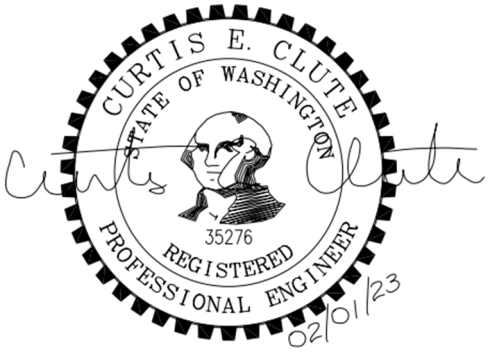
Appendix F
Technical Specifications

SECTION 00 01 07
SEALS PAGE

The undersigned Engineer of Record hereby certifies that the Technical Specifications for the following portions of this project were written by me, or under my direct supervision, and that I am duly registered under the laws of the State of Washington, and hereby affix my Professional Seal and signature.

Those Sections prepared under my direct supervision and being certified by my seal and signature below are as follows:

SEAL AND SIGNATURE	SECTION(S)
 Rebecca Gardner, PE Principal Engineer Anchor QEA, LLC	01 10 00 – Summary of Work 01 31 00 – Project Management and Coordination 01 32 00 – Construction Progress Documentation 01 33 00 – Submittal Procedures 01 35 29 – Health, Safety, and Emergency Response Procedures 01 42 13 – Abbreviations and Definitions 01 43 00 – Quality Assurance and Control 01 50 00 – Temporary Facilities and Controls 01 56 15 – Protection of Existing Utilities 01 70 00 – Execution 01 71 23 – Surveying 01 74 19 – Waste Management and Disposal 01 77 00 – Closeout Procedures 02 41 00 – Demolition 02 71 00 – Water Management and Treatment 02 71 10 – Permeable Reactive Barrier 31 05 16 – Soils and Aggregates 31 05 19.13 – Geotextiles for Earthwork 31 05 19.23 – Geosynthetic Clay Liners 31 11 00 – Clearing and Grubbing 31 20 00 – Earthwork 31 32 13 – Soil Mixing Stabilization

SEAL AND SIGNATURE	SECTION(S)
 David W. Rice, PE Principal Engineer Anchor QEA, LLC	01 57 13 – Temporary Erosion, Sediment, and Pollution Control 01 64 00 – Company-Furnished Products 05 50 00 – Prefabricated Equipment Shelters 31 23 19 – Dewatering 31 23 33 – Trenching and Backfilling 33 05 23 – Trenchless Utility Installation 32 12 16 – Asphalt Paving 32 13 13 – Concrete Paving and Miscellaneous Concrete 33 05 61 – Concrete Manholes 33 42 11 – Corrugated HDPE Gravity Stormwater Pipe 33 42 16 – Stormwater Force Main Piping 33 44 13 – Packaged Stormwater Pump Station 33 44 14 – Valves for Stormwater Control
 Curtis E. Clute, PE Principal Engineer CASNE Engineering, Inc.	26 00 00 – Electrical Work – General 26 05 19 – 600 Volt or Less Wire and Cable 26 05 23 – Control Signal Transmission Media 26 05 26 – Grounding 26 05 33 – Raceway and Boxes 26 05 43 – Underground Ducts and Manholes 26 05 48 – Seismic Controls for Electrical and Communication Work 26 05 53 – Electrical Identification 26 09 23 – Lighting Controls 26 56 00 – Exterior Lighting

END OF SECTION

END OF SECTION

SECTION 01 10 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 DESCRIPTION

A. The Seller must furnish all labor, materials, services, insurance, tools, equipment, temporary facilities, decontamination facilities, and incidentals to perform Work in accordance with the Contract Documents, including the Drawings and Technical Specifications and applicable laws, permits, regulations, codes, ordinances and standards.

B. The accompanying Drawings and these Technical Specifications show and describe the location and type of Work to be performed under this Project. The Work includes but is not limited to excavation and site preparation and establishment of TESC BMPs, on-site consolidation of Waste Material, backfill placement, low permeability cap installation, PRB installation, and stormwater infrastructure modifications and improvements. The Work Area is within a designated cleanup site known as the former Reynolds Plant. The Seller will comply with permits and regulations of local, state, and federal agencies.

C. Pre-construction tasks include but are not limited to the following:

1. Site orientation and health and safety training for the Seller, the Seller's employees, and Subcontractors

2. Development and approval of pre-construction submittals, including the following:

a) Contractor Construction Work Plan

b) HASP

c) CQC Plan

d) EPP

D. The work will require the Seller, the Seller's employees, and Subcontractors to obtain and display security identification badges from the Company.

1.02 RELATED SECTIONS

Work related to this section is described throughout the Technical Specifications.

1.03 PROJECT LOCATION

The project is located at:

Northwest Alloys – Longview (Former Reynolds Plant)'
4029 Industrial Way
Longview, Washington 98632

The site is located within an unincorporated portion of Cowlitz County.

1.04 SEQUENCING AND MILESTONE REQUIREMENTS

A. The Seller must complete the Work as described by the Contract Documents within the Contract Time. The Contract Time will start on the date established in the Notice to Proceed. The Seller must not begin Work until receipt of the Notice to Proceed.

B. The following Work elements must be included in the Seller's Season 1 schedule:

1. Installation of all permanent stormwater infrastructure

2. Ground improvement activities at East Landfill No. 1

3. Consolidation of SU1 and SU2 Waste Material into West Landfill and final capping of the landfill, including all stormwater management ditches

4. Consolidation of SU3 and SU5 Waste Material into East Landfill No. 2 and interim capping of the landfill, including all stormwater management ditches

5. Consolidation of SU8 and SU10 Waste Material into East Landfill No. 1 and interim capping of the landfill, including all stormwater management ditches

6. Final backfilling and, as required, hydroseeding of SU2, SU3, SU4, SU5, SU8, and SU10

7. Remediation of SU9 and SU11

C. The following Work elements must be included in the Seller's Season 2 schedule:

1. Installation of the PRB

2. Final grading and capping, including all stormwater management ditches, of East Landfill No. 1 and East Landfill No. 2 (East Landfills)

D. The Seller must also meet the following Milestones and Work sequencing requirements:

1. Excavation in SU11 must be completed before the west staging area can be used.

2. Complete ground improvement activities at East Landfill No. 1 by May 15 during Season 1.

3. Excavation in SU3, SU5, and SU8 must occur between August 1 and September 30 during Season 1.

4. Temporary Cover Material must be placed over the East Landfills prior to October 1 during Season 1.

5. Hydroseeding activities must be completed prior to October 1.

6. Temporary infrastructure for managing Remediation Water must be constructed and functional prior to breaking ground for excavation associated with SU1, SU2, or the West Landfill.

7. Permanent infrastructure for managing Remediation Water (i.e., the East Landfill Pump Station and force main) must be constructed and functional prior to breaking ground for excavation associated with SU3 or the East Landfills, with the exception of ground improvements required for East Landfill No. 1.

8. Permanent stormwater infrastructure (i.e, the West Landfill Pump Station and force main) for the West Landfill must be completed during Season 1.

9. Permanent stormwater infrastructure must be constructed, tested, and fully functional prior to decommissioning temporary stormwater infrastructure.

10. PRB construction must be performed during Season 2 summer months.

E. The Seller must provide sufficient resources and schedule Work elements and their predecessors such that the Seller is able to complete the Work within the stated Milestones and Contract Dates.

F. Substantial completion for Season 1 Work included in this Contract is to be accomplished by *October 6, 2023*.

G. Substantial completion for all Work included in this Contract is to be accomplished by *August 30, 2024*.

H. Final Completion is to be accomplished by *September 20, 2024*.

I. The Seller must perform Work Monday through Saturday (i.e., no Work on Sundays) during daylight hours, unless otherwise approved by the ARP.

J. Construction is anticipated to require a minimum of two construction seasons.

K. Work not specified as occurring during Season 1 or Season 2 may occur during either season.

L. The Seller must protect Work during and between construction seasons, as further detailed in Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control.

M. The Seller must sequence Work such that excavation activities occur during the dry-weather months when the groundwater table is anticipated to be lowest. This period typically spans August through September during an average weather year. Project excavation activities should be sequenced to maximize material removal as described in Section 31 20 00 – Earthwork.

1.05 RELATED WORK PERFORMED BY OTHERS

A. The Seller's attention is called to work that is being completed by others at or near the site under a separate contract with the Company. The Seller must be aware of and familiar with this work. The Seller must coordinate the Work under this Contract with work being completed by others under separate contract with the Company and must cooperate with the Sellers performing other work. Related work being performed by others includes demolition of infrastructure at the Site, which will be completed prior to and in parallel the Work to be completed under this Contract. Documents depicting the nature and extent of demolition activities can be made available by the Company upon request.

B. The Seller's HSO must coordinate at least daily with the ARP and the HSO of any third-party contractors hired by the Company.

1.06 PERMITS AND REGULATORY APPROVALS

A. The Company is in the process of acquiring or has acquired the following permits and regulatory approvals that apply to the Work:

1. CWA Section 402 NPDES Individual Permit

2. CWA Section 404 Permit (Nationwide Permit 38), including Section 106 reviews and approvals

3. CDID Encroachment Permit, including Section 408 reviews and approvals

4. CWA Section 401 Water Quality Certification

5. State Environmental Policy Act review

B. These permits are provided as Appendix A. Seller must become familiar with the appendix and ensure full compliance with all the requirements and conditions therein.

1.07 COMPANY-IMPLEMENTED PLANS

A. The Company has plans that have been prepared for the Site or specifically for this Work that the Seller must be familiar and comply with. Plans that apply to the Work include the following:

1. Construction Quality Assurance Plan
2. Remediation Water Management Plan
3. On-Site Media Management Plan
4. Stormwater Pollution Prevention Plan
5. Spill Prevention, Control, and Countermeasures Plan
6. Emergency Response Plan

B. These plans are provided as Appendix B. Seller must become familiar with the appendices and ensure that means and methods comply these plans.

1.08 KNOWN SITE CONDITIONS

A. The following materials or conditions are known to exist on the construction site. The Seller must comply with federal, state, or local agencies' regulations pertaining to these conditions:

1. Contaminated soil, groundwater, and waste materials containing, but not limited to: heavy metals, elevated pH characteristics, total petroleum hydrocarbons, and PAHs
2. The Site contains several wetlands, as indicated on the Drawings. Wetlands that are designated for protection on the Drawings must not be impacted or disturbed in any way.
3. The Site does not contain any known cultural resources. However, due to the close proximity to the river and potential historical activities, the Seller will follow the Site's Inadvertent Discovery Plan.

1.09 SOIL AND GROUNDWATER

A. Records of soil and groundwater exploration in the vicinity of this Work are provided as reference only in Appendix D. The Company makes no representation as to the completeness or accuracy of this information.

B. The Seller's attention is brought to the shallow groundwater conditions at the Site.

1.10 DEBRIS

A. It is anticipated that inert debris (e.g., concrete blocks, rebar, wires, brick, and plastic) will be encountered during excavation activities, especially in SU1, SU8, and SU10.

1.11 UNEXPECTED HAZARDOUS OR ENVIRONMENTALLY SENSITIVE SITE CONDITIONS

A. If the Seller encounters suspected hazardous or environmentally sensitive conditions in the Work Area beyond those included in these Technical Specifications or on the Drawings, the Seller must immediately stop all Work in the area of the suspected condition and notify the ARP.

B. The ARP will determine next steps and appropriate abatement.

C. The Seller must alert his or her employees to these facts and must assure that no operations occur that disturb the suspected hazardous or environmentally sensitive condition.

1.12 ELECTRICAL CODE

A. Work must comply with the requirements of the National Electrical Code (NFPA 70), current Washington electrical rules (WAC 296-46B)

B. The Seller must be, and remain, in compliance with licensing requirements of the State of Washington and Cowlitz County, including required individual state electoral licensing for employees performing electrical work on this Project.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. This section describes requirements for Seller's project management, including coordination and meetings.

B. The Seller must attend all required meetings and provide required preparation and follow-up materials.

1.02 RELATED SECTIONS

A. Section 01 32 00 – Construction Progress Documentation

B. Section 01 33 00 – Submittal Procedures

C. Section 01 43 00 – Quality Assurance and Control

1.03 SELLER'S ORGANIZATION

A. The Seller is responsible for overall management and coordination of the Work.

1.04 COMPANY/TENANT OPERATIONS

A. The Seller is responsible for ensuring that their activities do not disrupt or interfere with the Company's, tenant's, or other third-party contractors' concurrent activities, including the Company's normal operations.

B. The Company or tenant operations may require that the Seller's operations be scheduled around Company or tenant activities, and certain areas of the Work may be required to be bypassed and accomplished when Company or tenant operations permit.

C. The Company performs Work on Site, including active use of rail, roads, dock, and buildings. Seller will coordinate Work in these areas directly with the Company. The Seller will not impede Work in the Company's Work Areas without prior written arrangements with the Company.

D. The Seller must coordinate the Work with Company's tenants through the ARP.

E. Other third-party contractors performing work for the Company:

1. Contemplate in planning and Work scheduling the following projects, which may be in progress in the vicinity during the time of this Contract:

a) Demolition of many of the Former Reynolds Plant building structures, infrastructure, support buildings, and removal of concrete, asphalt, asphalt paving, foundations, and footers.

b) The various Sellers and the Company will mutually establish a schedule of construction for the use of common Work Areas.

1.05 PROJECT MEETINGS

A. Pre-Construction Meeting

1. The Company will hold and the Seller must attend a pre-construction meeting following issuance of the executed Contract. Attendees at a minimum include:

   a) Company's APL, ARP and support staff

   b) Seller's Project Manager

   c) Seller's Superintendent

   d) Seller's HSO

   e) Seller's EO

   f) Major Subcontractors

   g) Major suppliers, as appropriate

2. The ARP will establish time and location of the meeting and notify parties concerned a minimum 5 working days before the meeting. The pre-construction meeting will be led by the ARP.

3. The ARP will provide an agenda for the pre-construction meeting and provide a list of items required for the Seller to submit or present at the pre-construction meeting. The agenda may include, but is not limited to, the following:

   a) Team introduction, roles, and responsibilities

   b) Distribution (by Seller) and discussion of:

      1) List of major Subcontractors and suppliers

      2) Preliminary progress schedule and work sequencing

   c) Project overview, including Contract Documents and Contractor Work Plan

   d) Seller Health and Safety Program, including HASP

   e) Seller Environmental Compliance Program, including EPP and SWPPP

f) Seller Quality Control Program, including CQC Plan

g) Status of permits

h) Parking, staging, traffic flow, and laydown requirements

i) Major equipment deliveries and priorities

j) Communications and emergency contacts

k) Designation of responsible personnel

l) Process for submittals, SIDs, invoice submittal and change orders

m) Procedures for maintaining Record Documents including weekly submittal of Seller's and Subcontractor's on-site hours

n) Temporary utilities and utility shutdowns, including rail

o) Security procedures

p) Commissioning and closeout

q) Warranty requirements

B. Daily Tailgate Meetings

1. The Seller will hold daily tailgate meetings to discuss staff safety and potential safety concerns, as well as planned daily Work activities and related environmental concerns.

2. Attendees are to sign an attendance log daily to acknowledge their presence at the meeting.

3. Attendees may include ARP, Seller, Subcontractors, or other relevant parties.

C. Weekly Project Meeting

1. The ARP will prepare, coordinate, convene, arrange, and direct weekly meetings.

2. The weekly meeting will be held at the Site or by telephone conference. The location and time of the weekly meeting will be determined at the pre-construction meeting.

