after application. If the film becomes damaged from any cause within the required curing period, immediately repair the damaged portions with additional compound. Upon removal of side forms, immediately protect the sides of the exposed slabs to provide a curing treatment equal to that provided for the surface.
- C. Polyethylene Film: Cover the top surface and sides of the pavement with polyethylene sheeting. Lap the units at least 18 inches. Place and weight the sheeting to cause it to remain in contact with the surface covered. The sheeting shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the pavement. Unless otherwise specified, maintain the sheeting in place for 72 hours after the concrete has been placed.
- D. Waterproof Paper: Cover the top surface and sides of the pavement with waterproof paper. Lap the units at least 18 inches. Place and weight the paper to cause it to remain in contact with the surface covered. The paper shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the slab. Thoroughly wet the surface of the pavement prior to placing the paper. Unless otherwise specified, maintain the paper in place for 72 hours after the concrete has been placed.
- E. White Burlap-Polyethylene Sheets: Cover the surface of the pavement with the sheeting. The sheeting used shall be of such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. Place the sheeting so that the entire surface and both edges of the slab are completely covered. Place and weight the sheeting to remain in contact with the surface covered, and

maintain the covering fully wetted and in position for 72 hours after the concrete has been placed.

### 3.15 REMOVING FORMS:

- A. Unless otherwise specified, do not remove forms from freshly placed concrete until it has set for at least 12 hours, except where auxiliary forms are used temporarily in widened areas. Remove forms carefully to avoid damage to the pavement. After the forms have been removed, cure the sides of the slab as outlined in one of the methods indicated in paragraph 3.14. Major honeycombed areas shall be considered as defective work and shall be removed and replaced. An area or section so removed shall not be less than ten feet in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, remove and replace the remaining portion of the slab adjacent to the joints that is less than ten feet in length.

### 3.16 SAW CUTTING AND REPAIRS TO JOINTS AND CRACKS:

- A. Saw cutting and repairs to joints and cracks shall be made in accordance with the requirements of WSDOT M41-10, Section 5-05.3(22).

### 3.17 SEALING JOINTS:

- A. Seal joints as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be above 50°F. at the time of installation of the poured joint-sealing material.
- B. Immediately before sealing, the joints shall be thoroughly cleaned of all laitance, curing compound and other foreign material. Cleaning shall be accomplished by sandblasting. Upon completion of cleaning, the joints shall be blown out with clean compressed air. The joint faces shall be surface dry when the seal is applied.
- C. Joints shall be inspected for proper width, depth, alignment and preparation, and shall be approved by the engineer before sealing is allowed. Sealants shall be installed in accordance with the following requirements:
- D. Joint-sealing compound shall be applied by means of pressure equipment that will force the sealing material to the bottom of the joint and completely fill the joint without spilling the material on the surface of the pavement. A backing material shall be placed as shown on the plans and shall be non-adhesive to the concrete or the sealant material. Sealant which does not bond to the concrete surface of the joint walls, contains voids, or fails to set to a tack-free condition will be rejected and replaced by the Contractor at no additional cost. Before sealing the joints, the Contractor shall demonstrate that the equipment and procedures for preparing, mixing, and placing the sealant will produce a satisfactory joint seal. This shall include the preparation of two (2) small batches and the application of the resulting material.

### 3.18 PROTECTION OF PAVEMENT:

- A. The Contractor shall protect the pavement and its appurtenances against all traffic. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, or crossovers, etc. All damage to the



pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense. In order that the concrete be properly protected against the effects of rain before the concrete is sufficiently hardened, the Contractor will be required to have available at all times materials for the protection of the edges and surfaces of the unhardened concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 4-mils thick of sufficient length and width to cover the plastic concrete slab and edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering. The edges and surface of the sheeting shall be weighted to prevent movement from winds.

**3.19 OPENING TO TRAFFIC:**

- A. The pavement may be opened to traffic when the concrete has developed a compressive strength of 2500 psi as determined from cylinders, made at the time of placement, cured under comparable conditions, and tested in accordance with AASHTO T-22. If such tests are not conducted, the pavement will not be opened to traffic until at least five days after the concrete has been placed. Clean the pavement to the satisfaction of the Engineer prior to opening to traffic.

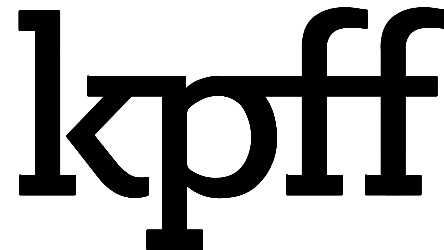
**3.20 SURFACE TOLERANCES:**

- A. Extreme care must be exercised in all phases of the operation to ensure that the pavement will pass the specified tolerances. The following tolerances are applicable:
  - 1. Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 foot in any lane.
  - 2. Vertical deviation from established grade shall not exceed plus or minus 0.04 foot at any point.
  - 3. Surface smoothness deviations shall not exceed 1/4 inch from a 16-foot straightedge placed in any direction, including placement along and spanning any pavement joint or edge.

**END OF SECTION**

PLOTTED BY: DEMONS DATE & TIME: Jul 27, 2021 - 9:18am FILE: N:\2017\1700049 Tacoma Rail Fueling Facility\Part 3 - KPFF Design\Drawings\08\_Q2-EQUIPMENT SCHEDULE.dwg

ITEM NO.	ITEM DESCRIPTION	QTY	ELECTRIC VAC/PH LOAD	COMPR AIR CFM/PSI	OTHER	SIZE WxDxH	WEIGHT (LB)	DESIGN BASIS MFR(S)	NOTES (EQUIVALENT COMPONENTS TO BE APPROVED BY ENGINEER)
SANDING SYSTEM									
11 11 29-04	SAND STORAGE SILO SYSTEM (SYSTEM 100, SILO TO TRANSPORTERS)	1	120 V/SINGLE PHASE/60 HZ	57 SCFM/HOUR	1500 ft^3 SILO CAPACITY	10' DIA. x 30'-10 9/16" H	75 TON	DYNAMIC AIR CONVEYING SYSTEMS	SYSTEM PLC-24V, 40AMP/TRUCK UNLOAD PLC-24AMP
11 11 29-09	SAND TRANSPORTER SYSTEM (SYSTEMS 200 & 300, TRANSPORTERS TO TRAIN)	2	120 V/SINGLE PHASE/60 HZ	40 SCFM/HOUR				DYNAMIC AIR CONVEYING SYSTEMS	SYSTEM 200 PLC=24V, 40AMP/SYSTEM 300 PLC-24V, 24AMP
11 11 29-05	SAND FILL WAND AND HOSE	4						DYNAMIC AIR CONVEYING SYSTEMS	
11 11 29-06	SAND FILL WAND HOLSTER	4						OTHER	
11 11 29-08	AIR RECEIVER TANK, SANDING SYSTEM, 137 CU. FT. (T-3)	1		1060 GALLONS, MAX PRESSURE 155 PSI	15% FOR DRYERS	48" DIA. x 144" H	2195	STEEL FAB	C100950
FUELING SYSTEM									
23 10 00-01	FUEL CONNECTION AND SPILL CONTAINMENT AT 40,000 GALLON STORAGE TANK	1				9'x3'x3"	215		
23 10 00-02	TRUCK FUEL CONNECTION, RECEIVING METER, FUEL OIL FILTER ASSEMBLY AND CONTAINMENT	1			150 PSI 350 GPM MAX		71	SNYDER	1720-30M2.5XX AUTOMATED FUEL NOZZLE. DETAILS TO BE CONFIRMED WITH SUPPLIER BY CONTRACTOR
23 10 00-03	DIESEL STORAGE TANK, 40,000 GAL (T-1)	1			40,000 GALLONS	12" DIA. x 52' L x 13' H		HIGHLAND TANK	HT-1105, UL-2085 WITH LEVEL SENSORS FOR INVENTORY AND ALARMS. REFERENCE SHEET M6 FOR REQUIRED TANK COMPONENTS.
23 10 00-04	FUEL CRANE	1						SNYDER	104-HP-1
23 10 00-05	SUBMERSIBLE FUEL PUMP (P-1)	1	230V/3PHASE/60HZ		3.73 KW			RED JACKET	MAXXUM-MXP500J4-2K 250 GPM AT 54 HD (FT), 5 HP WITH ADVANCED CORROSION PROTECTION
AIR SYSTEM									
11 11 29-01	AIR COMPRESSOR	1	460V/3PH/124.9A	444CFM AT 125 PSI	100HP @ 1780 RPM	87.5"L x 43.4"W x 68.5"H	3567	SULLAIR	SN7509, LUBRICATED, ROTARY SCREW
11 11 29-02	AIR RECEIVER TANK FOR LUBE OIL PUMP, SAND MODULES AND HOSE REELS (T-2)	1		660 GALLONS, MAX PRESSURE 200 PSI		42" DIA. x 120" H	1925	STEEL FAB	A10132
11 11 29-03	AIR DRYER	1	460V/3PH/60Hz/ 6.4A	400 SCFM		44" x 26" x 29"	320	SULLAIR	SR+400, REFRIGERATED WITH PRE AND POST FILTERS
11 11 29-07	HOSE REEL, COMPRESSED AIR	2		300 PSI		20.25" x 19.75" x 7"	47	REELCRAFT	7850 OLP121, 1/2 IN. X 50-FT, HEAVY DUTY, SPRING RETRACT
MISCELLANEOUS EQUIPMENT									
11 11 53-01	BULK TOTE, MAIN ENGINE OIL	2			275 GALLONS				OWNER SUPPLIED
11 11 53-02	PUMP, MAIN ENGINE OIL	1		103 CFM	120 GPM AT 75' HEAD			ARO	666250-144-C, 2IN METALLIC AIR OPERATED DOUBLE DIAPHRAGM PUMP
11 11 53-03	BOOM CABINET, MAIN ENGINE OIL	1	120V - 20A					SNYDER	BC-L0-XX-XX, ELECTRIC LUBE OIL PUMP START/STOP, ELECTRIC HOSE REWIND, OIL HEATER
11 11 53-04	SPILL CONTAINMENT PALLETS	2			360 GAL	62" x 62" x 28"		ULTRATECH	1158, CAPACITY FOR (2) 275 GALLON OIL TOTES
11 11 53-05	CHECK VALVE, 2"	1						MORRISON	158A-0600AV
11 11 55-01	BOOM CABINET, NON-POTABLE WATER	1	120V - 20A					SNYDER	BCW-XX-XX, ELECTRIC START/STOP, ELECTRIC HOSE REWIND, WATER HEATER
11 46 83-01	HEATER, SERVICE SHED	1	240/1PHASE/24AMP /5.7KW			10.4" x 16.5" x 13.6"	24	KING KBP2406	PROPER (K22) 3 POSITION, BUILT-IN THERMOSTAT
26 27 00-01	REEL, 110V ELECTRICAL	2	120VAC / 20A / 60HZ			12.8" x 12.6" x 9.38"		REELCRAFT L4545 123 7A	45-FT CORD W/METAL OUTLET BOX, DUAL 20 AMP RECEPTACLES, GFCI PROTECTION, 12AWG, SPRING RETRACT
22 33 13-01	INSTANTANEOUS ELECTRIC WATER HEATER	1	480V-87A-3PHASE		72KW	26.2" x 17.6" x 10.3"	65	EEMAX	AP072480EFD, REQUIREMENT 65-90 DEG. F, 25 GPM, BUILT-IN OVER TEMP. PROTECTION, BUILT-IN MICROPROCESSING THERMOSTAT ACCURACY ±1
22 45 33-01	COMBINATION EMERGENCY EYE/FACE WASH AND SHOWER UNIT	1					29	BRADLEY	S19314-AB2DFDDON, COMBINATION EYE WASH/DRENCH SHOWER STATION WITH FREEZE PROTECTION, STAINLESS SHOWERHEAD, AND EYEWASH. NO GALVANIZED PIPING
-	HEAT TRACING WATER PIPE	1	120V/0.65KW					CHROMALOX	(SRF) SELF REGULATING FREEZE PROTECTION HEATING CABLE, 5 WATTS/FOOT WITH 1" THICK INSULATION AND ALUMINUM JACKET
33 30 00-01	BURIED SEWAGE HOLDING TANK, 1000 GALLONS	1							
33 40 00-01	BURIED WASTE OIL HOLDING TANK-DOUBLE WALL STEEL	1			3,000 GAL				