3. Attendees are to include the following:

a) ARP and APL

b) Seller's Project Manager, Superintendent, HSO, and EO

c) Consultants, as needed

d) Major Subcontractors, as appropriate

e) Ecology representative, as appropriate

f) Other, as appropriate

4. The weekly Project meeting may include, but is not limited to, review of the following:

a) Outstanding action items and previous meeting minutes

b) Health and safety issues

c) Environmental issues

d) Site access and traffic issues

e) Specific questions regarding Drawings and Technical Specifications

f) TESC inspection and maintenance updates

g) Schedule

h) Submittals

i) SIDs

j) Technical concerns

k) Coordination with Company's tenants and third-party contractors

l) As-built review

D. Pre-Activity Meetings

1. If a pre-activity meeting is deemed necessary for a construction activity by the ARP or Seller, a separate pre-activity meeting will be scheduled ahead of that specific Work activity.

2. The need for a pre-activity meeting shall not be cause for a delay in Work progress.

3. The agenda for each pre-activity meeting must include the following:

a) Project conditions, weather conditions, activity-specific issues affecting the task, and lines of communication

b) Schedule, sequencing, and coordination with ongoing Work

c) Procedures

d) Quality Assurance; Seller's accommodation of Company, inspection of the activity, and other quality expectations

E. Special Meetings

1. The ARP may call special meetings at the Project Site or by telephone conference to coordinate the Work, answer questions, and resolve problems. Special meetings will be conducted at a mutually agreeable time and location for the ARP and Seller.

1.06 PROJECT MEETING MINUTES

A. The ARP will compile minutes (unless other arrangements have been made and agreed to) of each Project meeting and will distribute copies of the minutes to all interested parties.

B. Minutes are not required for daily tailgate meetings; however, the Seller must record and maintain the completed attendance log for each meeting held.

C. The minutes distributed by the ARP will be the official record minutes and all clarifications and/or corrections will be transmitted in writing to the Seller's Project Manager within 2 days of the date of receipt of the minutes, unless the clarification or correction has already been placed on the agenda for the next scheduled Project meeting. Corrections to the minutes will be legibly submitted electronically.

D. All meeting minutes and other applicable documents will be filed and maintained on a secure electronic site (SharePoint or other), accessible by the ARP, Seller, and other parties as necessary.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

A. This section provides requirements and procedures for preparing, submitting, and revising construction schedules related to documenting the progress of the Work to ensure adequate planning, scheduling, management, and execution of the Work by the Seller and to enable the Company to evaluate Work progress and make Contract Time adjustments. The Work specified in this section consists of submitting a Baseline Schedule, 3-Week Look-Ahead schedules for progress meetings, Monthly Update Schedule, and Daily Activity Report submittals.

1.02 RELATED SECTIONS

A. Section 01 10 00 – Summary of Work

B. Section 01 33 00 – Submittal Procedures

1.03 SUBMITTALS

A. Submit the following in accordance with the following sections and the requirements of Section 01 33 00 – Submittal Procedures:

1. Schedules

a) Baseline Schedule:

1) Submit a preliminary Baseline Schedule within 14 calendar days following issuance of Notice to Proceed.

2) Submit a final Baseline Schedule 5 working days after receipt of comments on the preliminary Baseline Schedule.

b) Three-Week Look-Ahead Schedules:

1) Submit an electronic version 24 hours in advance of Weekly Progress Meetings.

c) Monthly Update Schedules:

1) Submit with each Application for Payment.

2. During active construction, submit a Daily Activity Report summarizing the activities of the previous workday.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Use the scheduling technique known as the Critical Path Method (CPM) showing a phasing bar chart style showing specific tasks, dates, and Critical Path of anticipated stages of Work, and Final Completion of the Work within the time period required by the Contract documents.

B. Use an industry standard scheduling software (e.g., Microsoft Project or Primavera) or approved equal acceptable to the Company.

C. Failure to comply with the requirements of this section will be cause for delay review and acceptance of the Application for Payment.

D. The milestones described in Section 01 10 00 – Summary of Work must be considered and shown clearly on the schedule by the Seller.

3.02 BASELINE SCHEDULE

A. Schedule Requirements: The Baseline Schedule will be a CPM network diagram of the construction schedule, and must accomplish the following:

1. Show specific tasks, dates, and the defined Critical Path necessary for completion of the Project within the Contract Time limits.

2. Show all significant design, manufacturing, construction, and installation activities.

3. Include sufficient time for cleaning, Punch List review, and completion of Punch List items prior to the Substantial Completion Date.

4. Clearly show the relationship between the Work items and the starting and completion dates, as well as include all details of the Work within the time frame shown.

5. Identify activities to be accomplished separately by Subcontractors. Schedule analyses for these activities must be completed by Subcontractors.

6. Include hours of Work and a list of the holidays and non-workdays applicable to the schedule.

7. Include submittals and long lead items, and the relationship between a submittal and the Work item must be identified. Submittal and procurements activities must reflect preparation, submittal, and review of shop drawings, product data, samples, fabrication, delivery, as-built drawings, and O&M Manuals.

B. Schedule Format:

1. The CPM network diagram must include the following content for each activity:

   a) Number

   b) Description

   c) Duration

   d) Predecessors

   e) Successors

   f) Total Float

2. Prepare CPM network diagrams on 11-inch by 17-inch or larger sheets. Ensure that the schedule is provided in a format that is legible and compatible for printing in an 11-inch by 17-inch size.

3. Baseline Schedule must be submitted electronically in an industry standard project management software file formats (e.g., Microsoft Project or Primavera), or approved equal, and as an Adobe PDF.

4. Work breakdown structure: At a minimum, break the schedule down and band the activities together into the following categories:

   a) Items identified in the Price Schedule and significant design, manufacturing, construction, and installation activities

   b) Procurement of major materials and equipment

C. Dates imposed on the schedule are not binding on the Company, unless specified in the Contract.

D. Failure to include any element of Work required for the performance of the Contract does not excuse the Seller from completing the Work as described in the Contract.

E. Obtain and submit major Subcontractors' and suppliers' signoff of the submittal of the Baseline Schedule.

F. If the Seller submits a construction schedule showing completion of the Work in advance of the Contract completion date, the Seller agrees that the Company may, at no cost, decrease the Contract duration by issuance of a Change Order, which will change the appropriate milestone date(s) and the Contract Time shown in the construction schedule.

G. Any schedule having an early completion date (under the Contract Time) must show the time between the early completion date and the Contract Time as Float.

H. The Baseline Schedule submittal must include a narrative that conveys the Seller's schedule assumptions; constraints; Critical Path/critical activities and why they are critical; permit requirements; coordination required with the Company's operations and its tenants, other third-party contractors, utilities, or any other parties; and long-lead delivery items.

3.03 THREE-WEEK LOOK-AHEAD SCHEDULE

A. The 3-Week Look-Ahead Schedule must identify the completion and progress of major milestones and activities, and include problems occurring during the projected 3 weeks. The 3-Week Look-Ahead Schedule must also include a review of the activities performed in the preceding week.

B. The 3-Week Look-Ahead Schedule must be submitted electronically in an industry standard format (e.g., MS Project or Primavera), or approved equal, and as an Adobe PDF. It must be submitted prior to the Weekly Progress Meeting for review during the meeting.

3.04 MONTHLY UPDATE SCHEDULE

A. Include revisions in the construction schedule prior to implementation along with a written statement and rationale. Use the same format and method employed in the Baseline Schedule. These updates will be provided with sufficient time for the Company to comment on proposed modifications prior to implementing.

B. Prepare and submit a Monthly Update Schedule and graphic network diagram on a monthly basis. When the Work is behind schedule, submit a plan for completing the Work within the required milestones and Contract Time.

C. The Monthly Update Schedule will include a status of all Work to date (i.e., as-built schedule). It will include the following:

1. The latest Seller planning for all Work to complete the Contract.

2. All executed Change Order Work to date.

3. Activities added during the Work, as required.

4. All the requirements and information included in the Baseline Schedule.

5. Updated cost-loading to reflect added activities.

6. If requested by the Company, provide a written narrative summarizing the progress of the Work, including schedule changes and equipment and material requirements.

D. The Monthly Update Schedule must be provided with the Application for Payment as a condition precedent to receiving payment for Work accomplished each month.

E. The Company may request that the Seller provide a schedule update between Monthly Update Schedules when major elements of Work have changed.

3.05 DELAYS AND RECOVERY

A. As necessary, the Seller must submit, in writing, requests for time extensions to the Critical Path resulting from changes issued by regulatory agencies or the Company. The Seller must include a complete schedule analysis to support the time extension. Analysis to include, but not limited to, a schedule incorporating the Work change and a narrative report explaining the impacts, effects, and costs associated with the time extension.

B. If, at any time during the Project, the Seller fails to complete an activity by its latest schedule completion date, the Seller must submit within 2 working days a written statements as to how and when the Seller will reorganize its work force or enlist additional resources to return to the current construction schedule.

C. Whenever it becomes apparent from progress evaluation and/or updated schedule data that milestone completion dates and/or Contract completion dates will not be met, the Seller must take some or all of the following actions (at no cost to the Company):

    1. Increase construction staffing in such quantities and crafts to substantially eliminate backlog of Work.

    2. Increase number of working hours per shift, shifts per workday, work days per week, or amount of construction equipment, or combination of foregoing to substantially eliminate backlog of Work. The increase of Work effort will be subject to allowable Site working hours and days as well as approval by the Company.

    3. Reschedule Work items to substantially eliminate the backlog of Work.

    4. Under no circumstance will addition of equipment or construction forces, increasing working hours or any other method, manner, or procedure to return to current Project Schedule be considered justification for Contract modification or treated as acceleration.

3.06 DAILY ACTIVITY REPORT

A. The Seller must review the progress and quality of the Work on a daily basis and must prepare and submit to the Company each day a Daily Activity Report described herein. The Daily Activity Report must be submitted to the Company in the morning following completion of Work for that day. At a minimum, the Daily Activity Report must include the information in Table 1.

    1. Inspections must be performed daily to ensure continuing compliance with Contract requirements until completion of the particular feature of the Work. Each member of the Seller's quality control personnel will maintain a daily log of all inspections performed for both Seller and Subcontractor operations on a form acceptable to the Company.

    2. As part of the CQC Plan, the Seller will be responsible for establishing a system that will record all Quality Control test results. The daily test logs must be signed by the

responsible Quality Control technician and the CQC Supervisor. When required by the Technical Specifications, the Seller will maintain statistical Quality Control charts.

Table 1. Required Information for Daily Activity Reports

Daily Activity Report Sections	Required Information
General Requirements	Project name Date Author of report Weather conditions including wind, precipitation, and temperature Period covered by the report and hours worked Description of activity as identified by location Personnel and equipment on the Site, including a listing of all Subcontractors and suppliers, as well as sign-in logs for employees, Subcontractors, and visitors, including regulatory agencies and/or testing and inspection entities Documentation of daily health and safety briefings, daily health and safety toolbox topics, and applicable Job Safety Analyses Materials and equipment delivered, used and/or stored on the Site, and demobilized Quantity of materials placed and/or excavated that day and to date. Quantities requiring subsequent measurement or survey must be estimated for the purposes of these reports. Equipment being operated, including position, location, and performance Delays encountered and relevant details of the delay, such as the cause, resolution, and measures implemented to avoid similar delays in the future Change of conditions observed Accidents and safety reports and any emergency response actions Results of all inspections, surveys, and monitoring activities Signature of the Seller's Superintendent or CQC Supervisor
Daily Inspection Logs	Technical Specification item number and description Compliance with approved submittals Proper storage of materials and equipment Proper operation of all equipment Adherence to Drawings and Technical Specifications Review of Quality Control tests The daily inspection logs will identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The daily inspection logs must be signed by the responsible Quality Control technician and the Seller’s CQC Supervisor.

Daily Activity Report Sections	Required Information
Daily Test Logs	Technical Specification item number and description Test designation Location Date of test/retest Control requirements Test results Causes for rejection Recommended remedial actions The daily test logs must be signed by the responsible Quality Control technician and the Seller's CQC Supervisor.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL SUMMARY

A. This section includes the administrative and procedural requirements for submittals. Submittals covered by these requirements include proposed pre-construction submittals, products lists, shop drawings, progress schedules, product data and samples, test reports, Manufacturer's instructions and certificates, O&M Manuals, and miscellaneous Work-related submittals.

1.02 RELATED SECTIONS

A. Section 01 32 00 – Construction Progress Documentation

B. Section 01 71 23 – Surveying

1.03 REFERENCE

A. ASTM D3665 – Standard Practice for Random Sampling of Construction Materials

1.04 SUBMITTAL PROCEDURES

A. Seller must make all submittals in accordance with this procedure and the requirements of the Contract Documents.

B. Seller must certify all submittals for accuracy, completeness, and compliance with contract requirements. Seller must indicate approval on each submittal as evidence of coordination and review. Submittals provided without evidence of the Seller's acceptance will not be reviewed.

C. The review of submittals by the Company will be limited to general design requirements only and will in no way relieve the Seller from responsibility for errors or omissions contained therein.

D. Acceptance of submittals will not relieve the Seller from responsibility for the safety of their method or equipment or from responsibility for complying with the requirements of all applicable codes and of this Contract, except with respect to specifically approved variations.

E. Work done prior to submittal approval will be at the Seller's risk.

F. Delays, resequencing, or other impact to the Work resulting from the Seller's submission of unchecked or unreviewed, incomplete, inaccurate or erroneous, or nonconforming submittals, which will require the Seller's resubmission of a submittal review, will not constitute the basis of a claim for adjustment in the purchase agreement or time allocated for completion of the Work.

G. The Company reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

H. Seller must provide a "priority list" when submitting several submittals at one time.

I. Seller must allow for review coordination with regulatory agencies as specifically noted in the Contract Documents.

1.05 SUBMITTAL REQUIREMENTS

A. A preliminary submittal list/schedule (Section 01 33 00A) has been developed for the Work that details the required submittals and schedule for submission. The Seller must finalize this list and prepare a Submittal Register for the Project.

B. The Seller must prepare the required project submittals as detailed in the Submittal Register. The Seller must identify each submittal and resubmittal by including the following information:

1. Name, signature, address, and telephone number of submitter and name and telephone number of the individual who may be contacted for additional information (if different than the submitter).

2. Submittal name, as stated in the Technical Specifications

3. Submittal date and date of any revisions

4. Project title and contract number as they appear in the Contract Documents

5. Seller, Subcontractor, or supplier name and address

6. When applicable, the name, address, and telephone number of the local Manufacturer's representative

7. Drawing sheet and detail numbers(s) and Technical Specification section number to which the submittal applies

8. Submit only pertinent catalog pages and mark each copy of standard printed data to identify pertinent products. All options, models, or other unnecessary information must be clearly lined/crossed out or the pertinent information highlighted. Submittals received that do not clearly show the material being submitted will be returned to the Seller unreviewed.

C. Submittal Format

1. The Seller is required to transmit and receive documents electronically in PDF format.

2. Transmit each submittal with a sequentially numbered identification. Resubmittals are to have the original number with an alphabetic suffix.

3. Shop Drawings

   a) All shop drawings must be submitted on sheets that are 22 inches wide by 34 inches long in overall dimension or on small sheets that are multiples of 8-1/2 inches by 11 inches.

   b) Shop drawings must be drawn accurately to a scale sufficiently large enough to indicate all pertinent features of the products and the method of fabrication, connection, erection, or assembly with respect to the Work. Calculations associated with the design of shop drawings must also be submitted.

D. Submittals received from sources other than the Seller will be returned without action.

1.06 SUBMITTAL INFORMATION

A. Shop Drawings

1. Submit for review to check for conformance with information given and the design concept expressed in the Contract Documents.

B. Product Data

1. Mark each copy to identify applicable products, models, options, and other data for the specific products to be provided. Supplement Manufacturers' standard data to provide information unique to this Project.

2. For manufactured products, submit a complete catalog for the product and obtain approval prior to ordering.

C. Samples

1. Submit samples as specified in individual Technical Specification sections.

2. Include identification on each sample, with Project information.

D. Manufacturer's Instructions

1. When specified in individual Technical Specification sections, submit Manufacturer's printed instructions for delivery, storage, assembly, installation, adjusting, and finishing before item is delivered to the Project Site.