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NO.	DATE	BY	REVISION



TACOMA RAIL  
EAST END LOCOMOTIVE FACILITY UPGRADES

EQUIPMENT SCHEDULE

DRAWN: TRL	DATE:	PROJECT NO.:	1700049
DESIGN: JLF	DATE:	SCALE:	AS NOTED
CHECKED: DVH	DATE:	DATE:	07/26/2021
DRAWING NO.	Q2	SHEET 52	OF 60



FILE: N:\2017\1700049 Tacoma Rail Fueling Facility\Part 3 - KPFF Design\Drawings\01\_G2-GENERAL NOTES 1.dwg PLOTTED BY: Hambert DATE & TIME: Jul 26, 2021 - 2:07pm

## GENERAL NOTES

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH PERMIT CONDITIONS, CITY OF TACOMA STANDARDS, AREMA, TACOMA RAIL, AND WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD SPECIFICATIONS 2018.
- BEFORE ANY CONSTRUCTION MAY BEGIN, THE CONTRACTOR SHALL HOLD A PRE-CONSTRUCTION MEETING WITH TACOMA RAIL AND CITY OF TACOMA PERMIT DEPARTMENT AND INSPECTION STAFF.
- A COPY OF THESE APPROVED PLANS AND ALL AMENDMENTS SHALL BE ON THE CONSTRUCTION SITE AT ALL TIMES.
- IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO OBTAIN ALL CONSTRUCTION EASEMENTS IF NECESSARY BEFORE INITIATING OFF-SITE WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, SPOTTERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH, AND SAFETY OF THE PUBLIC, AND OF THE CONTRACTOR. ANY WORK WITHIN THE TRAVELLED RIGHT OF WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE AT LEAST ONE FLAGGER FOR EACH LANE OF TRAFFIC AFFECTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING TEMPORARY TRAFFIC CONTROL PLANS, PERMITTING, AND COORDINATION TO PROVIDE ADEQUATE TEMPORARY TRAFFIC CONTROL ACCORDING TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND WSDOT STANDARD PLANS.
- PRIOR TO THE START OF EXCAVATION, THE CONTRACTOR SHALL CALL 1-800-424-5555 FOR UTILITY LOCATES AND COORDINATE UTILITY WORK WITH THE UTILITY SERVICE PROVIDER.
- THE EXISTENCE, LOCATION AND CHARACTERISTICS OF UNDERGROUND UTILITIES SHOWN ON THESE PLANS HAS BEEN OBTAINED FROM A REVIEW OF AVAILABLE RECORD DATA. NO REPRESENTATION IS MADE AS TO THE ACCURACY OR COMPLETENESS OF SAID UTILITY INFORMATION. THE CONTRACTOR SHALL POTHOLE OR OTHERWISE CONFIRM CONDITIONS. IF CONDITIONS DIFFER FROM THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND SHALL NOT BEGIN CONSTRUCTION UNTIL THE CHANGED CONDITIONS HAVE BEEN EVALUATED. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
- AT A MINIMUM, CONTRACTOR SHALL POTHOLE UTILITIES AT THE LOCATIONS INDICATED ON THE PLANS PRIOR TO BEGINNING ANY EXCAVATION OR DRILLING. IF POTHOLING DETERMINES THAT EXISTING UTILITIES ARE NOT IN THE LOCATIONS SHOWN, CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY.

## HORIZONTAL DATUM:

- WASHINGTON STATE COORDINATE SYSTEM, SOUTH ZONE, NAD83-2011.

## VERTICAL DATUM:

- CITY OF TACOMA (NGVD 29) - BENCHMARK: 3 INCH BRASS DISK ON MILWAUKEE WAY, SOUTH OF E. 11th AVENUE. BENCHMARK NO. 2863 ELEVATION = 12.117'

## SUMMARY OF WORK

THE WORK OF THIS PROJECT WILL ACCOMMODATE THE FOLLOWING:

- NEW SAND STORAGE SILO AND SAND DISTRIBUTION SYSTEM.
- NEW COMPRESSED AIR SYSTEM.
- NEW FUEL STORAGE TANK AND LOCOMOTIVE FUELING SYSTEM.
- NEW LOCOMOTIVE SERVICE ISLAND.
- NEW LUBRICANT STORAGE AND DISTRIBUTION SYSTEM.
- LOCOMOTIVE SERVICING HOSE REELS.
- FREE STANDING CANOPY AND OVERHEAD PIPE SUPPORT STRUCTURE.
- FREE STANDING PIPE BRIDGE.
- PRE-FABRICATED UTILITY BUILDINGS.
- SANITARY SEWER PIPING AND HOLDING TANK.
- WASTE OIL PIPING AND HOLDING TANK.

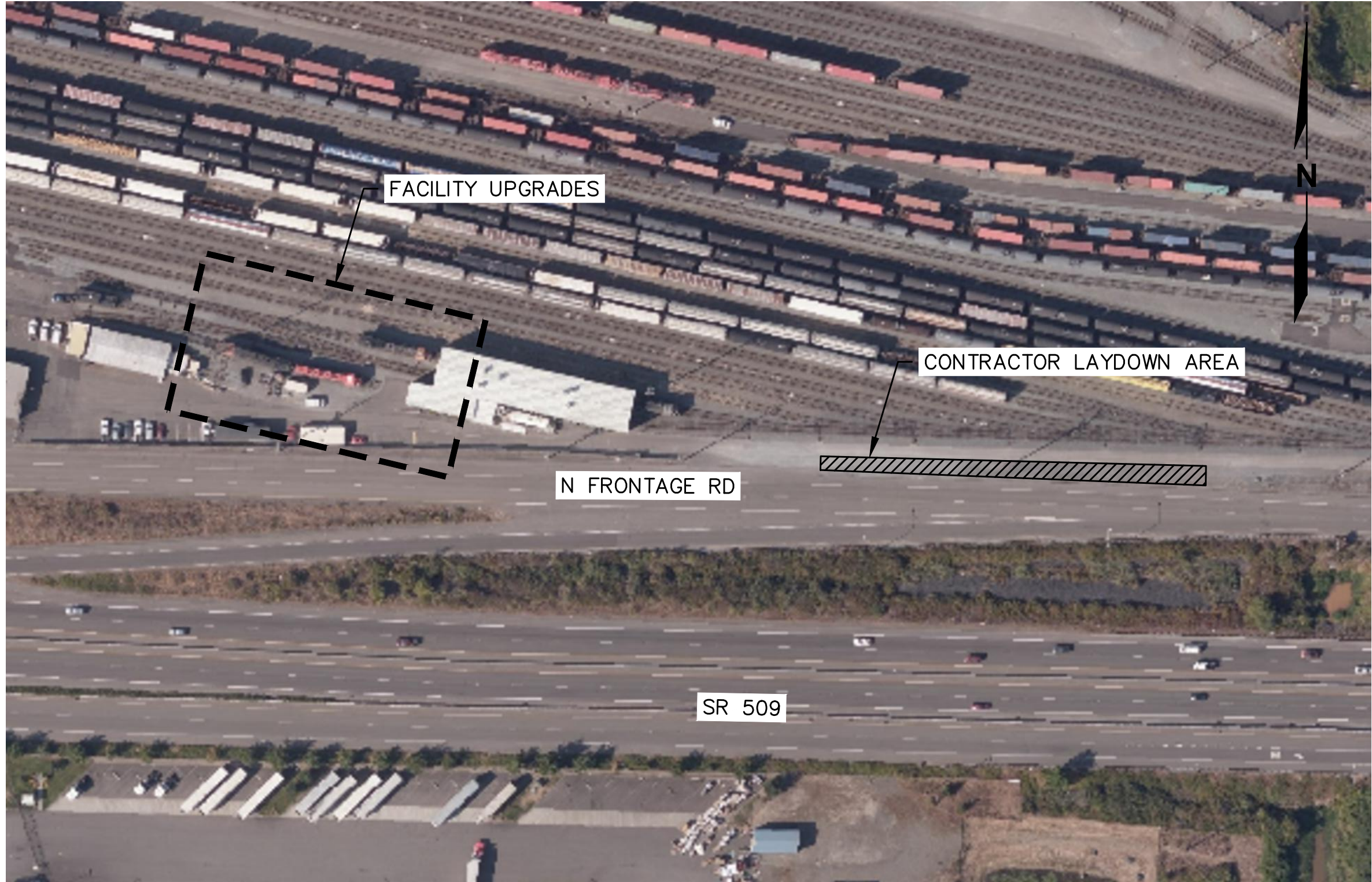
## DEFERRED SUBMITTALS

THE CONTRACTOR SHALL PROVIDE SEPARATE ENGINEERED AND SEALED DRAWINGS AND SPECIFICATIONS TO PERMITTING AUTHORITIES FOR THE REVIEW AND APPROVAL OF THE FOLLOWING ITEMS PRIOR TO CONSTRUCTION:

- COMPLETE SANDING SYSTEM, INCLUDING SAND SILO, PIPING AND COMPRESSED AIR SYSTEM.
- COMPLETE FUELING SYSTEM, INCLUDING FUEL DELIVERY COMPONENTS, TANK, PIPING, AND FUEL CRANE.
- COMPLETE LUBE/OIL SYSTEM, INCLUDING PUMP, PIPING AND HOSE REELS.
- PRE-ENGINEERED METAL BUILDINGS.
- COMPLETE WASTE OIL HOLDING TANK SYSTEM INCLUDING LEAK DETECTION, TANK, ANTI-FLOTATION ANCHORS, TANK VENTING, TANK FLUID LEVEL MONITORING AND TANK PUMP OUT COMPONENTS.

## PAINTING NOTES

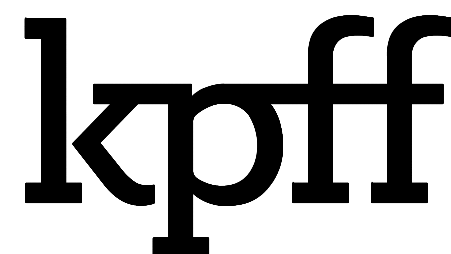
- COMPLETE PAINTING IN ACCORDANCE WITH SPECIFICATION SECTION 09 91 00.
- TOP SURFACE OF ALL PRECAST AND CAST-IN-PLACE CONCRETE SLABS, STEPS, FOOTINGS AND COLUMNS SHALL BE PAINTED WITH A 4 INCH WIDE YELLOW WARNING STRIPE AT THE PERIMETER EDGE OR WHERE SURFACE MATERIAL CHANGES SUCH AS AT THE INTERFACE OF CONCRETE AND METAL GRATING.
- FULL WIDTH OF TOP SURFACE OF ALL PRECAST AND CAST-IN-PLACE CONCRETE CURBS SHALL BE PAINTED YELLOW.
- EXPOSED VERTICAL FACES OF ALL PRECAST AND CAST-IN-PLACE CONCRETE SLABS, STEPS, FOOTINGS, COLUMNS AND CURBS SHALL BE PAINTED WITH A 4 INCH WIDE YELLOW WARNING STRIPE AT THE TOP EDGE.
- REFER TO SPECIFICATIONS AND DRAWINGS FOR ADDITIONAL PAINTING AND FINISHING REQUIREMENTS.



CONTRACTOR LAYDOWN AREA

1" = 100'

1



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1	07/23/21	RRL	ADDED CONTRACTOR LAYDOWN AREA



## TACOMA RAIL EAST END LOCOMOTIVE FACILITY UPGRADES

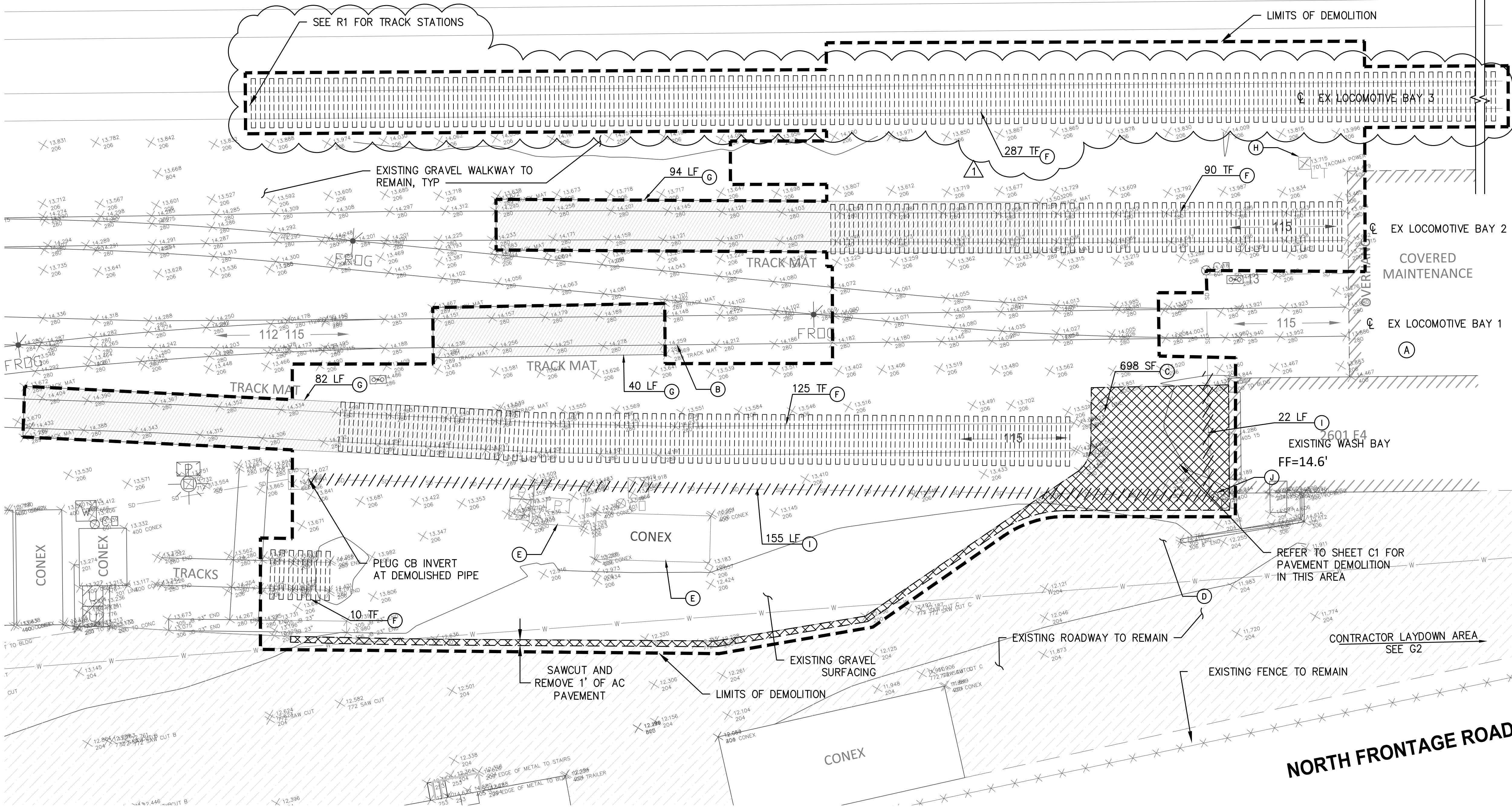
GENERAL NOTES

DRAWN: RRL	DATE:	PROJECT NO.:	1700049
DESIGN: NLM	DATE:	SCALE:	AS NOTED
CHECKED: SVWK	DATE:	DATE:	07/26/2021
DRAWING NO.	G2	SHEET	2 of 60



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## TACOMA RAIL CLASSIFICATION RAILYARD



## KEYNOTES

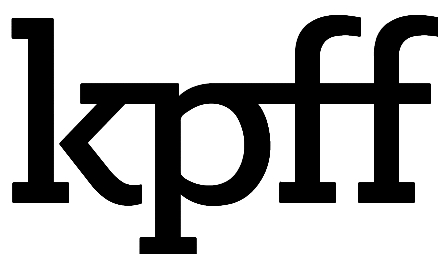
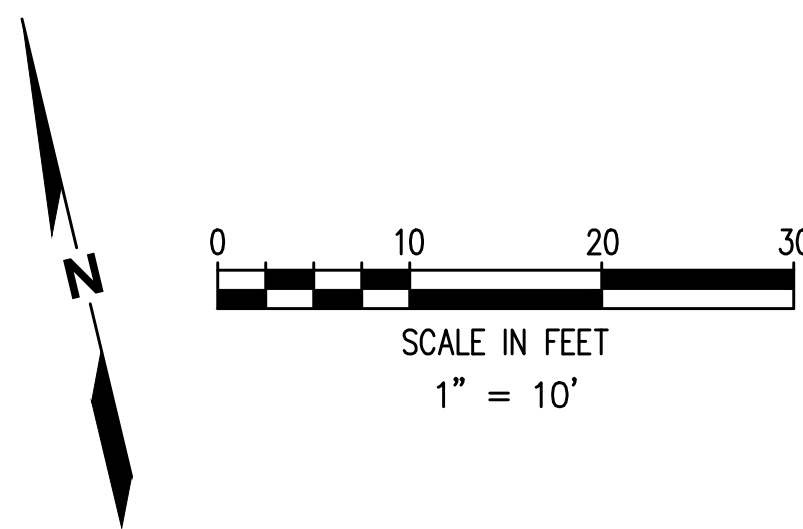
- (A) EXISTING EAST END FUELING FACILITIES. HOUSES EXISTING FUEL DISPENSING EQUIPMENT
- (B) EXISTING TRACK TO REMAIN
- (C) DEMOLISH ASPHALT PAVEMENT
- (D) EXISTING ASPHALT PAVEMENT TO REMAIN
- (E) EXISTING TRUCKS AND MATERIALS TO BE REMOVED BY OWNER PRIOR TO CONSTRUCTION
- (F) EXISTING RAIL, TIES, AND OTHER TRACK MATERIALS TO BE REMOVED, SALVAGE AND DELIVER RAIL AND TIES TO TACOMA RAIL
- (G) REMOVE TRACK MAT
- (H) RELOCATE EXISTING LIGHTPOLE
- (I) DEMOLISH SD PIPE
- (J) DEMOLISH SD CLEANOUT

## NOTES

1. CONTRACTOR SHALL MAINTAIN AND PROTECT ALL SITE IMPROVEMENTS NOT OTHERWISE NOTED FOR DEMOLITION. CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED BY CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
2. THE CONTRACTOR SHALL PROVIDE SUFFICIENT NOTIFICATION AND SHALL COORDINATE AND SCHEDULE ANY INTERRUPTIONS TO RAIL OPERATIONS OR ACCESS WITH TACOMA RAIL PRIOR TO THE COMMENCEMENT OF THE WORK.
3. ALL PAVEMENT NOTED FOR DEMOLITION SHALL BE SAWCUT.
4. ALL QUANTITIES IDENTIFIED ARE APPROXIMATE.
5. TRACK REMOVAL LIMITS ARE APPROXIMATE. ALL TRACK TO BE REMOVED SHALL BE MARKED IN THE FIELD AND APPROVED BY THE ENGINEER PRIOR TO DEMOLITION.
6. SEE R1 FOR LIMITS OF REMOVAL AND RELAY OF EXISTING TRACK.

## LEGEND

	LIMITS OF DEMOLITION		DEMOLISH PAVEMENT
	DEMOLISH TRACK		EX PAVEMENT TO REMAIN
	EXISTING RAIL		DEMOLISH SD PIPE
			REMOVE TRACK MAT



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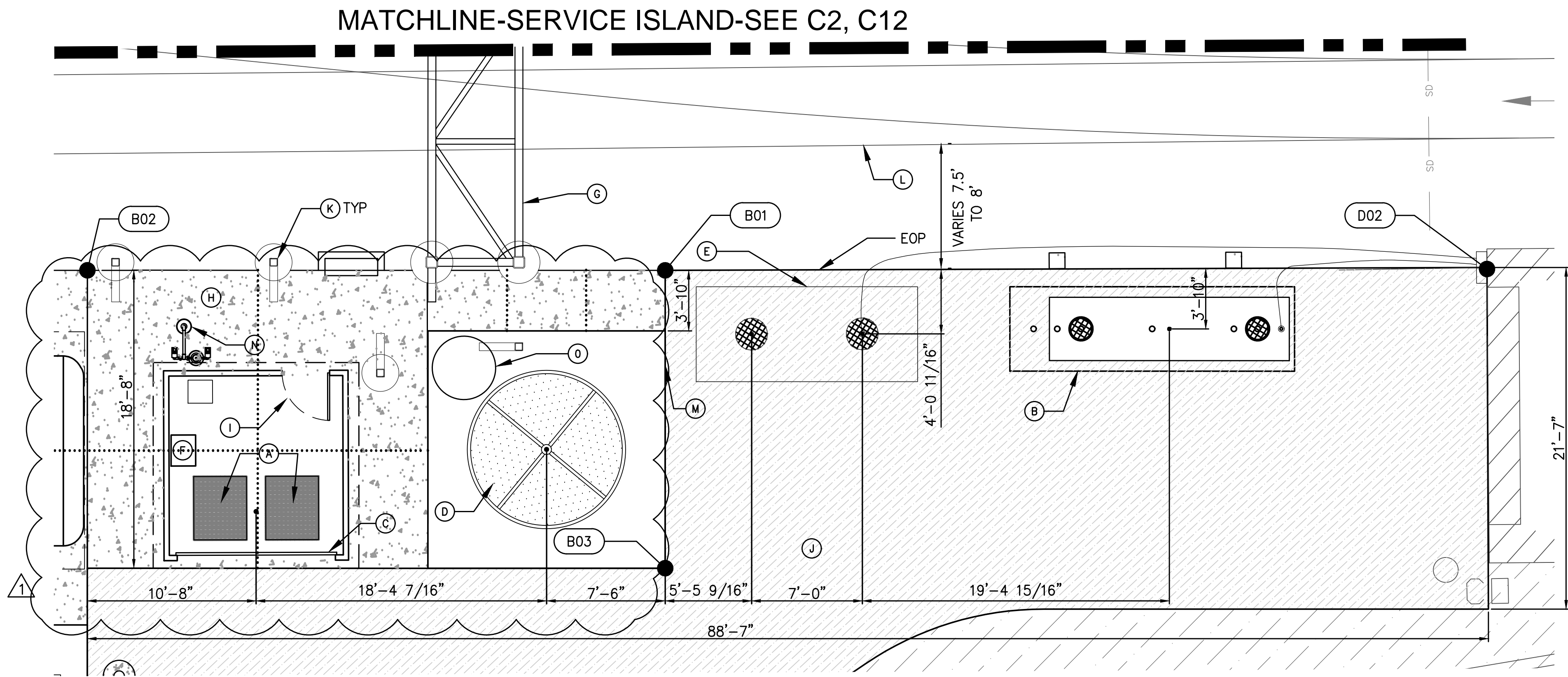