2. Identify any conflicts between Manufacturer's instructions and Contract Documents.

E. Manufacturer's Certificates

1. When specified in individual Technical Specification sections, submit Manufacturer's certificates for review.

2. Indicate that the material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

3. Certificates may be based on recent or previous test results on the material or product.

F. Submit Test Reports as required in individual Technical Specification sections.

G. Submit all Progress Specifications as specified in individual Technical Specification sections. Submit all Pre-Construction and Post-Construction Submittals as specified herein.

H. O&M Manuals

1. Submit O&M Manuals for all functional equipment. Provide two hard copies and one digital copy of each O&M Manual for review.

1.07 SUBMITTAL REVIEW

A. Submit to the Company all submittals required for review as described in these Technical Specifications. Submit promptly and in orderly sequence to not cause delay in Work. Provide submittals far enough in advance of scheduled installation to provide time for review and approval, for possible revision and resubmittal, and for orders and delivery. Failure to submit in ample time is not considered sufficient reason for extension of Contract duration, and no claim for extension by reason of such default will be allowed.

B. The Seller must allow a minimum of 5 working days for the Company to review of all submittals, except for pre-construction submittals, which will require 10 working days, and an additional 5 working days for resubmittals. The Seller must provide resubmittals within 5 working days upon receipt of the Company's comments. For pre-construction submittals, working days refer to Monday through Friday, excluding statutory holidays.

C. Work done prior to submittal approval will be at the Seller's risk.

D. Only those items required by the Contract Documents will be reviewed. Information submitted by the Seller that is not required will be returned marked "Information Only." When a single submittal contains both required and non-required information, only the required information is subject to review.

E. Submittals will be checked for conformance with the design concept of the Project and compliance with the information provided in the Contract Documents.

F. Review of drawings or data prepared by a Professional Engineer licensed in the State of Washington will be limited to the submittal's effect on the integrity of the completed Project.

G. Submittals will be marked to indicate the results of the review, as follows:

1. "NO EXCEPTIONS TAKEN" – Revision is not required.

2. "MAKE CORRECTIONS NOTED" – Seller must revise the submittal as indicated. Resubmittal is not required.

3. "REVISE AND RESUBMIT" – Seller must revise the submittal and resubmit for review and approval.

4. "REJECTED" – Submittal does not conform to the Contract Documents. Seller must provide a submittal that conforms to the Contract Documents for review and approval.

5. Submittals marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED" authorize the Seller to proceed with the construction covered by that submittal with correction, if any, incorporated.

6. No revision in any way will be made to a submittal marked "NO EXCEPTION TAKEN" without resubmitting for review.

1.08 CORRECTION AND RESUBMITTALS

A. The Seller must direct specific attention in writing to revisions other than the corrections called for on previous submittals. The Seller must state, in writing, all variations in costs and schedule and assumptions of the related changes. The Seller must identify each resubmittal with the number of the original submittal followed by consecutive letters starting with "A" for the first resubmittal, "B" for the second resubmittal, and so on.

B. The Seller must check returned submittals for correction and ascertain if the corrections result in extra cost above that included under the Contract Documents. If, in the Seller's opinion, extra costs result from corrections to the submittals, the Seller must give written notice to the ARP within 5 days after the submittal return. By failing to so notify the ARP, the Seller must waive all claims for extra costs resulting from required corrections.

1.09 SUBMITTAL REGISTER

A. A draft submittal register is presented for the Seller's convenience only, but no warranty is given to its accuracy of completeness. In the event of any discrepancies with the requirements of the individual Technical Specification sections, those individual Technical Specification sections apply.

1.10 PRE-CONSTRUCTION SUBMITTALS

A. Baseline Schedule: Submit in accordance with requirements of 01 32 00 – Construction Progress Documentation.

B. Site HASP: Submit in accordance with requirements of 01 35 29 – Health, Safety, and Emergency Response Procedures.

C. Pre-Construction Survey: Submit in accordance with requirements of 01 71 23 – Surveying.

D. Construction Work Plan: The Seller must prepare and submit a Construction Work Plan for review and approval by the ARP. No Work may occur at the Site until the Construction Work Plan has been reviewed and accepted by the ARP. The Construction Work Plan must document the Seller's methods, procedures, equipment, and schedule for the various components of the Work, including, but not limited to, the required information in Table 1.

1. The Seller must submit all required elements of the Construction Work Plan for the ARP review and approval within 10 calendar days after Notice to Proceed.

Table 1. Required Information for Construction Work Plan

Construction Work Plan Section	Required Information
General Requirements	• The order in which the Work is to be performed, indicating the sequence of construction at the various areas of the Site • The number, types, and capacity of equipment to be used, hours of operations, methods of operation, and the time required to complete each activity • A list of key personnel and the supervisory chain of responsibility • Sources of all earth materials • Equipment and means and methods for performing major Project elements, including the following: - Clearing and grubbing - Ground improvements and settlement monitoring at SU7/East Landfill No. 1 - Site preparations, including berm construction and regrading - Excavation and on-site consolidation, including means and methods for meeting compaction requirements - Placement of backfill, including means and methods for blending of Reactive Backfill - Low permeability cap installation - PRB installation - Stormwater infrastructure modifications and improvements - Construction of temporary cofferdam to isolate Pump Station 004 • Proposed temporary access roads must be described in the Construction Work Plan for approval by the ARP prior to construction. • Methods of protecting existing utilities during active construction • Methods for protecting constructed Work during and between construction seasons • Procedures and equipment for coordinating and performing required surveys

Construction Work Plan Section	Required Information
	- Procedures and equipment for controlling, verifying, and documenting that the Reactive Backfill and PRB Media specified mixtures are achieved after blending
Temporary Facilities and Controls Plan	• Traffic Management Plans that describe travel and haul routes, both on and off site; temporary traffic control devices; flaggers; etc., to promote safe travel on access roads, as necessary; and all traffic-related measures employed by the Seller • Methods and materials for access road construction and removal, if necessary • A visual representation (to scale) showing the location of temporary facilities to be used by the Seller, as well as the type or description of facility • Details for decontamination facilities • Details for control of waste generated by Site operations and the methods and locations for disposal • Description of Site security features
Demolition Plan	• Description of how the Seller will demolish all structures and utilities • Sequencing of the Work, including drawings, phasing, and other graphic aids to clearly demonstrate the areas and sequence of Work to the Company • Means to prevent interruption of utility service • Means and methods to prevent abandoned utility corridors from becoming preferential pathways for water • Approach for salvaging recyclable materials
Construction Facilities Layout Plan	• Locations and extents of all staging and stockpiling areas • Locations of temporary stockpiles and stockpile protection in accordance with the EPP • Locations of access roads, both permanent and temporary access roads constructed by the Seller, if necessary • All utility connections to be made by the Seller • All construction routes • Location of Site security features

Construction Work Plan Section	Required Information
Soil Stabilization Plan	• Proposed means, methods, and equipment for conducting soil stabilization and management of spoils and swell • Layout of the soil mixing stabilization, including lines, grades and cross sections of the proposed installation • Methods for vertical and horizontal control during installation and how these will meet required tolerances • Quality Control methods and equipment for performing real-time monitoring of confirming depth of treatment, the slurry injection rate, specific gravity testing, wet sampling, mixing rate, and optimization. • Methods and materials to construct and remove any temporary access roads and/or temporary support for equipment due to expected soft soil conditions to complete the soil stabilization program
Waste Management and Disposal Plan	• Means and methods for the management, recycling, and disposal of solid waste generated during the Work • Means and methods of handling and management of solid waste material
Utilities and Rail Crossings Plan	• Results of potholing or other Work completed to verify the locations, depths, sizes, and types of utilities at crossing locations • Results of potholing or other Work completed to verify subsurface soil conditions at crossing locations • Detailed drawings (plan view and section view) showing the proposed method and installation requirements for installing a utility sleeve at each crossing location • A short, written summary of the proposed method, equipment to be used, and requirements for installing a utility sleeve at each crossing location • Qualifications of the personnel or Subcontractor that will be performing horizontal drilling, jacking, or directional drilling work
PRB Design Plan	• Shipping and handling of material • Sequencing and traffic management for construction • Means and methods of surface preparation • Installation methods ensuring width and depth requirements are met, as shown on the Drawings • Verification of trench dimensions • Groundwater management plan • Management of excavated material • Means and methods of PRB Media mixing

Construction Work Plan Section	Required Information
	• Management and placement of PRB Media • Means and methods for testing and verifying dosage requirements of the PRB Media are met and that a sufficiently homogeneous mixture has been blended • Geotextile, General Backfill, and Topsoil placement

E. Construction Quality Control Plan (CQC Plan): The Seller must establish a CQC Plan to document performing inspections and testing of all Work items, including those performed by Subcontractors. The CQC Plan will be used to document inspections, monitoring, surveys, and other actions to be taken by the Seller to ensure that the Work complies with all Contract requirements with respect to materials, workmanship, construction, finish, and functional performance. The required information required in the CQC Plan is included in Table 2.

1. The Seller must submit all required elements of the CQC Plan for the ARP's review and approval within 10 calendar days after Notice to Proceed.

Table 2. Required Information for Construction Quality Control Plan

CQC Plan Section	Required Information
General Requirements	• The CQC Plan must demonstrate the Seller's understanding of the total Quality Control requirements of the Contract and generally how these will be used to control all processes within material/construction tolerances and acceptance criteria. • Document Control: The CQC Plan must include a description of the means and methods for document control to be performed by the Seller. • The Seller is encouraged to add additional elements to the CQC Plan deemed necessary to adequately control all production and/or construction processes required by this Contract.
Quality Control Organization	• The CQC Plan must describe the responsibility, authority, and interrelation of all personnel who manage, perform, and verify Work affecting quality. This will include personnel who need organizational freedom and authority to: - Initiate the actions necessary to prevent the occurrence of non-conformances. - Identify and record any product quality problems. - Initiate, recommend, or provide solutions through designated channels. - Verify the implementation of solutions. - Control further processing, delivery, or installation of non-conforming material or items until the deficiency has been corrected.

CQC Plan Section	Required Information
Inspection and Testing Requirements	• The CQC Plan must establish a system for the calibration, maintenance, and control of measuring and test equipment used by Seller during construction. Procedures must provide for the identification of each instrument or equipment item that requires calibration or checking and the establishment of a calibration system based on the elapsed time or usage cycles. - Records of calibration must be traceable to nationally recognized standards; otherwise, the basis for calibration must be established and documented. Calibration standards used must meet the accuracy tolerance recommended by the Manufacturer of the equipment being calibrated.
Inspection and Test Plan	• As part of the CQC Plan, the Seller must implement an Inspection and Test Plan. The Inspection and Test Plan must include the minimum tests and test frequencies required by each Technical Specification item, as well as any additional Quality Control tests that the Seller deems necessary to adequately control production and/or construction processes, including, but not limited to, the following: - An itemized listing of inspection and test requirements - A reference of documents for each plan - Inspection and test methods employed in determining compliance - Provisions for establishing mandatory inspection hold points for witness by the ARP or for allowing the ARP to verify acceptance of the Work - Inspection and test procedures and instructions for each identified item requiring testing, which will provide the following: o References to applicable documents, such as Drawings, Technical Specifications, and procedures o Identification of prerequisites and special-process control requirements, such as personnel, procedure or equipment qualifications, suitable and controlled environmental conditions, and calibrated instrumentation o Identification of characteristics to be inspected o Identification of individuals or groups responsible for performing the inspection o Identification or frequency of inspection or sampling - Requirements that inspections of modifications, repairs, and replacements be performed in accordance with either the original inspection procedure, instruction, plan, special procedures, or plans appropriate to the Work activity - Requirements that inspection and test records contain the following: o A description of the observation

CQC Plan Section	Required Information
	○ Record of the date and results of the inspection or test, including any special documentation and signoff by the inspector ○ Inspector identification ○ Evidence as to acceptability of the results ○ Verification that inspection or test operations are complete and acceptable ○ Action taken to resolve any discrepancies noted ○ Adequate documentation to demonstrate that the completed inspections or tests have met the objectives defined in the Inspection and Test Plan - Documentation requirements necessary to show evidence of compliance - Identification of the inspection or test status for Work in process by using Work sequence plans, inspection or test records, tags, markings, or other devices compatible with the item, system, or operation being inspected or tested. Work sequence plans must identify hold and witness points for inspections and tests, which will also be shown on the Project schedule. - Any other information or verification required to assure compliance with Contractual requirements - The Inspection and Test Plan must contain a statistically based procedure of random sampling for acquiring test samples of construction materials in accordance with ASTM D3665. The Company must be provided the opportunity to witness Quality Control sampling and testing.
Documentation of Quality Control Activities	• All Quality Control test results must be documented by the Seller as specified herein. The CQC Plan must establish a system for ensuring and documenting that all inspections are performed in accordance with the Inspection and Test Plan defined in this section. The Seller must use only inspection personnel who are independent of craft supervision and field engineering to perform quality verification inspection and testing. • The CQC Plan must describe and specify control testing operations required to qualify, demonstrate, or ensure the quality and characteristics of items, Site conditions, or the erection and construction of Contract-required items. All testing must be performed in accordance with the Inspection and Test Plan. • The Seller's CQC Plan must have document control procedures operations for the following related documents: – Manuals – Instructions – Procedures – Technical Specifications

CQC Plan Section	Required Information
	– Drawings – Inspection and Test Plan – Field change requests – Inspection test and manufacturing procedures
Requirements for Corrective Action	• The CQC Plan must indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. • The CQC Plan must detail how the results of Quality Control inspections and tests will be used for determining the need for corrective action and must contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

F. Environmental Protection Plan (EPP). The EPP must present the procedures by which the Seller must establish and maintain protocols for environmental protection during all construction activities and the means and methods by which the Seller will monitor the Work to comply with the Contract Documents and required permit conditions. The EPP must present a comprehensive overview of known or potential environmental issues. The EPP must include, with sufficient detail to adequately describe to the Company and Seller employees, at a minimum, the required information in Table 3.

1. The Seller must submit all required elements of the EPP for the ARP's review and approval within 10 calendar days after Notice to Proceed.

2. Any updates to the EPP must be provided promptly in writing to the Company using the SID. The write-up must describe all changes to the previous EPP revision including, but not limited to, the following:

   a) Changes to Work methodology

   b) Changes to BMPs used as part of the Work

   c) An explanation of why changes have been made

   d) Comments that may be received from the Company

Table 3. Required Information for Environmental Protection Plan

EPP Section	Required Information
TESC Plan	• Methods of minimizing erosion and sedimentation during construction, including (but not limited to) those measures specified herein • Compliance with all requirements of relevant state and local codes and bylaws • A description of all activities as part of the Work with the potential to cause erosion or pollution and the means and methods, including BMPs, to be used for prevention • A plan view showing Seller-recommended TESC BMPs, prepared as a redline revision of the conceptual TESC Plans provided as part of the Drawings • A detailed description of the means and methods that will be used to install and maintain the TESC BMPs • Technical Specifications/cutsheets and details including the name of the Manufacturer/supplier for each product to be used • Procedures for containment of excavation spoils and impacted material, including for Waste Material from the PRBs • Methods and procedures for stockpile protection, including long-term protection of stockpiles during construction off-season, if approved by the Company • Stabilization methods proposed for areas frequented by construction traffic or combined construction and other Site traffic under the control or joint control of the Seller • Measures to control and manage track out • Name, title, and telephone number of the designed individual who will be performing inspections and maintenance activities • Example template of the form that will be used for monitoring activities
Spill Control Plan	• Describe procedures for emergency spill prevention, containment, and removal operations. The Spill Control Plan must include but not be limited to measures that address the following items: - Storage and handling of liquid - Storage and stockpiling of construction materials and Waste Material - Fueling - Maintenance, repairs, storage of vehicles and equipment - Methods and protocols for the expeditious containment and removal of spills or inadvertent releases

EPP Section	Required Information
Stockpile Management Plan	• Means and timing for prepping each of the stockpile areas • Location of stockpiled materials to be screened for use as Screened Embankment and Vegetative Base Soil; each of the soils have different source material requirements and will need to be stockpiled in separate distinct locations • Location of screening and crushing operations and the size and location of the generated stockpiles • Seller's means and timing for covering completed surfaces of the stockpiles and temporary cover for stockpiles not actively being used for more than 2 weeks • Location of blending Vegetative Soil with organics and nutrients and the size and location of the generated stockpiles
Remediation Water Management Plan	• The Remediation Water Management Plan must describe the following: - Procedures for management of water generated during execution of the Work - Temporary water storage type, size, and location - Methods for conveying water to temporary storage and on-site treatment facility - Methods and equipment for infrastructure dewatering, including providing dewatering design plans and confirmation of expected dewatering volumes and flow rates for dewatering for acceptance by the Company prior to starting the Work
SWPPP (attachment to the EPP)	• The SWPPP must include the following: - CESCL and pollution prevention team contact information - Description of construction activities and areas - Materials to be handled on site during construction and potential pollutants generated by construction activities - BMPs to be implemented during construction activities, including operational source control BMPs, structural source control BMPs, treatment BMPs, and sedimentation and erosion control BMPs - Inspection protocols

EPP Section	Required Information
Site Controls	• A detailed Dust Control Plan for the Work must be included in the EPP. • The Seller must submit to the Company product specifications, installation recommendations and construction methods for the materials, equipment, and activities listed as follows, if they are proposed to be used as part of the Work: – Silt fence – Straw wattles – Straw bales – Temporary soil stabilization products in accordance with Section 32 90 00 – Hydroseeding – Sandbags or other approved ballast for stockpile covers – Plastic sheeting – Geotextile for separation – Marker Product – Water pumps – Temporary storage tanks – Tank trucks – Dust palliatives – Catch basin inserts • All other procedures for environmental protection and monitoring

3. Shop drawings, product data and samples, Test Reports, Manufacturer's instructions and certificates, O&M Manuals, and other Work-related submittals identified in the individual sections of these Technical Specifications

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES
ATTACHMENT A: PRELIMINARY SUBMITTAL LIST/SCHEDULE

Submittal	Submittal Time Frame
Section 01 32 00 – Construction Progress Documentation	
Baseline Schedule	• Preliminary within 14 calendar days following issuance of Notice to Proceed • Final 5 working days after receipt of comments on preliminary Schedule
3-Week Look-Ahead Schedule	24 hours prior to Weekly Progress Meetings (electronic version)
Monthly Update Schedule	Monthly submitted with each Application for Payment
Daily Activity Report	The morning following the completion of Work
Section 01 33 00 – Submittal Procedures	
Construction Work Plan, including the following sections: • General Requirements • Temporary Facilities and Controls Plan • Demolition Plan • Construction Facilities Layout Plan • Soil Stabilization Plan • Waste Management and Disposal Plan • Utilities and Rail Crossings Plan • PRB Design Plan	Within 10 calendar days after Notice to Proceed
HASP	Prior to commencing Work at the Site or within 10 days after receiving a Notice to Proceed (whichever comes first)
CQC Plan, including the following sections: • General Requirements • Quality Control Organization • Inspection and Testing Requirements • Inspection and Test Plan • Documentation of Quality Control Activities • Requirements for Corrective Action	Within 10 calendar days after Notice to Proceed
EPP, including the following stand-alone appendices: • TESC Plan • Spill Control Plan • Stockpile Management Plan • Remediation Water Management Plan • SWPPP • Site Controls	Within 10 calendar days after Notice to Proceed

Submittal	Submittal Time Frame
Section 01 35 29 – Health, Safety, and Emergency Response Procedures	
Worker training certificates, including (but not limited to) the following: • HAZWOPER • CPR/First Aid Training	Prior to starting the Work
Documentation of safety pre-qualification for all Subcontractors (per Alcoa Engineering Standard 33.055)	Prior to starting the Work
Site HASP	Prior to commencing Work at the Site or within 10 days after receiving a Notice to Proceed (whichever comes first)
Section 01 43 00 – Quality Assurance and Control	
CQC Plan, including the following: • Inspection and Test Plan • CQC Supervisor's qualifications	Within 10 calendar days after Notice to Proceed
Daily Activity Report, including the following: • Daily Inspection Logs • Daily Test Reports	The morning following the completion of Work
Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control	
Documentation of CESCL certification	Prior to starting the Work
TESC Plan (as part of the EPP)	Within 10 calendar days after Notice to Proceed
Section 01 71 23 – Surveying	
Pre-Construction Survey	14 days prior to commencing Season 1 Work
Progress Surveys	With the Seller's Daily Activity Report
Season 2 Baseline Survey	14 days prior to commencing Season 2 Work
As-Built Surveys	Upon completion of each component of Work
Section 01 74 19 – Waste Management and Disposal	
Waste Management and Disposal Plan (as part of the Construction Work Plan)	Within 10 calendar days after Notice to Proceed
Weigh tickets and manifests or bills of lading for all material transported off site for disposal	With Application of Payment

Submittal	Submittal Time Frame
Section 01 77 00 – Closeout Procedures	
Seller's Request for Substantial Completion, which includes the following: • As-Built Survey • Documentation of required testing and inspections • Documentation that Work is complete in accordance with Contract Documents and ready for Company's final inspection	Within 20 calendar days of completion of the Work
Documentation to the ARP, including the following: • Final Affidavit of Amounts Paid • Final, complete Record Documents following issuance of Certificate of Substantial Completion • Final Application for Payment	21 calendar days before Final Acceptance
Project As-Built documents to ARP	Within 10 working days after Final Completion of the Work
Section 02 41 00 – Demolition	
Demolition Plan (as part of the Construction Work Plan)	Within 10 calendar days after Notice to Proceed
Section 02 71 00 – Water Management and Treatment	
Water Management Plan (as part of the EPP)	Within 10 calendar days after Notice to Proceed
Section 02 71 10 – Permeable Reactive Barriers	
PRB Design Plan (as part of the Construction Work Plan)	Within 10 calendar days after Notice to Proceed
Alternative proposals to replace trenchless technology (if chosen)	Due as part of Bid proposal
Section 05 50 00 – Metal Fabrications	
Shop and fabrication detail drawings and installation details for Manhole debris racks	Prior to ordering materials
Section 13 34 60 – Prefabricated Equipment Shelters	
Shop and fabrication detail drawings, installation instructions, and structural calculations for prefabricated equipment shelters	Prior to ordering materials

Submittal	Submittal Time Frame
Section 26 00 00 Electrical Work – General	
Wooden Poles for overhead cable: • Product data • Mounting hardware • Installation details	Prior to installation of specified components
Section 26 05 19 – 600 Volt or Less Wire and Cable	
Product data for each type of product	Prior to ordering materials
Field test reports	Prior to placing component in service
Section 26 05 23 – Control/Signal Transmission Media	
Product data for control/signal transmission media	Prior to ordering materials
Product certificates	Prior to ordering materials
Field test compliance results	Prior to placing component in service
Maintenance data for transmission media	Prior to placing component in service
Section 26 05 26 – Grounding	
Product data for the following: • Grounding conductors and cables • Grounding connectors • Grounding electrodes • Exothermic weld kit • Grounding plans and calculations for Seller's designed ground system	Prior to ordering specified components
Field test reports to include the following: • Test procedures used • Test results that comply with requirements • Results of failed tests and corrective action taken to achieve test results that comply with requirements • Soil types and conditions where ground tests were performed	Prior to placing components in service
As-built data: Plans showing dimensioned as-built locations of grounding features including the following: • Test wells • Ground rods • Ground rings • Grounding arrangements and connections for separately derived systems	Prior to Substantial Completion

Submittal	Submittal Time Frame
Section 26 05 33 – Raceways and Boxes	
Product data for surface raceways, conduit, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets	Prior to ordering materials
Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.	Prior to ordering materials
Surface raceways	Prior to ordering materials
Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including internal components, from manufacturers.	Prior to shipment to the Site
Conduit, wireways, and fittings	Prior to ordering materials
Section 26 05 43 – Underground Ducts and Manholes	
Product data for accessories for manholes and handholes, conduit and duct, duct bank materials, and miscellaneous components	Prior to ordering materials
Shop drawings showing details and design calculations for precast manholes and handholes, including reinforcing steel	Prior to shipment to ordering materials
Duct Bank Coordination Drawings	Prior to shipment to ordering materials
Certificate for concrete and steel used in underground precast concrete utility structures	Prior to ordering materials
Qualification data for Professional Engineer and testing agency responsible for testing nonconcrete handholes and boxes	Prior to shipment to the Site
Inspection report for factory inspections	Prior to shipment to the Site
Record Documents: Show dimensioned locations of underground ducts, handholes, and manholes from nearest building or permanent structure	Prior to Substantial Completion
Section 26 05 48 – Seismic Controls for Electrical and Communication Work	
Plan: • Provide layout and details of seismic bracing assemblies, including relevant information about supporting structure and supported electrical system. • Show attachment locations, methods, and spacings, and identifying components.	Prior to installation of specified components

Submittal	Submittal Time Frame
Calculations: • Provide structural calculations for all seismic restraint assemblies, including calculation of loads for assembly design and reactions applied to supporting structure. • Calculations shall include sufficiency of supporting as needed. • Coordinate design calculations with wind load calculations required for equipment mounted outdoors. • Comply with requirements in other sections for equipment mounted outdoors.	Prior to installation of specified components
Product data for each component used	Prior to ordering materials
Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings	Prior to ordering materials
Design Analysis: To support selection and arrangement of seismic [and wind] restraints	Prior to shipment to the Site
Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items.	Prior to shipment to ordering materials
Pre-approval and Evaluation Documentation: By the ICC-ES, showing maximum ratings of restraints and the basis for approval (tests or calculations)	Prior to shipment to the Site
Product Certificates: For each type of seismic restraint system, provide a product certificate signed by manufacturer certifying that products furnished comply with requirements.	Prior to shipment to the Site
Qualification Data: Provide evidence of current licensure for firms and persons specified in "Quality Assurance" section.	Prior to shipment to the Site
Section 26 05 53 – Electrical Identification	
Furnish Manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.	Prior to ordering materials
Samples for each type of product specified	Prior to ordering materials
Product data for each type of product specified	Prior to ordering materials
Schedule of identification nomenclature to be used for identification signs and labels	Prior to ordering materials

Submittal	Submittal Time Frame
Section 26 56 00 – Exterior Lighting	
Plan: Provide layout and details of exterior lighting assemblies, including relevant information about supporting structure and supported lighting system. Show structural and electrical attachment locations, methods, and components.	Prior to ordering materials
Product data for each type of lighting unit indicated, arranged in order of lighting unit designation	Prior to ordering materials
Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.	Prior to ordering materials
Field Test Reports: Indicate and interpret test results for compliance with performance requirements.	Prior to placing components in service
Maintenance Data	Prior to final completion
Calculations: Submit calculation package prepared and signed by a Professional Engineer licensed in the State of Washington verifying that the light pole, light pole anchorage, and attached lighting fixtures meet indicated loading requirements and other codes requirements of authorities having jurisdiction.	Prior to shipment to the Site
Section 31 05 16 – Soils and Aggregates	
Certificate from the Manufacturer or material supplier certifying that the materials are free of contamination and meet MTCA Industrial Cleanup Standards	Prior to installation of specified materials
Test reports that Backfill and Cap Material Quality Control requirements are met and Borrow Source and Material Characterization	At least 2 weeks before delivery of the materials to the Site
Section 31 05 19.13 – Geotextiles for Earthwork	
Geotextile fabric submittals for each geotextile fabric used for the Work	Prior to ordering materials
Quality Control Certificate for each lot	Prior to installation
Section 31 05 19.23 – Geosynthetic Clay Liners	
Statement of experience from the proposed GCL supplier	Due as part of Bid proposal
Statement of experience from the proposed GCL installer	Due as part of Bid proposal

Submittal	Submittal Time Frame
Include the following for ARP review: • Samples of GCL proposed for use on the Project • Reference list supplied by the GCL Manufacturer • Reference list supplied by the GCL installer • Reference list supplied by the proposed CQC Supervisor	Within 30 business days prior to importing GCL materials to the Site
Certifications of subgrade acceptance for each area covered by GCL, signed by the Seller and CQC Supervisor	Prior to GCL installation
Quality Control certificates issued by the GCL Manufacturer to the Company, Seller, and CQC Supervisor	With each delivery of GCL material
Results of GCL physical testing	Before any delivery of GCL occurs for a season
GCL material and installation warranties	With final submittal documents
Section 31 20 00 – Earthwork	
Results of in-place density performed on fill materials (determined by ASTM D6938)	Upon receipt
Copies of all required local fill and grading permits, including the associated applications	Upon receipt
Section 31 23 19 – Dewatering	
Water Management Plan (as part of the EPP), including means and methods of dewatering	Within 10 calendar days after Notice to Proceed
TESC Plan (as part of the EPP)	Within 10 calendar days after Notice to Proceed
Section 31 23 33 – Trenching and Backfilling	
Source information and particle size analysis (gradation) test results (in accordance with ASTM D422) for approval of imported aggregate	Prior to hauling materials to the Site
Section 31 32 13 – Soil Mixing Stabilization	
Soil Stabilization Plan (as part of the Construction Work Plan)	Within 10 calendar days after Notice to Proceed
Daily Activity Report	Morning following completion of Work
Section 32 12 16 – Asphalt Paving	
Hot-mix asphalt (HMA) mix design documentation, data, and batch plant certification	At least 1 week before delivery of HMA to the Site

Submittal	Submittal Time Frame
HMA aggregate material documentation, including the following: • Particle sieve analysis (gradation) test results (in accordance with ASTM D422) • Origin of material	At least 1 week before delivery of HMA to the Site
Section 32 13 13 – Concrete Paving and Miscellaneous Concrete	
Concrete mix design for each concrete mixture indicating all material contents per cubic yard of concrete	At least 1 week before delivery of concrete to the Site
Certificates for each proposed concrete mix, including the following: • Certificates of compliance with specified mix design • Certificates for compressive strength, yield, air content, and slump • Written evidence that the concrete ready-mix plant is approved and certified by the National Ready Mix Concrete Association and others	At least 1 week before delivery of concrete to the Site
Concrete Delivery Tickets for each truck delivered to the Site (in accordance with ASTM C94)	Before each truck is unloaded at the Site
Records, including the following: • Records of all concrete placements • Exact mix proportions • List time, date, and location • Weather conditions at time of placement • Source of the concrete supply	Due as part of Record Documents
Section 32 90 00 – Hydroseeding	
Product data for the following: • Fertilizer • Hydromulch • Soil binding agent components	Prior to ordering
Seed vendor's certification for each required seed mixture, including the percentage by weight and percentages of purity, rumination, and weed seed for each species	Prior to ordering
Statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory	Upon request by the ARP
Name and address of seed supplier	Prior to ordering

Submittal	Submittal Time Frame
Section 33 05 23 – Trenchless Utility Installation	
Utilities and Rail Crossings Plan (as part of the Construction Work Plan)	Within 10 calendar days after Notice to Proceed
Section 33 05 61 – Concrete Manholes	
Catalog data and dimensional drawings from Manufacturer of pre-cast concrete manhole sections	Prior to ordering materials
Section 33 42 11 – Corrugated HDPE Gravity Stormwater Pipe	
Product data and specifications for corrugated polyethylene stormwater pipe	Prior to ordering materials
Catalog data for gaskets and other jointing materials	Prior to ordering materials
Manufacturer's installation instructions	Prior to ordering materials
Section 33 42 16 – HDPE Stormwater Force Main Piping	
HDPE pipe information for Seller-furnished materials, including the following: • Manufacturer data showing pipe dimensions and material specifications • Certification that pipe material meets specification requirements	Prior to ordering materials
HDPE pipe installation recommendations, including the following: • Pipe deflection and minimum bending radius recommendations • Fusion recommendations, including fusion temperature, interface pressure, and cooling time • Fusion Welder Certification and Statement of Qualifications	At least 2 weeks prior to pipe installation
Filling and Testing Plan, including the following: • Proposed rate, time, and procedure for filling and pressure testing the distribution pipe and appurtenances • Proposed method of disposing of water drained from pipeline to enable repair of leaks	At least 2 weeks prior to filling and testing
Section 33 44 14 – Valves for Stormwater Control	
Schedule and catalog data for pipe, fittings, valves, utility boxes, and other equipment needed to complete air release valve assemblies	Prior to ordering materials

SECTION 01 35 29
HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES

PART 1 GENERALSUMMARY

A. Seller must prepare and implement a Site HASP complying with applicable laws and Company's Environmental and Health and Safety (EHS) requirements and expectations for the Project.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 56 15 – Protection of Existing Utilities

1.03 REFERENCES

A. The publications listed below pertain to requirements of this Technical Specification section to the extent referenced. The publications are referred to in the text by basic designation only. All publications are "latest edition" unless specified otherwise.