TACOMA RAIL  
EAST END LOCOMOTIVE FACILITY UPGRADES  
DEMOLITION PLAN

DRAWN: NLM	DATE:	PROJECT NO.: 1700049
DESIGN: NLM	DATE:	SCALE: AS NOTED
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DRAWING NO. CD1		SHEET 4 OF 60



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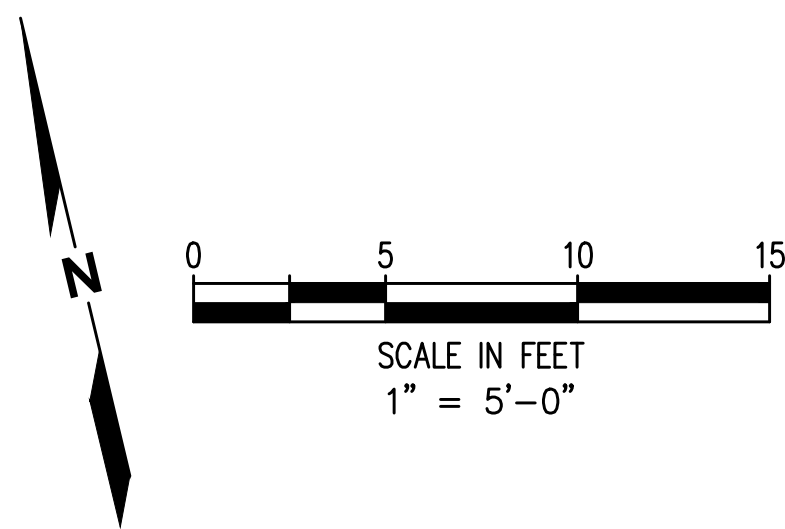
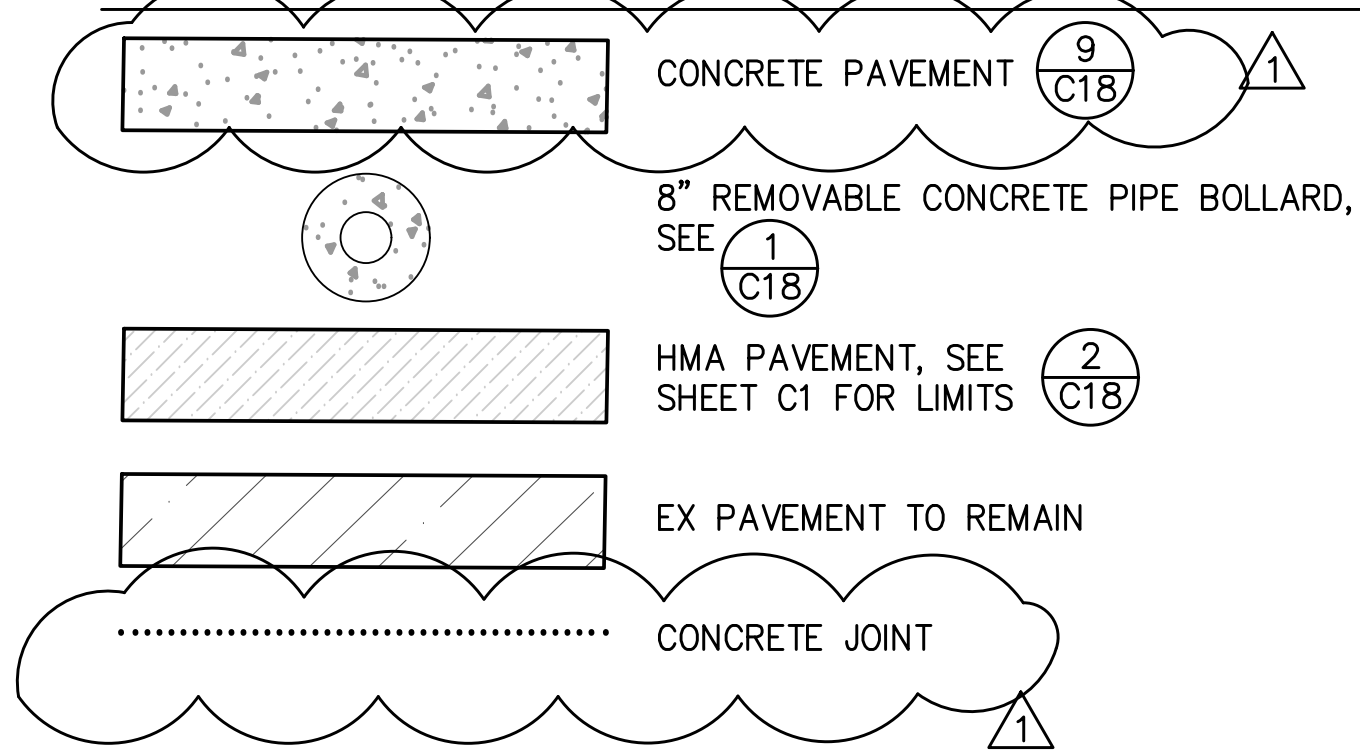
## KEYNOTES

- (A) LUBE OIL TOTES (2) AND PUMPING SYSTEM, SEE M9
- (B) WASTE OIL HOLDING TANK, 3000 GALLONS DOUBLE-WALL STEEL
- (C) HEATED LUBE OIL STORAGE SHED WITH ROLL UP DOOR FOR FORKLIFT ACCESS TO LUBE OIL TOTES. POSITION SHED SUCH THAT SOUTH FACE IS LOCATED 4 INCHES NORTH OF CONCRETE PAVEMENT EDGE
- (D) SAND STORAGE SILO, 1500 CF
- (E) BURIED SEWAGE HOLDING TANK, 3000 GALLONS
- (F) PUMP, MAIN ENGINE OIL, SEE SHEET M9
- (G) OVERHEAD PIPE/CONDUIT SUPPORT BRIDGE WITH LIGHTING, SEE SHEETS C6 AND S6
- (H) CONCRETE PAVEMENT, SEE 9 C18 1
- (I) ENTRY DOOR FOR CREW ACCESS
- (J) HMA PAVING, SEE C1 FOR LIMITS
- (K) FREESTANDING PIPE SUPPORT, SEE SHEET S10
- (L) EXISTING TRACK TO REMAIN
- (M) SILO FOUNDATION, SEE SHEET S4
- (N) EMERGENCY EYEWASH AND SHOWER, WITH INSTANT WATER HEATER MOUNTED ON FACE OF STORAGE SHED
- (O) SAND DISTRIBUTION SYSTEM, AIR RECEIVER TANK, SEE SHEET Q1

## NOTES

1. FOR WATER SUPPLY PIPING AND SANITARY SEWER PIPING, SEE WATER AND SEWER PLAN, SHEET C16.
2. FOR FUEL OIL PIPING, SANDING PIPING, AND LUBE OIL PIPING, REFER TO MECHANICAL PLANS.
3. FOR PROJECT CONTROL DATA, SEE SHEET C1.
4. FOR PAVING LIMITS, SEE SHEET C1.
5. SEE PAINTING NOTES, SHEET G2.

## LEGEND



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NO.	DATE	BY	REVISION
1	07/23/21	RRL	UPDATED DETAIL REFERENCES, ADDED CONCRETE JOINTS



**TACOMA RAIL**  
**EAST END LOCOMOTIVE FACILITY UPGRADES**  
  
LUBE OIL, SAND SILO & HOLDING TANKS  
DETAIL SITE PLAN

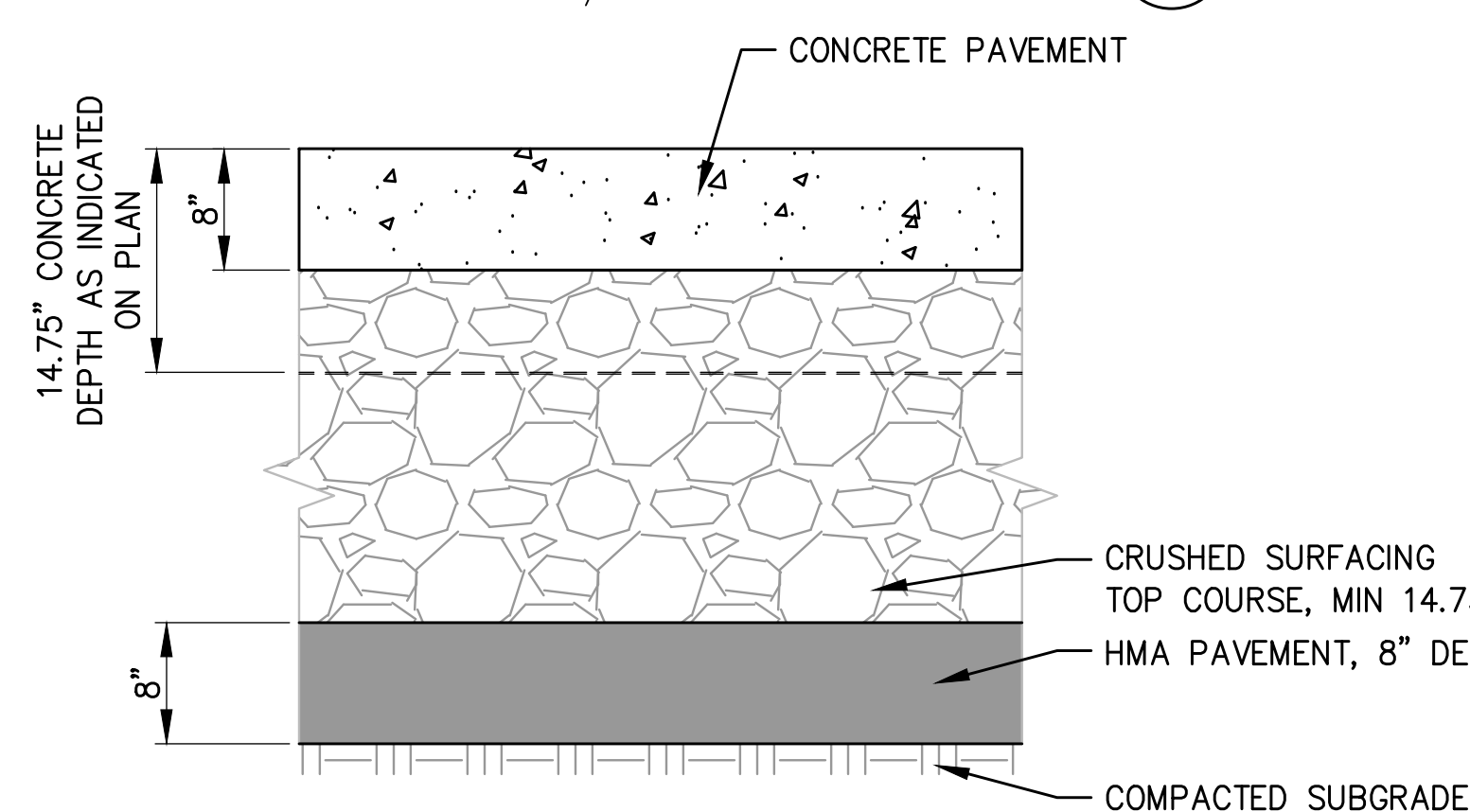
DRAWN: NLM	DATE:	PROJECT NO.: 1700049
DESIGN: NLM	DATE:	SCALE: AS NOTED
CHECKED: SVVK	DATE:	DATE: 07/26/2021
DRAWING NO. C3		SHEET 7 OF 60







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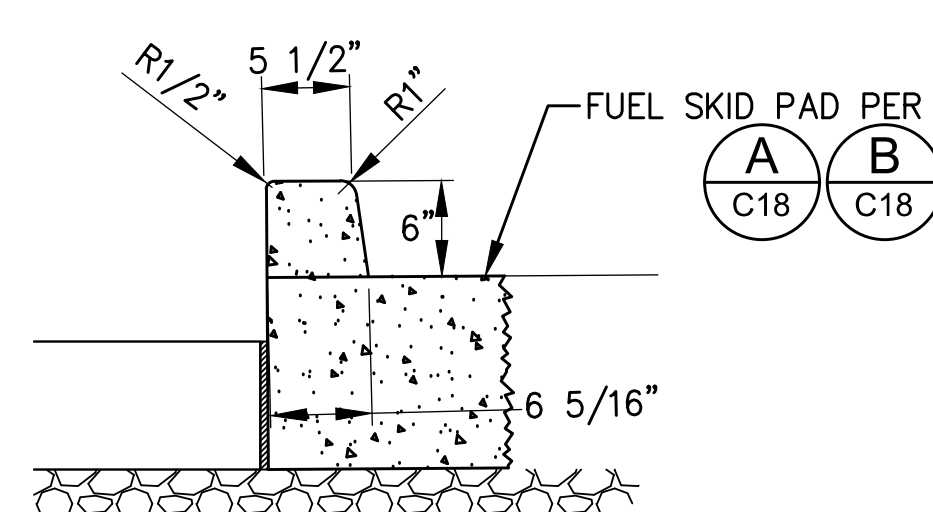

$$3/4'' = 1'-0''$$


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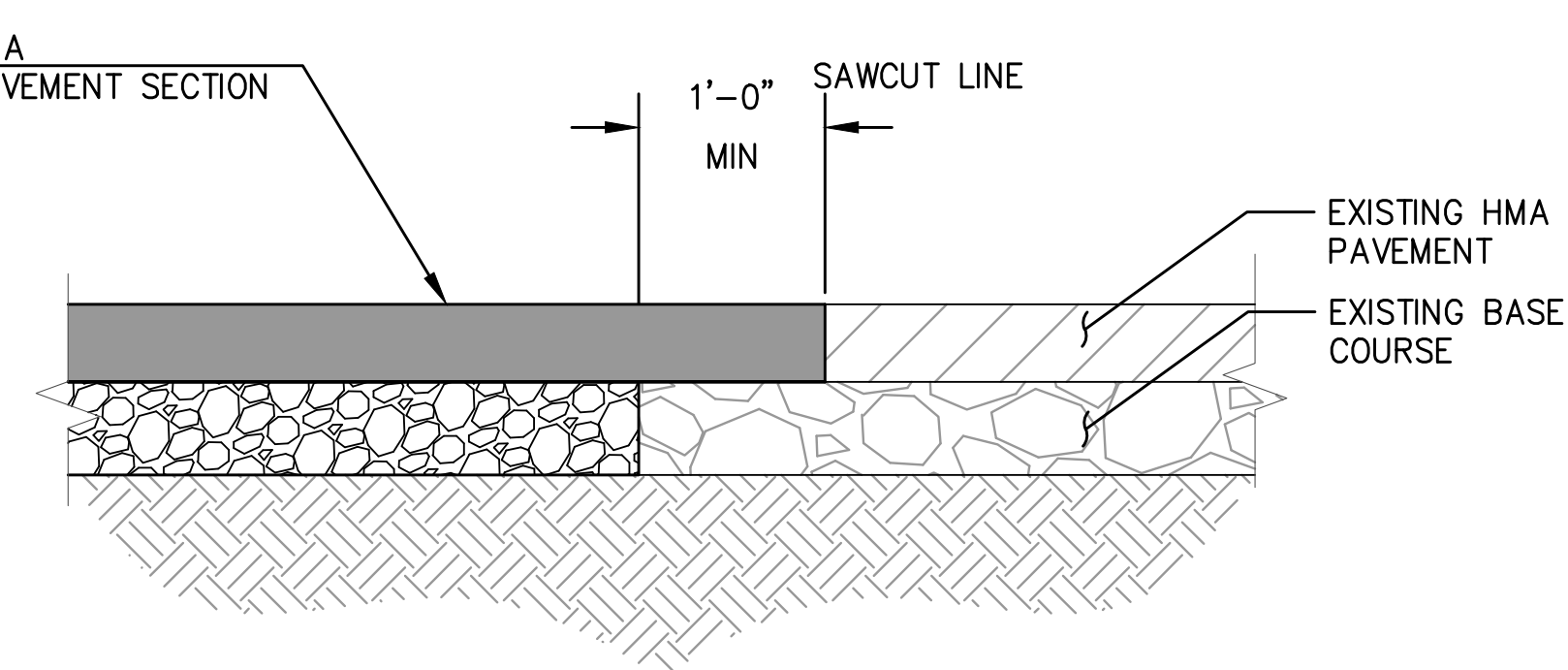

$$1'' = 1' - 0''$$

- 
- 5" HMA PG 70-22 CL 1/2"
- 6" CSBC, 10" DEPTH WITHIN  
2' OF SAND SILO AND FUEL  
TANK FOUNDATIONS
- COMPACTED SUBGRADE  
OR FILL AS REQUIRED
- C

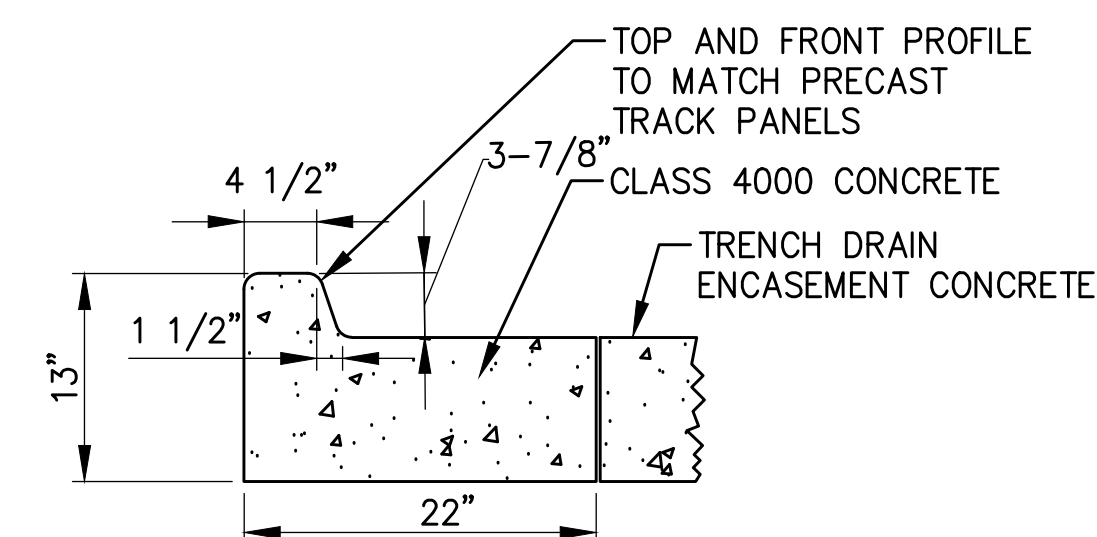
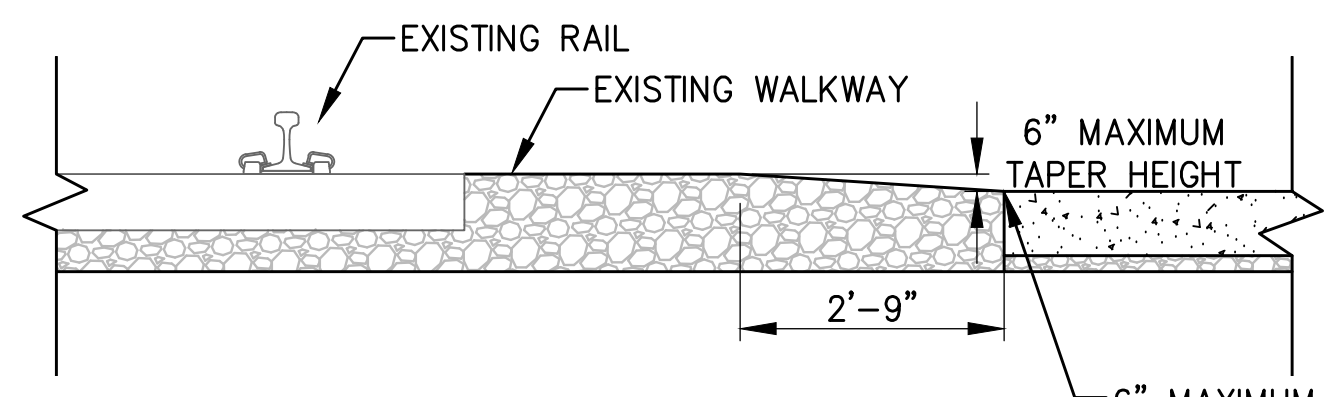
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$$1'' = 1' - 0''$$


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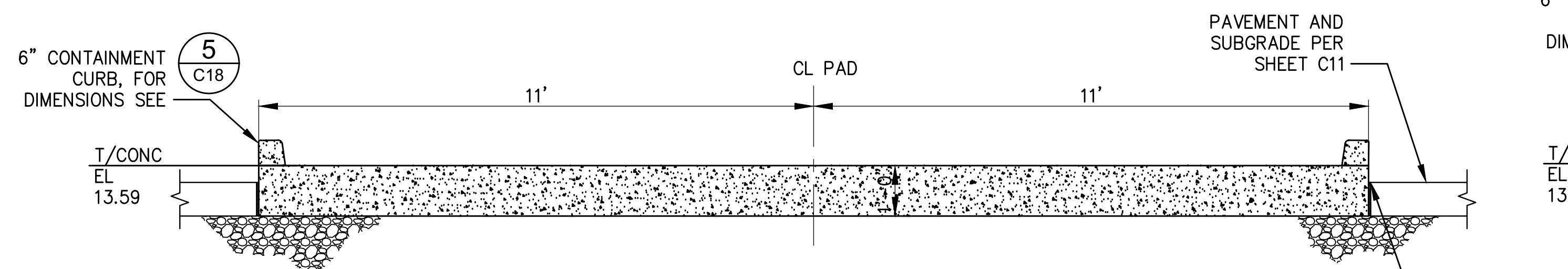