1. Alcoa Engineering Standard 33.055
2. Northwest Alloys Site Conditions (Appendix E)
3. 29 CFR 1910 – Occupational Safety and Health Standards
    a) Including 29 CFR 1910.120 – HAZWOPER
4. 29 CFR 1926 – General Industry Occupational Safety and Health Standards
5. NIOSH/OSHA/USCG/USEPA: Occupational Safety and Health Guidance Publication 85-115: Manual for Hazardous Waste Site Activities, October 1985.
6. RCW 49.17 –WISHA
7. WAC:
    a) Chapter 296-62: General Occupational Health Standards
    b) Chapter 296-824-100: Emergency Response

1.04 JOB CONDITIONS

A. The Seller must be aware that Work may take place in a hazardous environment and that the Seller must be responsible for the health and safety of Seller employees as well as those of any Subcontractor. All Work completed as part of these Technical Specifications must be performed in accordance with Federal, State, and the Company's requirements pertaining to

worker safety. This must include, but not be limited to, 29 CFR 1910 (General Industry Standards), 29 CFR 1926 (Construction Industry Standards), and WAC 296-824-100 (Emergency Response).

1. Potential Contaminated Media:

    a) Site activities may expose subsurface soil or groundwater containing fluoride, heavy metals, PCBs, PAHs, petroleum hydrocarbons, and various types of debris. Direct human contact with these materials must be minimized and limited to permissible exposure levels and must be taken into consideration in the HASP.

    b) The site may contain buried cement asbestos pipe. Proper precautions must be taken in consideration for protection against potential asbestos exposure.

2. Physical Hazards

    a) The Seller must be aware of slip, trip, and fall hazards associated with the Work. In particular, excavation and earthwork will be accomplished on or near slopes that may be subject to soil raveling, low soil bearing capacity, or other hazards.

    b) The Seller must be aware of active rail operations on the Site. The Seller must stay 10 feet away from active rail right-of-way. If Work within the right-of-way becomes necessary, notifications for lockout must be made per Section 01 70 00 – Execution.

    c) The Seller must be aware of mobile equipment on the Site operated by the Company, its tenants and other third-party contractors. All Seller's mobile equipment must have appropriate occupant restraints and backup alarms.

3. Seismicity

    a) The Seller must be aware of the potential for seismic events at this location and must include relevant Site safety protocols in the Site HASP.

4. Utilities

    a) The Seller must be aware of existing power lines, gas lines, and other utilities on site and include protocols for safely performing the Work in lieu of existing utilities as part of the Site HASP.

    b) The Seller must maintain adequate flagging and marking of at-risk utilities, such as overhead power lines, throughout the construction phase.

    c) Location and verification of existing utilities must conform to the information included in Section 01 56 15 – Protection of Existing Utilities.

1.05 SUBMITTALS

A. The Seller must submit copies of all appropriate worker training certificates to the ARP, prior to starting the Work. This must include, as a minimum, documentation of HAZWOPER, supervisory, refresher, and CPR/First Aid training.

B. The Seller must submit documentation of safety pre-qualification for all Subcontractors per Alcoa Engineering Standard 33.055, prior to starting the Work.

C. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Site HASP.

a) No Work will occur at the Site until the Site HASP has been reviewed and accepted by the Company. The Seller must provide a written Site HASP prior to commencing Work at the Site or within 10 days after receiving a Notice to Proceed, whichever comes first.

b) The Seller must develop, implement, and maintain for the duration of this Contract, a Site HASP prepared under the supervision of, and signed by, a Certified Industrial Hygienist.

c) The Site HASP must be consistent with and effectively incorporate and implement all applicable Local, State and Federal health standards and guidelines, including, but not limited to, OSHA, WISHA, NIOSH, the American Conference of Governmental Industrial Hygienists (ACGIH), and USEPA. Where these are in conflict, the more stringent requirements must be followed.

d) The plan must be sufficient to protect on-site and off-site personnel from the potential physical, chemical, and/or biological hazards particular to the Site.

e) The Seller must assign an individual to serve as a full-time, on-site Site HSO during Work who is responsible, and authorized, to supervise and enforce compliance with the Site HASP in accordance with this section.

f) Preparation of the written Site HASP is the Seller's responsibility and no statement made in these provisions relieves the Seller of responsibility for information included and implementation of the Site HASP.

g) The Seller's written Site HASP must include, but not be limited to:

1) A list of names of key personnel and alternates responsible for Site safety and health, including the Site HSO.

2) A list of chemical and physical hazards (such as methane exposure), allowable OSHA exposure levels, threshold limit values, other regulatory exposure levels, and the emergency response should an exposure or injury occur.

3) Personal protective equipment to be used by employees for each of the Site tasks and operations and criteria for upgrading level of worker protection from Level D to Levels C and B.

4) A list of safety and monitoring equipment at the job site and an easy to read figure showing the locations where equipment is stored or maintained.

5) An emergency evacuation plan for immediate removal to a hospital or a doctor's care any person who may be injured on the job site including routes to medical treatment, and emergency telephone numbers including hospital, ambulance, fire, sheriff/police, poison control, the Company, and others as deemed necessary.

6) Employee training assignments.

7) Medical surveillance requirements.

8) Decontamination procedures.

9) Confined space entry procedures.

10) A spill containment program for handling contaminated liquids.

11) Copies of individual 40-hour HAZWOPER and 8-hour annual HAZWOPER refresher certificates for employees

12) A copy of the Site Safety and Health Officer's 40-hour OSHA HAZMAT Certificate

13) Documentation of participation in ongoing respiratory protection program, as per Part E of WAC 296-842, including results of fit-testing conducted within the past 6 months.

h) Failure on the part of the Seller to follow the Site HASP or to continue any Work in an unsafe manner may result in suspension of the Work by the Company. The Seller must not be entitled to extra compensation for health and safety-related suspensions, nor must the Contract Time be extended.

PART 2 PRODUCTS

2.01 MEDICAL, FIRST AID, AND MONITORING EQUIPMENT

A. Seller must provide all medical, first aid, and environmental monitoring equipment to be used at the Site, consistent with the Site HASP.

2.02 PERSONAL PROTECTIVE EQUIPMENT

A. Seller must supply all PPE necessary to be in compliance with the Site HASP for all Site personnel. Seller must make available PPE for use by any Site visitors.

PART 3 EXECUTION

3.01 GENERAL

A. The Seller and all Subcontractors must conform to the requirements of Company's safety protocols. Prior to the Work beginning, the Seller and all Subcontractors must:

1. Have health and safety training as required by the Washington State Department of Labor and Industries (WAC 296-62, Subpart P, Hazardous Waste Operations and Emergency Response), including on-site training. At a minimum, 40-hour health and safety training will be required.

2. Have up-to-date 8-hour Refresher OSHA HAZWOPER training.

3. Complete site-specific health and safety orientation with the Company's HSO prior to entering the Site.

4. The Seller, including all on-site Subcontractors, must also comply with the Company's annual pre-qualification standards.

B. At the beginning of Work and throughout the duration of the Work, all personnel on site must do the following:

1. Check in at the security gate daily before conducting on-site Work, upon completion of each workday, and each time leaving and reentering the Site.

2. Provide a name and mobile phone number on the sign-in sheet at the security gate.

3. Each staff will receive a badge, which must be worn by and visible on all personnel at all times while on the Property.

4. Wear site-required PPE (Level D), at a minimum.

C. The Seller and all Subcontractors must conform to the safety rules and regulations of WISHA (Chapter 49.17 RCW) and any other applicable standards enacted by federal, state, or local governing authorities having jurisdiction as referenced in this Technical Specification.

D. In addition to complying with health and safety rules, regulations, and ordinances promulgated by the Local, State, and Federal Government, the various construction permits, and other sections of the Contract Documents, the Seller must inform its employees and Subcontractors and their employees of the potential danger in working on and near solid waste landfills and with contaminated soils and groundwater.

E. The Seller's management is accountable for the safety and health of the Seller's employees, Subcontractors and any other parties under the Seller's organizational control. The Seller is also accountable for the impacts that the actions of their employees and Subcontractors may have on the safety and health of others.

F. Seller must perform whatever Work is necessary for safety and be solely and completely responsible for conditions of the job site within the Construction Limits, including safety of all persons (including but not limited to employees of Ecology, the Engineer, the Company, Subcontractors, any Site visitors, and the Seller) and property during the Contract period. This requirement applies continuously and is not limited to normal working hours.

G. The Company's review of the Seller's performance is not intended to include a review or approval of the adequacy of the Seller's HSO, the safety program or any safety measures taken in, on, or near the Site.

H. The Seller must provide for the protection of employees and all others from fire, explosion, or asphyxiation caused by any gases encountered during construction and landfill leachate emitted from, and present within, existing solid waste landfills.

I. The Seller must provide at all times proper facilities for safe access to the Work by the Owner, and authorized government officials.

J. In the event of an on-site emergency, the Seller must follow the emergency procedures as outlined in the Site HASP and as discussed herein.

K. Accidents causing death, injures, or damage must be reported immediately to the ARP and APL by telephone or messenger. In addition, promptly report in writing to the ARP and APL all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the Site, giving full details and statements of witnesses.

L. If a claim is made by anyone against the Seller or any Subcontractor on account of any accident, the Seller must promptly report the facts in writing within 24 hours after occurrence, to the ARP, giving full details of the claim.

3.02 SELLER SAFETY EQUIPMENT

A. Seller must maintain at the job site, safety equipment applicable to the Work as prescribed by the governing safety authorities in quantities that are adequate for the construction worker, as well as the Company's team and all articles necessary for giving first aid to the injured.

B. All operations have the potential for encountering contaminated conditions and Level D be the minimum protection allowed. To adequately protect personnel in areas of higher potential contaminant exposure, an upgrade to Level C may be required if action levels are exceeded. The Seller's Site Safety and Health Officer must be responsible for monitoring conditions and upgrading protection equipment as required. The Seller must supply properly trained personnel with approved safety equipment.

C. Seller must train all personnel in use of the appropriate safety equipment that would be utilized during the course of their Work. It is the responsibility of the Site Safety and Health Officer, or person(s) in authority, to ascertain that all safety equipment is being used when appropriate.

3.03 WORK ZONES

A. The Seller must clearly delineate, mark, label, and identify the Work Zones in the field and must limit equipment, operations, and personnel in the zones as required by the Contract Documents and described in the Site HASP, consistent with 29 CFR Section 1910.120.

B. Exclusion Zone (EZ): The EZ boundary must be set by the Seller so that it encompasses areas around individual intrusive construction activities being performed. The Seller must control entry into this area, and exit may only be made through the CRZ.

C. Contaminant Reduction Zone (CRZ): The CRZ must be located outside of the designated EZ and will be where PPE is donned/doffed and decontamination activities occur; PPE and contaminated water or soil must be containerized for disposal.

D. Support Zone (SZ): The SZ must be established on site and is defined as the area outside the CRZ and EZ. The SZ must be clearly delineated and must be secured against active or passive contamination from the Site. No equipment or personnel may go from the EZ to the SZ without passing through the CRZ and being decontaminated in accordance with the HASP.

3.04 SITE SAFETY AND HEALTH OFFICER

A. The Seller must provide a person designated as the Site HSO who is thoroughly trained in rescue procedures, the use of safety equipment and gas detectors, and the potential hazards that may be present while working with contaminated materials. The person must be present at all times while Work is being performed, implement the written Site HASP, and conduct testing.

B. The Seller's HSO must be delegated the authority to order any person or worker on the landfill site to follow the safety rules. Failure to observe these rules is sufficient cause for removal of the person or worker(s) from the Project.

C. The Seller’s HSO must have taken a course satisfying the training requirements of 29 CFR 1910.120 for Hazardous Waste Site Operations. A copy of the HSO's 40-hour OSHA HAZMAT Certificate must be submitted to the Company.

D. The Seller’s HSO is responsible for determining the extent to which any safety equipment must be utilized, depending on conditions encountered at the Site.

END OF SECTION

SECTION 01 42 13
ABBREVIATIONS AND DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes abbreviations and definitions used in the Contract Documents. This section supplements the definitions included in Section 1 of the Company's Contract[1].

1.02 RELATED SECTIONS

A. This section provides abbreviation and definitions used throughout the Drawings and Technical Specifications.

1.03 ABBREVIATIONS

A. AASHTO: American Association of State Highway and Transportation Officials

B. AISC: American Institute of Steel Construction

C. ANSI: American National Standards Institute

D. APL: Alcoa Project Lead

E. APWA: American Public Works Association

F. ARP: Alcoa Responsible Person

G. ASME: American Society of Mechanical Engineers

H. AST: aboveground storage tank

I. ASTM: ASTM International

J. BMP: best management practice

K. CDID: Consolidated Diking Improvement District

L. CESCL: Certified Erosion and Sediment Control Lead

M. CFR: Code of Federal Regulations

N. CPM: Critical Path Method

[1] *Standard Terms and Conditions for Environmental Remediation Contracts (rev 12-19)*

O. CQC: Construction Quality Control

P. CQC Plan: Construction Quality Control Plan

Q. CSBC: Crushed Surfacing Base Course

R. CWA: Clean Water Act

S. Ecology: Washington State Department of Ecology

T. EO: Environmental Officer

U. EPP: Environmental Protection Plan

V. Final Revised EDR: *Final Revised Engineering Design Report*

W. Former Reynolds Plant: former Reynolds Metals Reduction Plant

X. GCL: Geosynthetic Clay Liner

Y. HDPE: high-density polyethylene

Z. HSO: Health and Safety Officer

AA. MTCA: Model Toxics Control Act

BB. NFPA: National Fire Protection Association

CC. NIOSH: National Institute of Occupational Safety and Health

DD. NPDES: National Pollutant Discharge Elimination System

EE. O&M Manual: Operations and Maintenance Manual

FF. OSHA: Occupational Safety and Health Administration

GG. PAH: polycyclic aromatic hydrocarbon

HH. PCB: polychlorinated biphenyl

II. PPE: personal protective equipment

JJ. PRB: permeable reactive barrier

KK. psi: pounds per square inch

LL. RCW: Revised Code of Washington

MM. SID: Seller Interface Document

NN. SU: site unit

OO. SWPPP Stormwater Pollution Prevention Plan

PP. TESC: temporary erosion and sediment control

QQ. USC: United States Code

RR. USCG: U.S. Coast Guard

SS. USEPA: U.S. Environmental Protection Agency

TT. WAC: Washington Administrative Code

UU. WISHA: Washington Industrial Safety and Health Act

VV. WSDOT: Washington State Department of Transportation

1.04 DEFINITIONS

A. Additional Excavation: Excavation performed for the convenience, fault, or operation of the Seller beyond specified or directed excavation lines

B. Authority Having Jurisdiction: An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, and installation or a procedure

C. Company: Company means Alcoa USA Corp. or any subsidiary or affiliate of Alcoa USA Corp. issuing the Contract. The Company will have a management team for this Project which will consist of a Project Manager (APL); Construction Manager (ARP); Environment, Health and Safety Leads; the Engineer; and other individuals as needed to properly manage, oversee, and ensure the success of the Project. The Company's team will be referred to as Company throughout this document.