$$1'' = 1' - 0''$$


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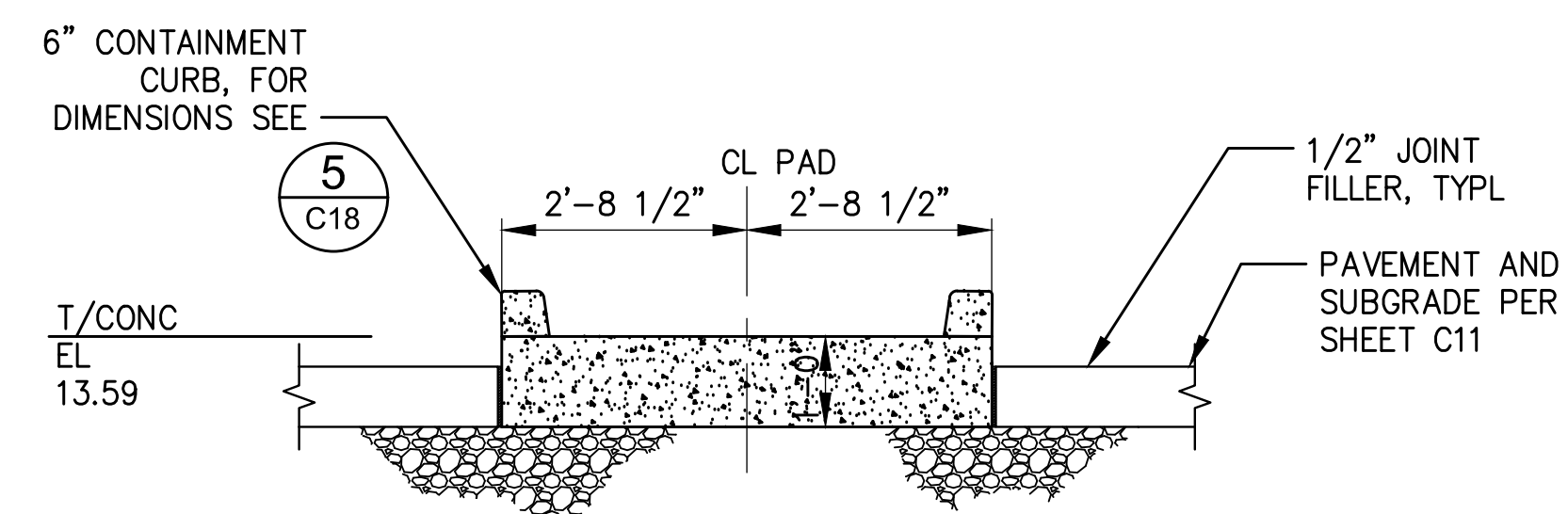

$$1'' = 1' - 0''$$

$$1'' = 1'-0''$$


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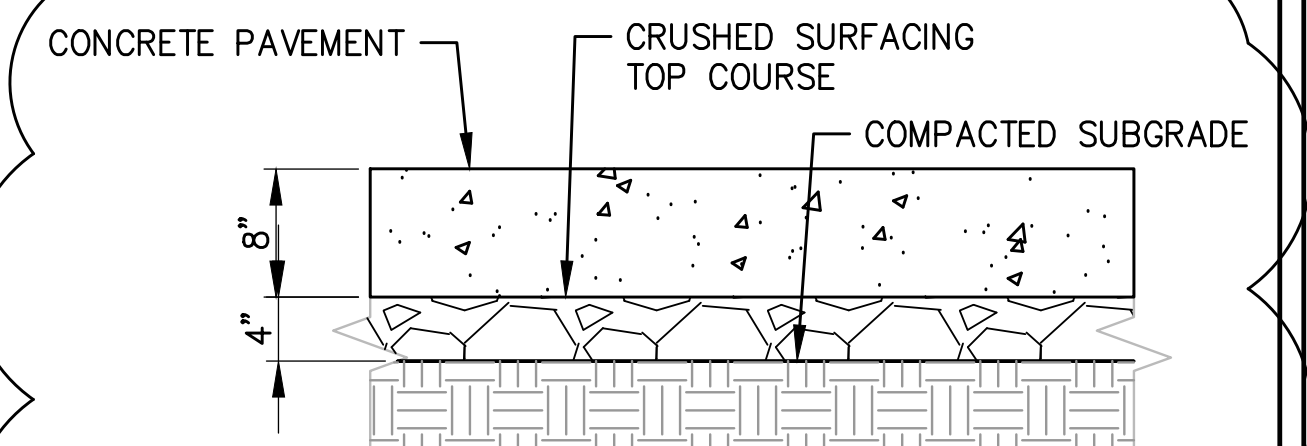
1/2" = 1'-0"



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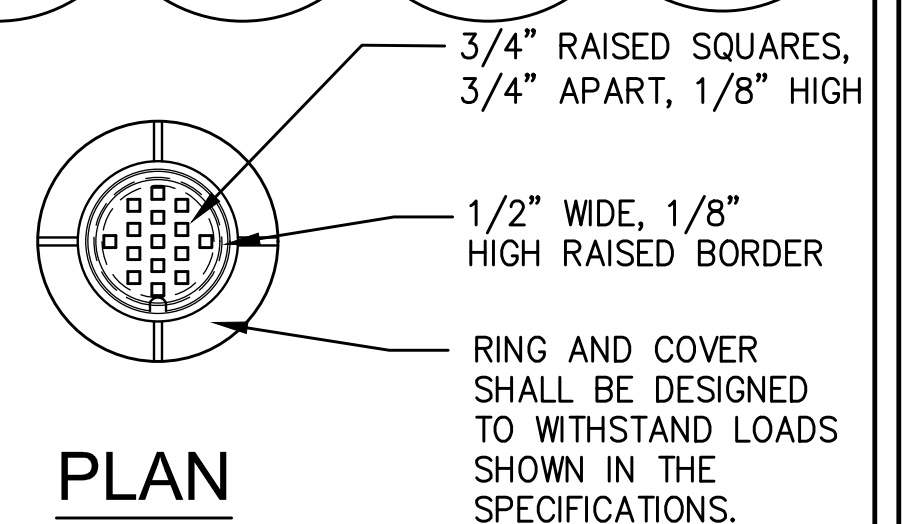

$$1/2'' = 1'-0''$$


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$$1/2'' = 1'-0''$$


1. REFER TO SHEETS C3 AND C4 FOR LAYOUT OF CONTRACTION AND EXPANSION JOINTS.
2. CONTRACTION JOINTS SHALL BE 1 INCH DEEP SPACED AT 12'-6" O.C MAXIMUM.

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$$1'' = 1' - 0''$$


Technical drawing of a concrete foundation for a wall. The drawing shows a cross-section of the foundation with dimensions: 10" top width, 8 3/4" top width, 8" bottom width, 15" total width, and 4" height. The foundation is shown with a concrete pour and a wall section.

24"  $\phi$  CONCRETE COLLAR

FIBER JOINT PACKING

BEND 45°

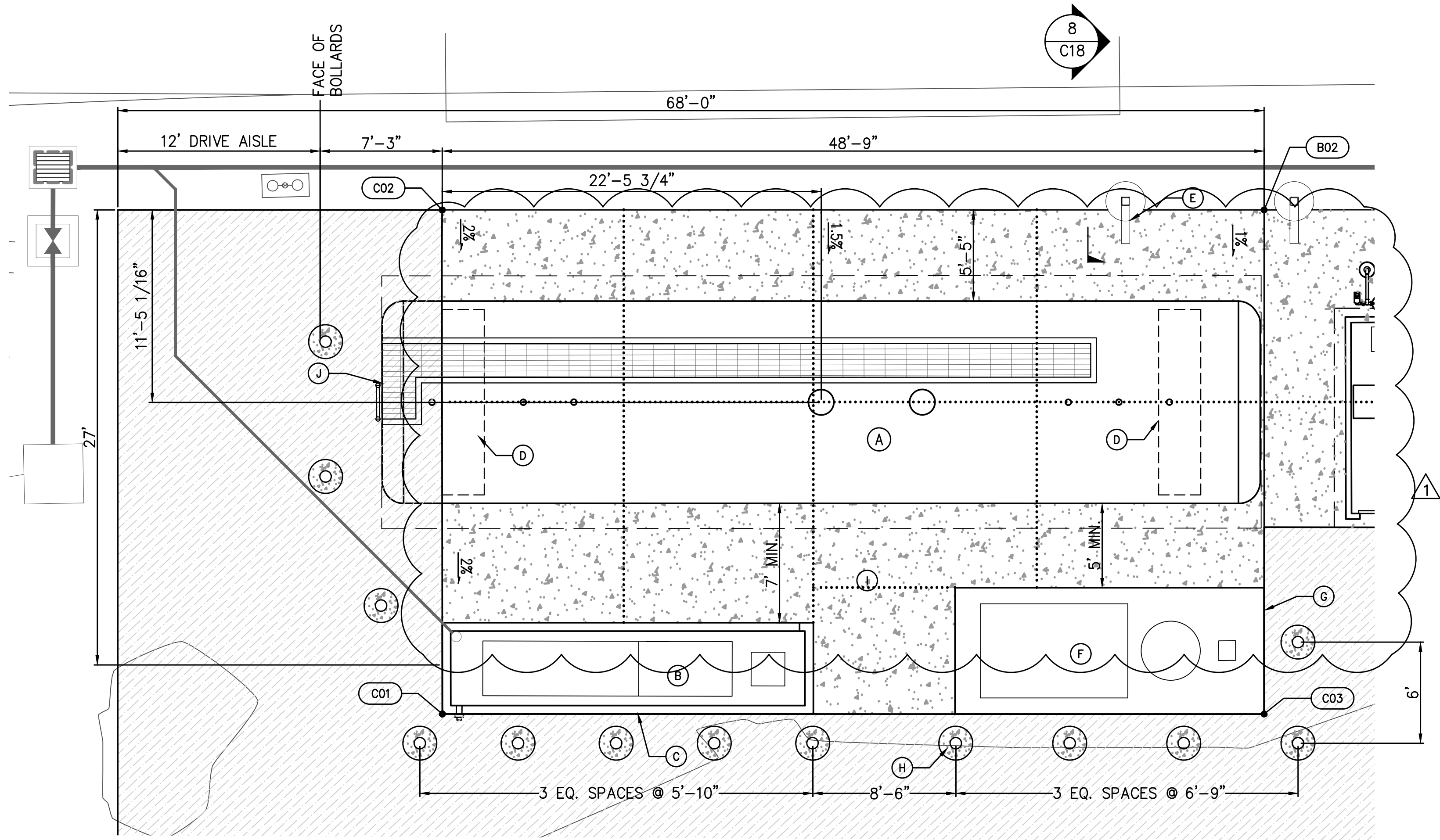
4 3/4" MIN.