D. Design Excavation Grade: The elevation to which the Seller must excavate material, corresponding to the anticipated bottom elevation of Waste Material or the encountered groundwater elevation, at the time of excavation. The Design Excavation Grade, which is shown on the Drawings for each SU, may be modified in the field by the ARP or Engineer based on actual encountered bottom elevation of Waste Material.

E. Drawings: The official plans, profiles, cross sections, and details illustrating the location, dimensions, and nature of the Work to be performed

F. Engineer: The Engineer of Record for this Project is Anchor QEA, LLC.

G. Excavation Area: Those areas over which the Seller and its Subcontractors will perform excavation activities to complete the Work of the Contract

H. Excavation Limits: The boundary to which excavation must occur to, and not beyond (unless otherwise approved by the ARP or Engineer); the Excavation Limits are as indicated on the Drawings

I. Geosynthetic Clay Liner: A factory-manufactured hydraulic barrier consisting of granular Sodium Bentonite clay, sandwiched between and supported and encapsulated by two non-woven geotextiles, held together by Needle-Punching

J. In Writing: In writing includes communications in written form such as by hard copy, email, or fax.

K. Limits of Work: The boundary beyond which no construction Work is allowed; the Limits of Work are as indicated on the Drawings

L. Optimum Moisture Content: Must be determined in accordance with ASTM D1557 to determine maximum dry density for relative compaction; determine field moisture content on basis of fraction passing 3/4-inch sieve

M. Overexcavation: Excavation beyond specified lines as directed by the Company to remove unsuitable foundation material

N. Permeable Reactive Barrier (PRB): A vertical trench, perpendicular to contaminated groundwater flow, that is backfilled with selected reactive media to enhance the natural attenuation process and further limit the mass flux of fluoride from groundwater to the CDID ditches

O. Project: All activities relative to this Contract, including activity of the Seller and its Subcontractors

P. Quality Assurance: A planned, systematic set of procedures and documentation designed to provide confidence that elements of the Project meet the requirements of the Contract Documents; QA will be performed by the Company

Q. Quality Control: A planned, systematic set of procedures and documentation designed to maintain the quality of Project elements as they are constructed; Quality Control will be performed by the Seller and its Subcontractors

R. Relative Compaction: The ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined by ASTM D1557; apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by the Company

S. Season 1: The first construction season of the Contract, which starts upon Notice to Proceed and finishes in October of the same year in which construction begins

T. Season 2: The second construction season of the Contract, which will occur the next calendar year after completion of Season 1

U. Seasonal High Groundwater Elevation: The highest elevation at which groundwater is anticipated to be encountered throughout the year, as shown on the Drawings

V. Seasonal Low Groundwater Elevation: The lowest elevation at which groundwater is anticipated to be encountered throughout the year, as shown on the Drawings

W. Seller: Seller means the individual, corporation or other entity other than Company who is a party to this Contract. At a minimum, the Seller's project leadership must include the following: Project Manager, Superintendent, HSO, EO, and Quality Control Officer.

X. Site or Project Site: The location at which construction, equipment, or services furnished by the Seller under the Contract will be performed, completed, and/or delivered; also referred to as "Premises" in the Contract

Y. Site Unit (SU): A subareas of the Project Site where remediation efforts specific to the corresponding area will be implemented

Z. Staging Area: Those areas where the Seller and its Subcontractors and suppliers may store and stage all equipment, offices, parking, materials, and supplies to perform and complete the Work under this Contract; each Work Area will have its own Staging Area (i.e., Staging Area East and Staging Area West)

AA. Waste Material: Contaminated media, including soil and debris, that is being targeted for excavation and on-site consolidation

BB. Work: Work means all items, materials, labor or other services provided by the Seller as specified in the Contract, including Drawings and Technical Specifications

CC. Work Area: The areas bounded by the Limits of Work, including both an East Work Area and a West Work Area, as shown on the Drawings

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 43 00
QUALITY ASSURANCE AND CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the Quality Assurance and Quality Control requirements, duties, and responsibilities for the Seller during execution of the Work. The intent of this section is to require the Seller to establish a necessary level of control that will:

1. Adequately provide for the production of acceptable quality materials.

2. Provide sufficient information to assure the Seller and the Company that the Technical Specification requirements are being and have been met.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 32 00 – Construction Progress Documentation

1.03 SUBMITTALS

A. Submit the following pre-construction submittals in accordance with Section 01 33 00 – Submittal Procedures:

1. CQC Plan

a) Inspection and Test Plan

b) CQC Supervisor's qualifications

B. Submit the following progress submittals as part of the Daily Activity Report in accordance with the requirements of Section 01 32 00 – Construction Progress Documentation:

1. Daily Inspection Logs

2. Daily Test Reports

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 SELLER QUALITY CONTROL PROGRAM

A. The Seller must establish a Quality Control Program to perform inspection and testing of all items of Work required by the Technical Specifications, including those performed by

Subcontractors. The Quality Control Program must ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program must be effective for control of all construction work performed under this Contract and must specifically include tests required by the Technical Specifications, in addition to other requirements of this section and any other activities deemed necessary by the Seller to establish an effective level of Quality Control.

B. The Seller will be prepared to discuss and present, at the pre-construction meeting, its understanding of the Quality Control requirements. The Seller must not begin any construction or production of materials to be incorporated into the completed Work until the CQC Plan has been reviewed and approved by the ARP. No partial payment will be made for materials subject to specific Quality Control requirements until the CQC Plan has been reviewed and approved.

C. Quality Control requirements contained in this section and elsewhere in the Technical Specifications are in addition to and separate from any acceptance testing requirements. Acceptance testing requirements are the responsibility of the Company. The Seller must cooperate fully in facilitating the sampling and inspection necessary for an effective acceptance testing program by the Company.

D. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Seller of responsibility or compliance with Contract Document requirements.

E. Quality Control requirements for individual construction activities are shown in the sections that specify those activities.

F. Requirements for the Seller to provide Quality Control services required by the Company, or authorities having jurisdiction are not limited by provisions of this section.

3.02 CONTRACTOR QUALITY CONTROL (CQC) PLAN

A. The Seller will establish, provide, and maintain a CQC Plan as specified in Section 01 33 00 – Submittal Procedures, detailing the methods and procedures that will be taken to assure that all materials and completed construction elements conform to Drawings, Technical Specifications, and other requirements, whether these elements be manufactured by the Seller or procured from Subcontractors or Manufacturers. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the Technical Specifications, it is the responsibility of the Seller to ensure that construction and construction Quality Control are accomplished in accordance with the stated purpose and Technical Specifications as described herein.

3.03 QUALITY CONTROL ORGANIZATION

A. The CQC Plan must be implemented by the establishment of a Quality Control organization. An organizational chart must be developed to show all Quality Control personnel and how

these personnel integrate with other management/production and construction functions and personnel. The organizational chart must be included in the CQC Plan. Qualifications of all proposed personnel and independent testing labs must be documented and submitted in the CQC Plan.

B. The organizational chart must identify all Quality Control staff by name and function and must indicate the total staff required to implement all elements of the CQC Plan, including inspection and testing for each item of Work. If necessary, different technicians can be utilized for specific inspection and testing functions for different items of Work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQC Plan, the personnel assigned must be subject to the qualification requirements indicated as follows. The organizational chart must indicate which personnel are Seller employees and which are provided by an outside organization.

1. The Seller must designate a full-time CQC Supervisor for the duration of the Project. The CQC Supervisor must be an individual within the Seller's organization who is responsible for overall management of the CQC Plan and has full authority to institute any and all actions necessary for the successful implementation of the CQC Plan to ensure compliance with the Technical Specifications and Drawings.

2. The CQC Supervisor's qualifications must be submitted to the Company for review and approval. At the option of the Company, the candidate(s) for CQC Supervisor must be subject to interview by the Company prior to approval. The Seller's approved CQC Supervisor will not be removed or replaced without prior written approval by the Company.

3. The CQC Supervisor must have the authority to stop the Work when and where deemed necessary to ensure compliance with the Contract Documents.

4. Quality Control Personnel: The Seller must maintain a sufficient number of qualified Quality Control personnel to adequately implement the CQC Plan. The Seller will provide sufficient qualified Quality Control personnel to monitor each Work activity at all times. Quality Control personnel must report directly to the CQC Supervisor and will perform the following functions:

    a) Inspection of all materials, construction, and equipment for conformance to the Technical Specifications, and as required by Article 3.04.

    b) Performance of all Quality Control tests as required by the Technical Specifications.

5. Where material is being produced in a plant for incorporation into the Work, separate plant and field technicians must be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of Work activity. The CQC Plan will state where different personnel will be required for different Work elements.

3.04 INSPECTION AND TESTING REQUIREMENTS

A. The Seller must prepare an Inspection and Test Plan as part of the CQC Plan that identifies all inspection and test activities and in accordance with Section 01 33 00 – Submittal Procedures.

B. Modifications, repairs, and replacements required as a result of test failures will be treated as non-conforming items and controlled in accordance with the controls for non-conforming items.

C. Inspection and testing activities must be performed in accordance with procedures that may be supplemented by specific or standard instructions, Work operations, or planning documents, including inspection plans delineating inspection hold points. The inspection activities that will be planned in advance include the following:

   1. Receiving inspection

   2. Construction inspection and testing

   3. Installation inspection and testing

   4. Plant inspections

D. Inspections must be performed daily to ensure continuing compliance with Contract requirements until completion of the particular feature of the Work. Each member of the Seller's Quality Control personnel will maintain a daily log of all inspections performed for both Seller and Subcontractor operations on a form acceptable to the Company.

E. As part of the CQC Plan, the Seller will be responsible for establishing a system that will record all Quality Control test results. The daily test logs must be signed by the responsible Quality Control technician and the CQC Supervisor. When required by the Technical Specifications, the Seller will maintain statistical Quality Control charts.

F. During any operations for material production, Quality Control test results and periodic inspections must be utilized to ensure the quality of aggregates and other mix components and to adjust and control mix proportioning to meet the approved design and other requirements of the Technical Specifications. All equipment utilized for this purpose must be inspected to ensure its proper operating condition.

G. During field operations, Quality Control test results and periodic inspections must be utilized to ensure the quality of all materials and workmanship. All equipment utilized in placing, finishing, and compacting must be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the Technical Specifications and are within the Drawing dimensions, lines, grades, and tolerances specified. The CQC Plan must document how these and other Quality Control functions will be accomplished and utilized.

3.05 DOCUMENTATION

A. The Seller must maintain current Quality Control records of all inspections and tests performed. These records must include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; and corrective actions taken.

B. Quality Control Records are those documents that have been reviewed and accepted by the Seller as complete, correct, and legible. Quality Control Records must include documents such as the following:

1. Drawings, specifications, procedures used for construction, procurement documents, inspection and test records

2. Submittals

3. Personnel and procedure qualification records

4. Material, chemical, and physical property test results

5. Certificates of Compliance and shipment releases

6. Receiving inspection, storage, cleaning, and cleanliness control records

7. Non-conformance reports and corrective action

C. All Quality Control records must be identified in the CQC Plan and maintained in the Seller's Site files. The ARP must be provided access to these files when requested. Upon the completion of the Seller's Contractual activities, these files must be turned over to the ARP.

D. Quality Control records must cover both conforming and defective or deficient features and must include a statement that all supplies and materials incorporated in the Work are in full compliance with the terms of the Contract. Legible copies of these records must be furnished to the ARP as requested. The records must cover all Work placed subsequent to the previously furnished records and must be verified and signed by the Seller's CQC Supervisor.

3.06 CORRECTIVE ACTION REQUIREMENTS

A. Documentation of corrective actions must be in accordance with the CQC Plan as specified in Section 01 33 00 – Submittal Procedures.

B. The requirements for corrective action must include both general requirements for operation of the CQC Plan as a whole and for individual items of Work contained in the Technical Specifications.

C. When applicable or required by the Technical Specifications, the Seller must establish and utilize statistical Quality Control charts for individual Quality Control tests. The requirements for corrective action must be linked to the Quality Control charts.

3.07 OVERSIGHT BY THE COMPANY

A. All items of material and equipment are subject to oversight by the Company at the point of production, manufacture, or shipment to determine if the Seller, producer, Manufacturer, or shipper maintains an adequate Quality Control system in conformance with the requirements detailed herein and the applicable Technical Specifications and Drawings. In addition, all items of materials, equipment, and Work in place must be subject to surveillance by the Company at the Site for the same purpose.

B. Oversight by the Company does not relieve the Seller of performing Quality Control inspections of either on-site or off-site Seller's or Subcontractor's Work.

C. The Company may perform testing of all or portions of the Work at their discretion.

D. The Seller must grant the Company and any other quality personnel access to on-site facilities to review the Work, materials, and equipment, as required to conduct oversight.

3.08 NON-COMPLIANCE

A. The ARP will notify the Seller of any non-compliance with any of the foregoing requirements. The Seller must, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the ARP or his/her authorized representative to the Seller or his/her authorized representative at the site of the Work, will be considered sufficient notice.

B. In cases where Quality Control activities do not comply with either the CQC Plan or the Contract provisions, or where the Seller fails to properly operate and maintain an effective CQC Plan, as determined by the ARP, the Company may:

    1. Order the Seller to replace ineffective or unqualified Quality Control personnel or Subcontractors.

    2. Carry out the functions and operations of the Seller's approved CQC Plan. Costs incurred by the Company to operate the CQC Plan or to otherwise remedy the Seller's non-compliance with quality-related provisions of the Contract will be deducted from the total amount due the Seller. This deduction will be based on the actual cost to the Company for operation of the CQC Plan, as opposed to the amount that the Seller may have bid initially for Quality Control services.

    3. Order the Seller to stop operations until appropriate corrective actions are taken.

C. Any failure by the Company to notify the Seller of any non-compliance with any of the foregoing requirements will not be deemed as a waiver of enforcement rights hereunder, and the Seller is still bound by the terms and conditions of said requirement.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for temporary utilities and facilities, temporary controls, and removal of utilities, facilities, and controls.

B. Temporary facilities must meet construction safety requirements of OSHA, state, and other governing agencies. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to the following:

1. Health and safety regulations
2. Utility company regulations
3. Police, Fire Department, and Rescue Squad rules
4. Environmental protection regulations

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

C. Section 01 74 19 – Waste Management and Disposal

D. Section 02 71 00 – Water Management and Treatment

1.03 TEMPORARY UTILITIES

A. The Seller may use non-potable water and electric power from the Company at no cost, as available.

B. The Seller must plan for obtaining temporary telephone, potable water, and other services.

C. The Seller must maintain temporary facilities in a safe and proper manner and completely remove from the Site prior to final acceptance.

D. The Seller must provide labor and equipment for temporary lines and services at no added cost to the Company.

1.04 SANITARY FACILITIES

A. Provide and maintain sanitary facilities and enclosures and litter containers for the Work that meet the requirements of applicable state and local health regulations. Facilities must be provided for the duration of the Work and must be installed at the time of Project mobilization. Place secure facilities on flat surface at convenient locations. At the end of the job, such facilities and enclosures must be removed completely.

1.05 FIRE PROTECTION

A. Provide adequate firefighting equipment to contain an equipment fire. Make available and accessible in the Work Area.

B. Install and maintain temporary fire protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standards for portable Fire Extensities,” and NFPA 241 “Standards for Safeguarding Construction, Alterations and Demolition Operations”

C. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

1.06 WATER MANAGEMENT

A. The Seller must provide temporary water storage for Remediation Water, decontamination water, and dewatered water with the requirements of Section 02 71 00 – Water Management and Treatment.