CLASS 4,000 CONCRETE, 4" MINIMUM THICKNESS

NTS



FILE: N:\2017\1700049 Tacoma Rail Fueling Facility\Part 3 - KPFF Design\Drawings\02\_C1-C4-SITE PLANS.dwg  
PLOTTED BY: Hambert DATE & TIME: Jul 26, 2021 - 4:34pm



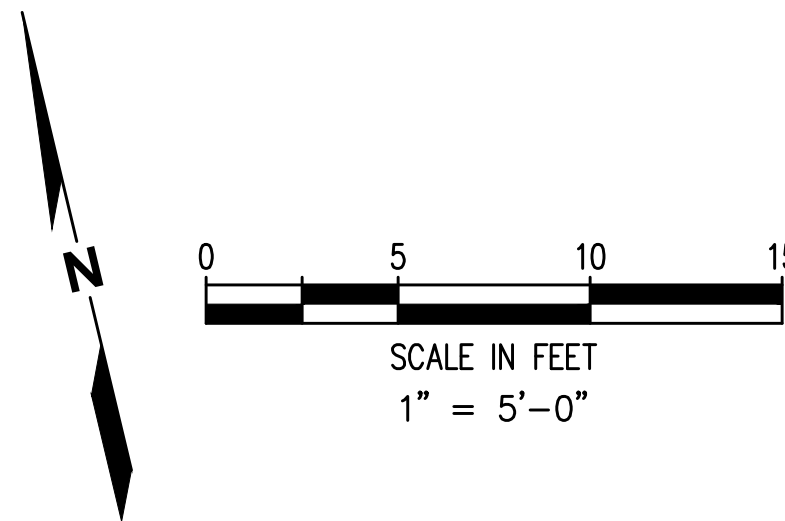
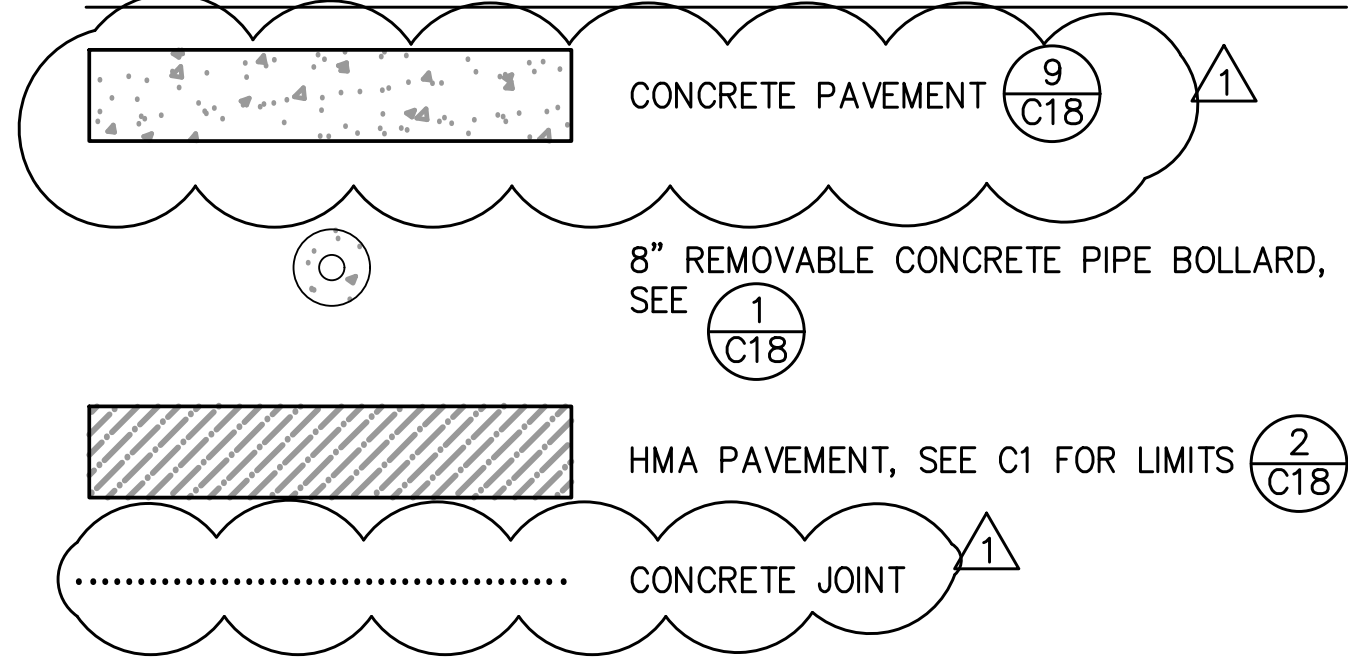
## KEYNOTES

- (A) 40,000 GAL PROTECTED ABOVEGROUND DIESEL STORAGE TANK LISTED UL 2085
- (B) FUEL CONNECTION, RECEIVING METER AND FUEL FILTER ASSEMBLY. REFER TO EQUIPMENT PLANS, Q1.
- (C) FUEL SKID PAD AND CONTAINMENT CURB, SEE (A/C18) (B/C18)
- (D) TANK SUPPORT PIERS, VERIFY LOCATION OF PIERS WITH TANK MANUFACTURER PRIOR TO CONSTRUCTION. SEE (A/S8)
- (E) FREE STANDING PIPE SUPPORT, SEE SHEET S10.
- (F) AIR COMPRESSOR, RECEIVER AND DRYER ASSEMBLY. REFER TO EQUIPMENT PLANS, Q1.
- (G) 12" HIGH CONCRETE HOUSEKEEPING PAD FOR AIR COMPRESSOR EQUIPMENT, SEE (E/S9) (F/S9)
- (H) REMOVABLE PIPE BOLLARDS, TYP, SEE (1/C18)
- (I) CONCRETE PAVEMENT, SEE (9/C18) (1)
- (J) ACCESS LADDER AND WALKWAY. VERIFY LOCATION WITH TANK MANUFACTURER PRIOR TO CONSTRUCTION.

## NOTES

- FOR WATER SUPPLY PIPING AND SANITARY SEWER PIPING, SEE WATER AND SEWER PLAN SHEET C16.
- FOR FUEL OIL PIPING, SANDING PIPING, AND LUBE OIL PIPING, REFER TO MECHANICAL PLANS.
- REFER TO PAINTING NOTES, SHEET G2, FOR PAINTING OF SITE FEATURES.

## LEGEND



**kpff**

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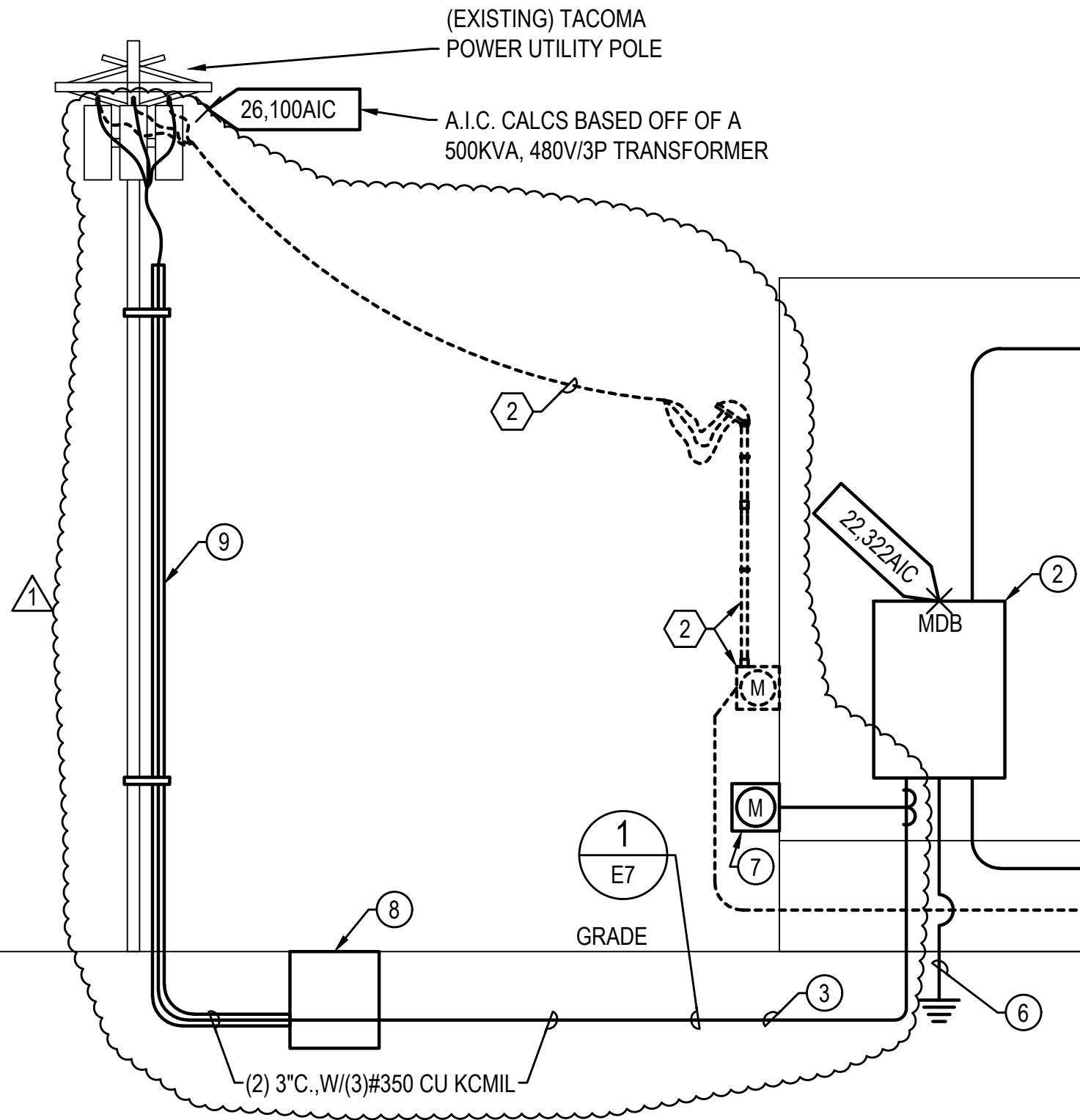
NO.	DATE	BY	REVISION
1	07/23/21	RRL	UPDATED DETAIL REFERENCES, ADDED CONCRETE JOINTS



**TACOMA RAIL**  
**EAST END LOCOMOTIVE FACILITY UPGRADES**  
  
FUEL TANK  
DETAIL SITE PLAN

DRAWN: NLM	DATE:	PROJECT NO.: 1700049
DESIGN: NLM	DATE:	SCALE: AS NOTED
CHECKED: SVWK	DATE:	DATE: 07/26/2021
DRAWING NO. C4		SHEET 8 OF 60





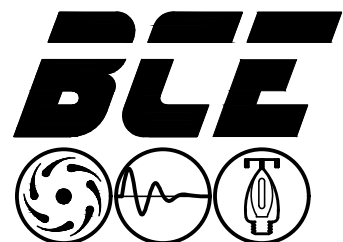
## DEMOLITION NOTES

- 1 REMOVE EXISTING RACEWAY AND CONDUCTORS FROM UTILITY METER TO PANEL SDP. MAINTAIN RACEWAY AND CONDUCTORS FOR REUSE. SEE CONSTRUCTION NOTE 1.
- 2 EXISTING OVERHEAD ELECTRICAL SERVICE TO BE DEMOLISHED. COORDINATE DEMOLITION WITH TACOMA POWER.

## CONSTRUCTION NOTES

- 1 REROUTE AND EXTEND EXISTING RACEWAY AND CONDUCTORS TO PANEL MDP. MAKE ALL CONNECTIONS COMPLETE. SEE PANEL SCHEDULE FOR CIRCUIT INFORMATION.
- 2 PROVIDE UNI-STRUT ASSEMBLY TO MOUNT PANEL TO EXISTING STRUCTURE. EXISTING STRUCTURE IS CORRUGATED METAL SIDING WITH VERTICAL "I" BEAMS.
- 3 PROVIDE NEW ELECTRICAL UNDERGROUND SERVICE. COORDINATE INSTALLATION WITH TACOMA POWER PRIOR TO ANY WORK PERFORMED.
- 4 ROUTE RACEWAY UNDERGROUND TO EXISTING BUILDING.
- 5 ROUTE RACEWAY ON BUILDINGS EXTERIOR SURFACE AND UNDERGROUND TO NEW STORAGE SHED. PROVIDE ALL MOUNTING APPURTENANCES REQUIRED.
- 6 PROVIDE NEW SERVICE GROUND SYSTEM.
- 7 PROVIDE NEW CT CAN. COORDINATE REQUIREMENTS WITH TACOMA POWER.
- 8 PROVIDE PRE-CAST VAULT PER TACOMA POWER STANDARDS. COORDINATE INSTALLATION PRIOR TO ROUGH-IN
- 9 COORDINATE RACEWAY INSTALLATION WITH TACOMA POWER PRIOR TO ROUGH-IN.