B. The Seller will select the location of the decontamination station within the Work Area with approval of the Company.

1.07 SOLID WASTE MANAGEMENT

A. Solid waste, including temporary waste receptacles, must be managed in accordance with Section 01 74 19 – Waste Management and Disposal.

1.08 STAGING, PARKING, AND WORK AREAS

A. The Seller will be responsible for establishing, maintaining, and restoring Staging Areas to support the Work. Available areas are shown on the Drawings.

B. Access to and from Staging, parking, and Work Areas are shown on the Drawings.

C. Perform operations and movement within the staging, parking, and Work Areas in strict conformance with the Company’s rules and requirements.

1. No personal vehicles will be allowed within Work Areas. Personal vehicles must remain parked at the guard office outside of the Work Area.

2. Construction vehicles are not permitted on grassy areas and must be parked on hard surfaces such as gravel, concrete, or asphalt.

3. Construction equipment must be stored in appropriate Staging Areas and is not permitted to be stored in grassy areas.

D. Portions of the East Work Area are not contained within the gated facility; the Seller is responsible for any additional security necessary to secure all equipment or material maintained outside of the gated facility.

E. Upon completion of the Work, remove unused materials and equipment and restore the area to original condition, including any grading necessary to restore drainage patterns and surface smoothness.

1.09 STORAGE AND PROTECTION OF MATERIAL AND EQUIPMENT

A. The Seller may store material and equipment only in designated Staging Areas, as shown on the Drawings.

B. Protect materials and equipment from damage, pilfering, etc., and fully relieve the Company of this responsibility.

C. Store materials to be salvaged by the Seller in the Staging Area.

D. Materials must be stored at least 50 feet from the CDID levee right-of-way unless being stored within an SU as part of active construction of that SU.

E. Materials and equipment must be stored at least 10 feet from the outer edge of any in-service rail track.

1.10 WARNING SIGNS AND BARRIERS

A. Before starting Work, provide and install all signs, barricades, and lights necessary for protection of the Work. Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

B. The Seller must install and maintain adequate warning signs and lighted barricades to protect property and personnel in the Work Area. Barricades must be weighed or anchored to prevent overturning from wind.

C. Space barricades a maximum of 20 feet apart unless directed otherwise by the Company.

D. Relocate barricades, at the direction of the Company, whenever required to maintain protection of the Work Area or when changing Work Areas.

E. Open trenches, excavations, or obstructions not being actively worked must be marked with weighted barricades that can be seen from a reasonable distance.

1.11 TEMPORARY FENCING

A. At all times during the construction period, the Seller must maintain fences that enclose the Site to the satisfaction of the Company. The Seller must provide gates at access points where required. All gates to the Site must be locked whenever the Seller is not present.

B. A Seller's lock will be placed with the Company's lock for Work Area access gates. The Seller's lock must be marked to identify the Seller. Place the lock in series with the existing locks and take care to assure that no existing lock is omitted from the series. Remove the Seller's lock upon completion of the Work. Failure to adhere to these requirements will result in the Seller's lock being removed by the Company.

1.12 SELLER'S SECURITY

A. The Seller must provide security and facilities to protect the Work and existing facilities from unauthorized entry, vandalism, or theft. Maintain security throughout construction period until acceptance by the Company precludes the need for Seller security.

B. Where Seller's materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

1.13 TRAFFIC CONTROL

A. The Seller must conduct its Work to not interfere with Company's operations and traffic, whether vehicular, rail, or vessel, consistent with the traffic management plans described in the Temporary Facilities and Controls Plan as described in Section 01 33 00 – Submittal Procedures.

B. Schedule and phase Work to maintain movement of traffic through the Work Area. Provide signing, barricades, markers, and other traffic regulation to maintain safe and efficient control of traffic around or through the Work Area.

C. Keep pavement surfaces free and clear of dirt, mud, and debris.

D. The Seller must only travel on routes noted on the Drawings within the Property Boundary and must not use Industrial Way (SR 432) to travel between the East and West Work Areas.

1.14 HAUL ROUTE CONSTRUCTION AND MAINTENANCE

A. The term "haul route" applies to any designated paved or unpaved road used by the Seller for travel of construction equipment.

B. Construction equipment must follow haul routes, as shown on the Drawings.

C. Do not cross electrical or communication cables unless protected by approved means.

D. Equipment operated on haul routes over existing pavements must conform to legal load limits for public highways unless approved protection is provided. Always keep pavements areas free of material spillage and foreign material matter.

E. Maintain haul routes over unpaved area in good usable condition during the Work.

F. Construct, maintain, and restore haul routes to the satisfaction of the Company. Cost will be considered an incidental item.

G. Depending on Seller methods and sequencing of activities, temporary access roads may be required to achieve the Work. Proposed temporary access roads must be approved by the Company prior to construction. All temporary access roads must be removed at the end of the Work and their area returned to pre-existing conditions to the satisfaction of the Company.

1.15 SELLER'S OFFICE

A. During the performance of this Contract, the Seller must maintain a suitable office at an Company-designated space that must be the headquarters of the representative authorized to receive Drawings, instructions, or other communications or articles.

B. The Seller must maintain copies of Drawings, Technical Specifications, submittals, material safety data sheets for all products to be used on site, permits, personnel certifications, and other Contract Documents, available for use always, at the Seller's office.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Clean and repair damage caused by installation or use of temporary Work.

B. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 56 15
PROTECTION OF EXISTING UTILITIES

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the protection of existing underground and overhead utilities, including, but not limited to, electric, water, sewer, a CDID outfall pipe, communications, natural gas, rail, and stormwater.

1.02 RELATED SECTIONS

A. Section 02 41 00 – Demolition

B. Section 31 11 00 – Clearing and Grubbing

1.03 REFERENCES

A. Institute of Electrical and Electronics Engineers (IEEE) C2-2007 – National Electrical Safety Code (NESC)®

B. RCW 19.122 – Underground Utilities

1.04 PROJECT CONDITIONS

A. The Drawings show existing utilities, insofar as it has been possible to show them. The locations of existing utilities should be considered schematic and are not based on accurate as-built information of field locations. Existing utilities are shown for the Seller's convenience, and the Company assumes no responsibility for improper locations or incorrect utility information. The locations of existing utilities should be considered approximate, and the Seller must be responsible for field verifying utility locations and protecting existing utilities.

   1. The Seller must notify the Company immediately of any discrepancies between the utilities shown or referenced in the Drawings or Technical Specifications and those observed in the field. The Seller must record the encountered utility locations on the Record Drawings.

B. Contact the Utility Location Request Center (One Call Center) at 811 or 1-800-424-5555 for utility locations within the construction area or within affected public rights-of-way or easements not less than 2 business days before the scheduled date for earthwork or trenching that may impact existing utilities, as prescribed in WAC 296-155-650 to 296-155-66411. Notify the Company when the "one-call" request is being initiated.

C. Hire services of a private utility locate contractor to locate utilities prior to the start of earthwork or trenching.

D. Obtain the location of embedded conduit, pipe, cable, ground mat, and other buried items before performing any excavation.

E. Note the location and extent of overhead utilities. The Project will require Work under and adjacent to overhead electrical lines and other overhead utilities. If excavation or other Work will be within 10 feet of any existing electrical utility either above or below ground, lockout/tagout procedures are required. The Seller must provide 5 working days' prior notice of planned excavations of this type to the Company. The Seller must coordinate with the Company and the applicable utility companies to arrange for and perform this lockout/tagout.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 COORDINATION

A. The Seller is solely responsible for calling the utility locate center and procuring the services of a private utility locate service, coordinating with existing utility owner, and arranging for the movement or adjustment of existing utilities, as needed to complete the Work.

B. The Seller must hand excavate within 3 feet of areas where existing utilities are indicated, unless directed otherwise by the Company. After the actual locations and routing of the existing utilities have been found to be accurately determinable through hand-excavation, and after approval from the Company, the Seller may begin excavation using machinery in a manner acceptable to the Company.

    1. Cement asbestos pipe may be encountered during excavation. Notify the ARP immediately if any suspected cement asbestos pipe is encountered.

C. After excavation by machinery has begun, the Seller must continue to be fully responsible for all utilities found through the location services, by hand-excavation, and/or as indicated on the Drawings.

    1. Notify the ARP immediately if any existing utilities that were not indicated are encountered during excavation.

D. The Seller must obtain approval from the Company before backfilling existing utilities. Utility warning tape (provided by the Seller) must be placed 12 inches above existing utilities.

3.02 INTERFERENCE WITH OPERATION OR MAINTENANCE

A. All existing utilities must maintain continuous service and operation during the Seller's operation, unless the Seller receives prior written approval from the utility Company and the Company.

B. Parking within 10 feet of the edge of active rail lines is not permitted. Notify the ARP four days in advanced of any Work that interferes with and requires a disruption of active rail services. See Section 01 70 00 – Execution for notification requirements for Work within the rail right-of-way.

C. Notify the ARP of all utilities exposed. Do not disrupt or cut utilities until identified and the Company has approved the cut.

1. Do not interfere with operation or maintenance of existing utilities. Provide for access to utilities in a manner satisfactory to utility owner and operators and the Company.

2. Provide required temporary structures; make necessary repairs, replacements, or similar operations; and furnish indemnity or other bonds.

3. Perform any shutdown of utilities only when such shutdown will not interfere with Company operations. Schedule shutdowns through the Company, allowing time for adequate coordination.

4. Do not excavate or operate equipment within 10 feet of any monitoring wells or probes. Damaged wells or probes will be re-established by the Company and paid for by the Seller.

3.03 REMOVAL OF PROTECTIVE INSTALLATIONS

A. Protect existing utilities and other private facilities and improvements that are to remain in place from damage in the course of the Work.

B. Remove protective installations after the purpose for which they have been installed has been served. Materials furnished by the Seller to provide protection will remain property of the Seller.

3.04 REPAIR

A. In the event of interruption to field-located utility services as a result of the Work, promptly notify the ARP first and then the proper authority. Cooperate with said authority in restoring service as promptly as possible. If required, the Seller must install suitable temporary service until permanent repair is completed and bear the cost of repair and temporary service.

B. Repair, at the Seller's expense, damage to existing installations due to the Seller's operations or the Seller's failure to provide proper protection. At the Company's option, damage may be repaired by the Company, and the Seller will be backcharged repair costs. Repairs must be subject to approval of the Company.

C. All areas disturbed by construction must be returned to the original ground topography before construction ends, unless otherwise shown in the Drawings.

D. If disturbance of private utilities or installations is required to complete the Work, the Seller must replace or repair the existing utility or installation unless otherwise approved by the

Company. The Seller must coordinate replacement, repair, relocation, or removal of existing installations with the Company.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION, SEDIMENT, AND POLLUTION CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. This section describes TESC BMPs to be implemented during completion of the Work to control water pollution, soil erosion, and siltation to prevent pollutants or undesirable materials from entering the surrounding environment during construction.

B. The Seller must plan for and furnish all labor, materials, tools, supervision, transportation, and incidentals required to provide, install, maintain, repair, and replace TESC BMPs prior to, during, and upon completion of construction as specified herein, consistent with all permits and approvals, as shown on the Drawings, and as necessary to complete the Work to the satisfaction of the Company.

C. The Company operates the Site under a SWPPP that has been approved by Ecology and is required by the individual NPDES Permit that regulates discharges from the Site to adjacent surface waters. All Work must comply with the approved SWPPP. The Seller must have a copy of the SWPPP on site and available for reference at all times.

D. Ecology may also require that a Project-Specific SWPPP be prepared by the Company. If this occurs, all Work must comply with the approved Project-Specific SWPPP. The Seller must have a copy of the Project-Specific SWPPP on site and available for reference at all times.

E. The Seller must submit a TESC Plan for approval as part of the information required in the Seller's EPP. The TESC Plan must be consistent with the Company's SWPPP and/or Project-Specific SWPPP. Additional requirements for the EPP are outlined in Section 01 33 00 – Submittal Procedures.

F. The Work must include implementation and maintenance of TESC BMPs for those areas shown on the Drawings and all areas disturbed by the Seller, as needed, to prevent pollution of air and water and control, respond to, and dispose of eroded sediment and turbid water during the term of the Contract, consistent with applicable permits, the SWPPP and/or Project-Specific SWPPP, the approved EPP, and the requirements outlined in the Ecology *Stormwater Management Manual for Western Washington*. TESC BMPs may include, but are not be limited to, silt fences, straw bales, straw wattles, catch basin inserts, stabilized construction entrances, stockpile covering, and other applicable BMPs.

G. The Work described in this section covers implementation of TESC BMPs to prevent erosion and the discharge of sediment or sediment-laden water to adjacent surface and stormwater control facilities. The management and control of water generated as part of the Work, including the capture and conveyance of water from dewatering excavations and

surface water runoff, is outlined in detail in Section 02 71 00 – Water Management and Treatment.

H. Acceptance of the Seller's TESC Plan as part of the Company's acceptance of the Seller's EPP does not constitute an approval of permanent Work or drainage design (e.g., size and location of roads, pipes, restrictors, channels, retention facilities, or utilities).

I. For this Work, the Seller must read and conform to all requirements set forth in the NPDES Permit for discharges from the Site.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29 – Health, Safety, and Emergency Response Procedures

C. Section 01 74 19 – Waste Management and Disposal

D. Section 02 71 00 – Water Management and Treatment.

E. Section 31 05 19.13 – Geotextiles for Earthwork

F. Section 31 05 16 – Soils and Aggregates

G. Section 32 90 00 – Hydroseeding

1.03 REFERENCES

A. The publications listed as follows pertain to requirements of this Technical Specification section to the extent referenced. The publications are referred to in the text by basic designation only. All publications are "Latest Edition" unless specified otherwise.

1. Ecology, *Stormwater Management Manual for Western Washington*, July 2019.

2. Cowlitz County, *Stormwater Management Program Plan,* March 2022.

3. ASTM Standards:

a) ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity

b) ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat

c) ASTM D4397 – Standard Specification For Polyethylene Sheeting For Construction, Industrial, And Agricultural Applications

d) ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

e) ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile

B. Where reference is made to one of the previously listed standards, the revision in effect at the time of the Project award must apply.

1.04 SUBMITTALS

A. The Seller must submit documentation of CESCL certification prior to starting the Work.

B. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. TESC Plan as part of the EPP

1.05 QUALITY ASSURANCE

A. TESC measures must be implemented in accordance with the requirements and procedures outlined in the Technical Specifications, Drawings, state or county standards or guidelines for TESC, and all regulatory authorities having jurisdiction. Where conflicts between requirements exist, the more restrictive rules must govern.

B. The Seller must provide all TESC measures required by permit or the Company's SWPPP, and/or shown on the Drawings, or as directed by the Company, for the duration of the Contract. TESC controls on the Drawings are intended to be a guide to address the stages of Work shown. Conceptual TESC plans have been included in the Drawings. The Seller must review the conceptual TESC Plans provided in the Drawings and develop and submit detailed TESC plans as described in Section 01 33 00 – Submittal Procedures, indicating recommended modifications, revisions, or additions to the TESC plans provided in the Drawings. Additional measures not specified on the Drawings may be necessary and must be implemented to address intermediary stages of Work and any conditions that may develop during construction at no additional cost to the Company.

C. TESC measures must at all times be satisfactory to the Company. The ARP will inform the Seller of unsatisfactory construction procedures and operations if observed. If the unsatisfactory construction procedures and operations are not responded to and corrected within 24 hours, the ARP may suspend the performance of any or all other construction until the unsatisfactory condition has been corrected. Such suspension must not be the basis of any claim by the Seller for additional compensation nor for an extension of time to complete the Work. Any complaints, fines, etc., relating to ineffective erosion control must be the sole responsibility of the Seller.