XX,XXXAIC AVAILABLE FAULT CURRENT



bce engineers, inc.

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f: (253) 922-0896

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## ONE LINE DIAGRAM

### REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	7/26/2021

DRAWN BY: JB

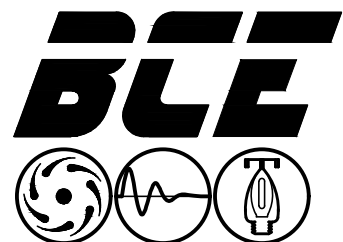
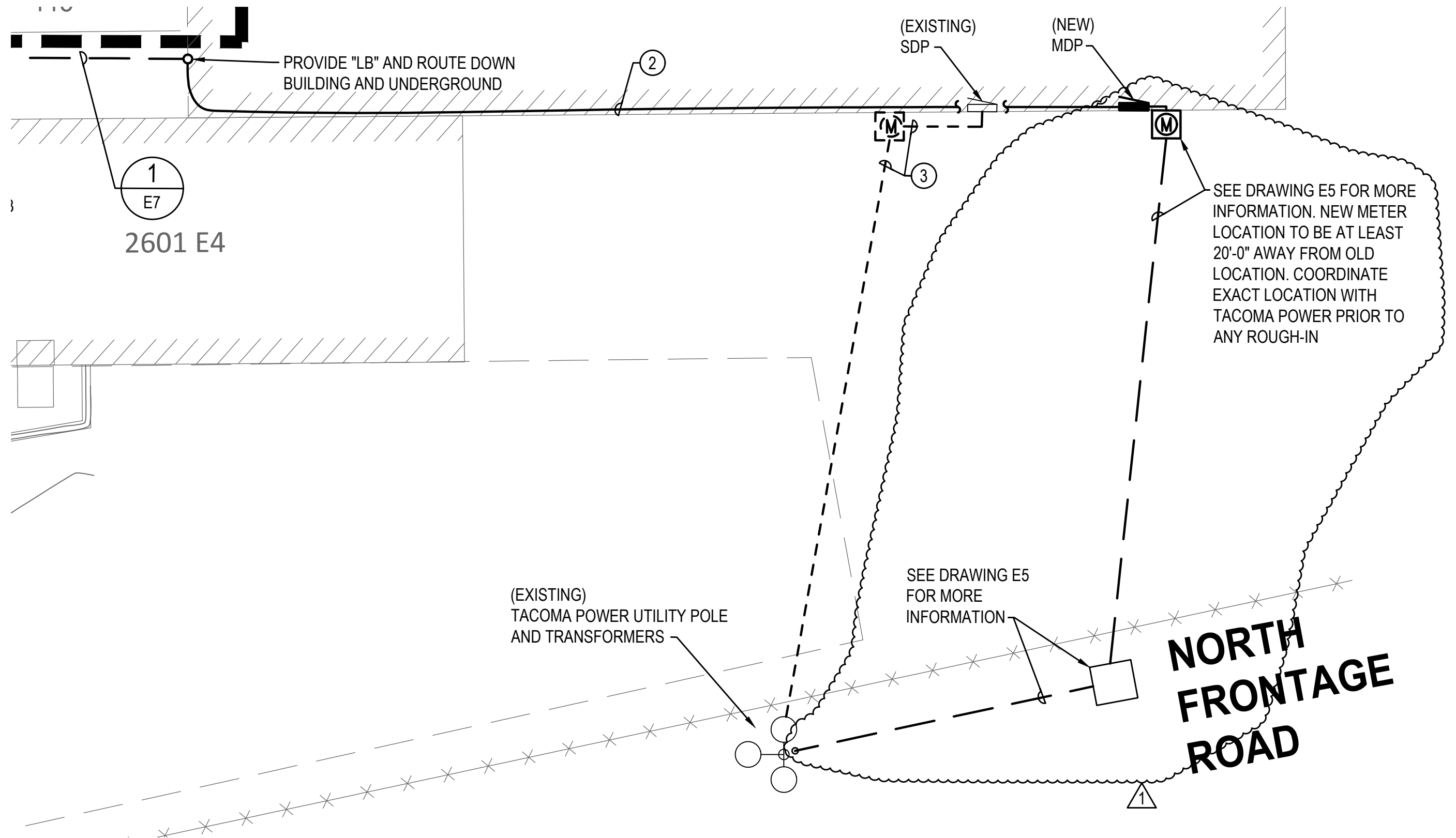
CHECKED BY: BH

PROJECT MANAGER: JB

DRAWING No. 1 of 4

# ESK-1

DATE: 7/26/2021  
SUBMITTAL: ADDENDUM #1  
PROJECT No. 218-272



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## ELECTRICAL SITE PLAN

### REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	7/26/2021

DRAWN BY: JB

CHECKED BY: BH

PROJECT MANAGER: JB

DRAWING No. 2 of 4

# ESK-2

DATE: 7/26/2021  
SUBMITTAL: ADDENDUM #1  
PROJECT No. 218-272

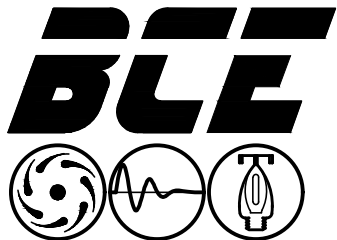
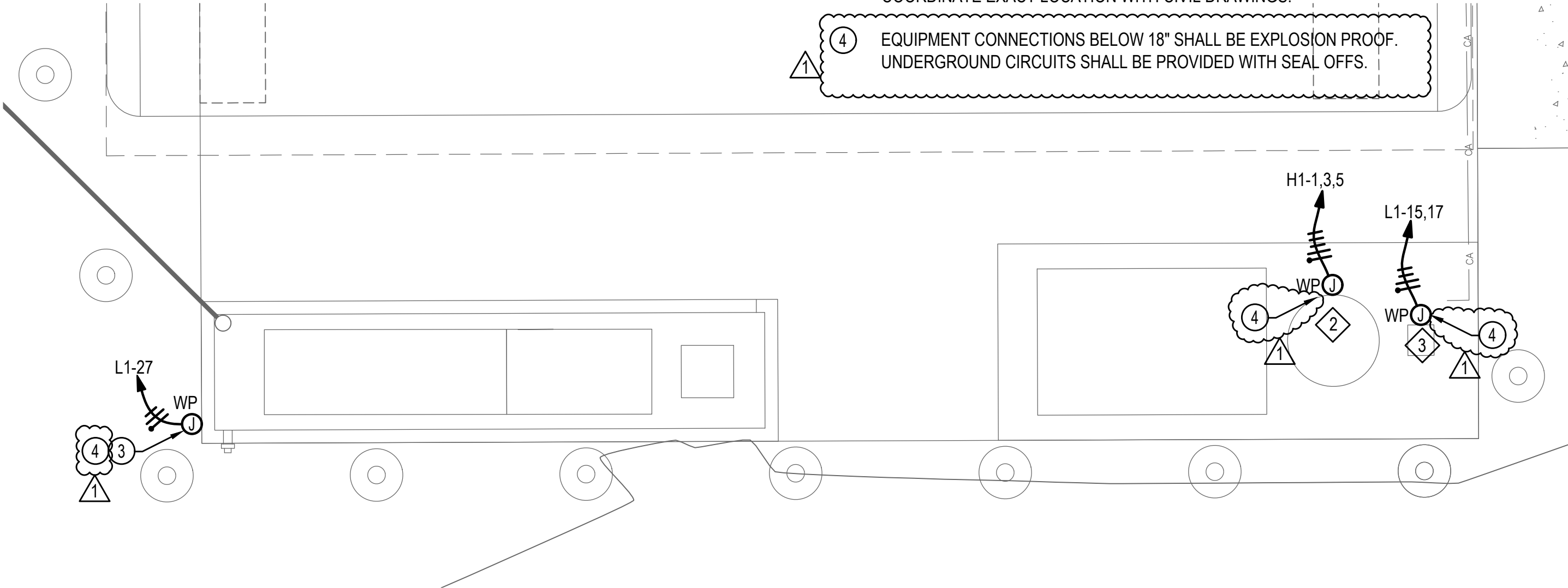
GENERAL NOTES

- 1. SEE EQUIPMENT SCHEDULE ON SHEET E5 FOR ELECTRICAL INFORMATION.

CONSTRUCTION NOTES

- ① PROVIDE EXPLOSION PROOF ELECTRICAL CONNECTION.
- ② PROVIDE ELECTRICAL CONNECTION FOR ACTUATOR AND 20W ELECTRICAL HEAT.
- ③ PROVIDE AN ELECTRICAL CONNECTION FOR BUTTERFLY VALVE SWITCH. COORDINATE EXACT LOCATION WITH CIVIL DRAWINGS.

④ EQUIPMENT CONNECTIONS BELOW 18" SHALL BE EXPLOSION PROOF. UNDERGROUND CIRCUITS SHALL BE PROVIDED WITH SEAL OFFS.



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FUEL TANK ELECTRICAL

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	7/26/2021

DRAWN BY: JB

CHECKED BY: BH

PROJECT MANAGER: JB

DRAWING No. 3 of 4

ESK-3

DATE: 7/26/2021  
SUBMITTAL: ADDENDUM #1  
PROJECT No. 218-272

EQUIPMENT CONNECTION SCHEDULE

	EQUIPMENT	VOLT/PH	LOAD				CIRCUIT		CONDUIT/WIRE SIZE	MANUAL STARTER (NOTE 1)	MAGNETIC STARTER (NOTE 1)	FUSED DISC. (NOTE 1)	RATED DISC. SWITCH	REMARKS
			VA	MCA	MOP	HP	PANEL	BKR						
1	BOOM CABINET(WATER)	120V/1P	1920				L1	8	3/4"C., W/(2)#12 CU & (1)#12 CU GND					
2	AIR COMPRESSOR	480V/3P	93000	111			H1	1,3,5	2"C., W/(3)#3/0 CU & (1)#3/0 CU GND			BY E.C.		
3	AIR DRYER	480V/3P		20			L1	15,17	3/4"C., W/(2)#12 CU & (1)#12 CU GND			BY E.C.		
4	ELECTRIC REEL (2)	120V/1P	1920				L1	14,16	3/4"C., W/(2)#12 CU & (1)#12 CU GND					
5	BOOM CABINET (OIL)	120V/1P	1920				L1	10	3/4"C., W/(2)#12 CU & (1)#12 CU GND			BY E.C.		
6	HEATER	240V/1P	5700				L1	26,28	3/4"C., W/(2)#12 CU & (1)#12 CU GND			BY E.C.		
7	SANDING SYSTEM (SYSTEM 100)	120V/1P	1920				L1	20	3/4"C., W/(2)#12 CU & (1)#12 CU GND					
8	SANDING SYSTEM (SYSTEM 200)	120V/1P	1920				L1	22	3/4"C., W/(2)#12 CU & (1)#12 CU GND					
9	SANDING SYSTEM (SYSTEM 200)	120V/1P	1920				L1	24	3/4"C., W/(2)#12 CU & (1)#12 CU GND					
10	CREW SHELTER W/ LTG & PWR	240V/1P	5700				L1	5,7	3/4"C., W/(2)#10 CU & (1)#10 CU GND			BY E.C.		

1



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EQUIPMENT SCHEDULE

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	7/26/2021

DRAWN BY: JB

CHECKED BY: BH

PROJECT MANAGER: JB

DRAWING No. 3 of 4

ESK-4

DATE: 7/26/2021  
SUBMITTAL: ADDENDUM #1  
PROJECT No. 218-272