D. The Seller must designate a CESCL to act as Erosion Control Supervisor for the duration of the Work responsible for managing and maintaining TESC measures and conducting inspections.

E. Maintenance of all TESC measures within the Limits of Work will be the responsibility of the Seller until final stabilization is complete and until the permanent soil erosion controls are established and in proper working condition.

F. The Seller must protect adjacent properties and water courses from soil erosion and sediment damage throughout construction. Measures taken must include, but not be limited to, the following:

1. Seller must monitor any roads traversed by construction vehicles or equipment roads for material, including soil and Waste Material, which is dropped onto roads from haul vehicles travelling throughout the Project Site ("track out").

2. Work stoppage resulting from the Seller's track out, discharges, or other violations will not be considered in issuing a request for Contract time performance, nor will it be basis for a claim.

1.06 SEQUENCING AND SCHEDULING

A. No Work will be permitted without a Seller-provided, Company-approved EPP.

B. TESC measures must be installed prior to commencing the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with Manufacturer requirements.

B. All chemicals must be stored and handled in accordance with Manufacturer's recommendations, relevant material safety data sheets and requirements of Section 01 35 29 – Health, Safety, and Emergency Response Procedures.

1. Storage of chemicals used for erosion control or water treatment must be provided within lockable covered containers unless authorized otherwise by the Company.

2. These chemicals may include, but are not limited to, soil stabilization chemicals and coagulants for enhancing settlement.

1.08 INSPECTIONS, MAINTENANCE, AND RECORDKEEPING

A. TESC measures must be repaired and replaced as necessary.

B. The Seller must continue inspections and maintenance operations during periods of work stoppages or until permanent erosion control measures, including seeding, mulching, and/or stabilization, have been completed in accordance with the Contract Documents. The inspection frequency during these times, including time between construction seasons, must coincide with inspections of the East Landfill No. 1 and East Landfill No. 2.

C. Remediation Water monitoring will be conducted by the Company per the Site's NPDES permit as described in Section 02 71 00 – Water Management and Treatment.

D. The CESCL must inspect all BMPs and all areas disturbed by construction activities daily and maintain these facilities to ensure continued proper functioning during the construction period.

E. The results of each inspection must be documented on an inspection form and attached to the Site log book. At a minimum, each inspection form must include:

1. Inspection date and time
2. Weather information
3. The general conditions during inspection
4. The approximate amount of precipitation since the last inspection
5. The approximate amount of precipitation within the last 24 hours
6. A summary or list of all implemented BMPs, including observations of all erosion/sediment control structures or practices
7. A description of BMPs inspected, BMPs that need maintenance and why, BMPs that failed to operate as designed or intended, and where additional or different BMPs are needed
8. General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made following the inspection
9. An implementation schedule for the remedial actions that the Seller plans to take if the Site inspection indicates that the Site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.
10. The name, title, and signature of the person conducting the Site inspection, a phone number or other reliable method to reach this person, and the following statement: *I certify that this report is true, accurate, and complete to the best of my knowledge and belief.*

F. The Seller's CESCL must keep records on site throughout construction activity and provide weekly updates to the ARP at the Weekly Progress Meeting.

PART 2 PRODUCTS

2.01 GENERAL

A. The materials used in performing this Work must conform to the material specifications listed in this section and in the EPP/TESC Plan to be submitted by the Seller. Materials not specified in this section must be as specified in the approved EPP/TESC Plan prepared by the Seller.

B. TESC BMPs employed by the Seller must be in accordance with the Ecology *Stormwater Management Manual for Western Washington* and the Company's SWPPP.

C. Deliver materials and products in factory-labeled packages. Store and handle in strict compliance with Manufacturer's instructions and recommendations. Protect materials from damage caused by weather, excessive temperatures, or construction operations.

2.02 MARKING CLEARING LIMITS

A. Clearing limits must be marked with high-visibility plastic or metal fence, unless otherwise approved by the ARP. Where silt fence is placed to mark clearing limits, high-visibility silt fence must be used.

2.03 SILT FENCES

A. Geotextile for silt fences must be purchased in a continuous roll cut to the length of the barrier to avoid joints. If necessary, joints must be constructed only at support posts and by splicing the geotextile together, with a minimum 6-inch overlap, and securely fastening both ends to the post.

B. Silt fence geotextile must consist of a material specifically sold as silt fence and may be prefabricated with appropriate posts to facilitate installation.

C. Posts must be either steel or wood:

1. Wood posts must have minimum dimensions of 2 inches square by a minimum length of 3 feet.

2. Steel posts must have a minimum diameter of 1 inch, a minimum weight of 1.35 pounds (lbs) per foot, and a minimum length of 3 feet.

D. Silt fence geotextile must meet the requirements of the following table:

Geotextile Property	Test Method	Geotextile Property Requirement
Apparent Opening Size	ASTM D4751	60 mm max. for slit film wovens (#30 sieve), 30 mm max. for all other geotextile types (#50 sieve) 15 mm min. (#100 sieve)
Water Permittivity	ASTM D4491	0.02 sec^{-1}
Grab Tensile Strength, min. in machine and x-machine direction	ASTM D4632	180 lbs in machine direction, 100 lbs unsupported and supported
Grab Failure Strain, min. in machine direction only at 180 lbs or more	ASTM D4632	30% max.
Ultraviolet Radiation Stability	ASTM D4355	70% Strength Retained min., after 500 hrs. in xenon arc device

Notes:

1. All geotextile properties in table are Minimum Average Roll Values (i.e., average minus two standard deviations), unless stated otherwise
2. Provide geotextile sampling and specimen condition, in accordance with WSDOT Test Methods 914 and 915, respectively. These test methods are available online at www.wsdot.wa.gov.

max: maximum
mm: millimeters
min.: minimum
hrs. hours

2.04 STRAW WATTLES

Property	Test Method	Units	Minimum Specified Value
Mass per Unit Weight	Field Measured	lbs/foot	1.6
Dimension	Field Measured	diam./inches	12.0
Net Strand Thickness	Field Measured	inches	0.030
Net Knot Thickness	Field Measured	inches	0.055
Netting Unit Weight	Certified	ounces/foot	0.35
Installed Free-Board Height	Field Measured	height/inches	6.0–70
Straw Fiber	Field Measured	average length (inches)	3.0
Fiber Content	Certified	% straw	100

Notes:
diam.: diameter

A. Straw wattles must consist of biodegradable plant material such as straw, coir, or wood shavings encased in biodegradable or photodegradable netting.

   1. Plant material must be free of noxious weeds and reed canary grass seeds.

   2. Encasing material must be clean, evenly woven, and free of encrusted concreted of other contaminating materials such as preservatives.

   3. Encasing material must be free of cuts, tears, or weak places and have a lifespan greater than 6 months.

B. Wattles should be at 8 to 12 inches in diameter.

2.05 STOCKPILES AND STOCKPILE COVERS

A. General

   1. Lines to secure the sandbags and stockpile covers must be a minimum 3/8-inch polypropylene or manila braided rope with a maximum 10-foot grid spacing in all dimensions.

   2. The Seller may propose to keep long-term stockpiles on site between construction seasons by soliciting acceptance from the Company in writing. If accepted in writing by the Company, long-term stabilization methods must be employed. Stockpile stabilization must be implemented in accordance with this Technical Specification.

B. Ground Separation

1. The Seller must implement a means of separation between the ground and stockpiles containing material of known or suspected contaminants.

2. The Seller must provide a separation layer beneath stockpiles consisting of Geotextile Type 2 in accordance with Section 31 05 19.13 – Geotextiles for Earthwork and crushed stone in accordance with Section 31 05 16 – Soils and Aggregates.

C. Plastic Sheeting

1. Plastic sheeting must meet the requirements of ASTM D4397 for polyethylene having a minimum thickness of 6 mils.

2. Plastic coverings must be placed with at least a 12-inch overlap at all seams.

2.06 TEMPORARY COVER

A. Temporary Cover must include, but not be limited to:

1. Seeding and mulching materials in accordance with Section 32 90 00 – Hydroseeding

2. Plastic sheeting in accordance with Paragraph 2.05-C of this section.

2.07 STABILIZED CONSTRUCTION ENTRANCES

A. Aggregates used for stabilized rock construction entrances must comply with the requirements of Section 31 05 16 – Soils and Aggregates.

B. Geotextile Type 2 must comply with the requirement of Section 31 05 19.13 – Geotextiles for Earthwork.

2.08 WATER

A. The Seller must use water for the control of dust during construction. However, the water used for dust control must not be in excess to create runoff.

2.09 MULCH AND SEED

A. Mulch and seed must conform to Section 32 90 00 – Hydroseeding.

B. Fertilizers must conform to Section 32 90 00 – Hydroseeding.

PART 3 EXECUTION

3.01 GENERAL

A. The Work defined by this section includes, but is not limited to:

1. Furnishing and delivery of all required materials and equipment

2. The installation and maintenance of all TESC measures within the Limits of Work and Staging Areas shown on the Drawings and staked by the Seller

3. Supply and operation of equipment for water trucks and other material or equipment for the control of dust

B. In the event of a conflict between these requirements and applicable pollution control laws, rules, or regulations, the more restrictive laws, rules, and regulations must apply, as determined by the Company.

C. The Seller must implement linear erosion controls, such as silt fences, wattles, and straw bales, in accordance with this Technical Specification, as indicated by the *Stormwater Management Manual for Western Washington*, and as shown on the Drawings or designated by the Company. Generally, silt fences, wattles, straw bales, and check dams will also be implemented along ditches to prevent sedimentation.

D. The Seller must perform the application of stockpile covers and ground separation in stockpile areas in accordance with this Technical Specification and as shown on the Drawings or designated by the Company.

E. If necessary, the Company will enforce a work stoppage until BMPs are implemented to effectively manage TESC. Work stoppage due to TESC measures must not constitute a time extension of the Contract Time and will not be considered the basis for a change in payment.

F. The Seller must not allow the area of work to exceed their ability to adequately prevent sediment from leaving the Limits of Work.

G. When, in the opinion of the Company, TESC devices are no longer needed, the Seller must remove them and finish the areas in accordance with the Contract Documents.

H. Seller must brief all employees working on the Site on the EPP. The briefing must include, but not be limited to:

1. TESC system maintenance

2. Spill prevention practices and spill response and cleanup procedures

3. The importance of TESC BMPs, including details of the BMPs to be incorporated in the Work

3.02 SILT FENCE

A. The Seller must install silt fence in the locations and manner presented in the Drawings and this Technical Specification.

B. The silt fence must have a 2-foot-minimum and a 2½-foot-maximum height above the original ground surface.

C. Bury the bottom of the geotextile fabric 4 inches minimum below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric backup support mesh is used, the wire or polymeric mesh must extend into the ground a minimum of 3 inches.

D. Anchor posts for the silt fence must be installed on a maximum spacing of 6 feet on centers (or 8 feet on centers if wire backing is used), and the filter fabric and wire mesh must be attached to the posts on the upstream side.

E. Silt fence must be maintained in an erect position and cleaned as required to function efficiently. If the silt fence bulges by more than 4 inches from sediment buildup or is observed in a collapsed position due to sediment buildup, the silt and debris must be removed and the silt fence repaired or replaced immediately. Additional requirements for silt fence maintenance must be described in the EPP.

F. Wire mesh support, if used, must consist of steel wire with a maximum mesh spacing of 2 inches or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh must be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.

3.03 STRAW WATTLES

A. Linear sediment and erosion control barriers (straw wattles) must be installed as shown on the Drawings. Wattles must be placed in a row with a minimum 1-foot overlap at the ends. On slopes, wattle ends must overlap in a manner that prevents runoff from leaving the Limits of Work at the point of overlap.

B. Install wattles perpendicular to the flow direction and parallel to the slope contour.

C. Place wattles in shallow trenches, staked along the contour of disturbed or newly constructed slopes.

D. Stakes are not required if wattles are installed on asphalt or pavement surfaces. Straw wattles placed on soil must be anchored in place with stakes driven through the wattle every 4 feet at a minimum. All stakes must be driven at least 14 inches into the ground.

3.04 CHECK DAMS

A. Check dams may be installed within ditches to prevent sedimentation during high precipitation events, reduce the velocity of concentrated flow, and dissipate energy.

B. Use check dams where temporary or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

C. Check dams should be placed:

1. Perpendicular to the flow of water

2. Every 50 feet or one every 2-foot drop in elevation

3. With maximum height at 2 feet at the center of the check dam

3.05 INLET PROTECTION

A. Use inlet protection at operational inlets. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area.

B. The Seller must install catch basin inlet protection at catch basins in the vicinity of the Work, including any in the parking lots that are adjacent to the Work. The placement and selection of inlet protection is subject to the approval of the Company.

C. There are several options for inlet protection. If catch basin inserts are used, the Seller must regularly inspect and clean inserts and treat material as material with known or suspected contaminants in accordance with Section 01 74 19 – Waste Management and Disposal.

D. If inlet protection is damaged, the Seller must replace or repair immediately, subject to the approval of the Company.

3.06 STABILIZED CONSTRUCTION ENTRANCES

A. Stabilized construction entrances must be installed at the beginning of construction at the East Construction Entrance, the West Construction Staging Area entrance, and the entrance to the unpaved access to the West Work Area, as shown on the Drawings, and maintained for the duration of the Project.

B. The Seller must maintain stabilized rock construction entrances in good working order and ensure loose rocks and soil do not impede normal traffic flow on Washington State Route (SR) 432 (Industrial Way). Seller must also ensure that no soil or Waste Material is tracked onto SR 432.

3.07 TRACK OUT OF MATERIAL

A. The Seller must ensure that haul trucks on roads within the property boundary are not tracking any contaminated material beyond the Limit of Work. The Seller must take measures to clean any and all tracked material on a daily basis.

B. The Seller must prevent dirt and dust from escaping trucks that depart the Site by covering dusty loads, by washing truck tires before trucks leave the Site, or by other methods as applicable. This requirement also applies to the Seller's trucks and equipment at the disposal site.

C. The Seller must employ a wheel-cleaning method for all vehicles traveling between the East Work Area and West Work Area. The Seller's method must clean and contain what comes off of the wheels and body of equipment traversing the Site.

D. If the Company deems that the Seller has demonstrated a failure to adequately comply and protect roadways, the Seller may be required to implement a more involved approach, such as a truck-wash station or street sweeper, at no additional cost to the Company.

3.08 EQUIPMENT MANAGEMENT

A. The Seller must store materials and equipment in a manner that minimizes exposure to weather and prevents contamination of stormwater runoff. The Seller must manage materials and equipment in a manner that prevents contamination of the Site through spills, leaks, overfilling, poor housekeeping, or any other means.

    1. Materials and equipment are not permitted to be stored on grassy areas at any time.

3.09 STOCKPILE MANAGEMENT

A. Stabilize soil stockpiles from erosion, protect with sediment trapping measures, and where possible, locate away from storm drain inlets, waterways, and drainage channels.

B. All stockpiles, regardless of their content, must be protected against erosion by wind and rain and must be covered by a continuous layer of plastic sheeting to prevent stormwater run-on from entering the stockpiles. The stockpile cover must be weighed down (with sandbags or other ballast) or anchored to prevent it from being removed by wind.

3.10 MANAGEMENT OF EXPOSED SOILS

A. Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, and dust control.

B. Exposed and unworked soils will be stabilized according to the time period set for dry and wet seasons:

Season	Dates	Number of Days Soils Can Be Left Exposed
During the Dry Season	May 1–September 30	7 days
During the Wet Season	October 1–April 30	2 days

C. Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

3.11 DUST CONTROL

A. Where Work includes clearing, grubbing, excavating, grading, hauling, placing, stockpiling, sawing, coring, drilling, sandblasting, general demolition, or other activities that will create

dust of blowing soil, the Seller must present their methods to control dust with the Company prior to starting the Work. The dust control methods must include all methods required to retain or control dust and soil so that they do not leave the immediate Work Site, present health hazards, or enter any public areas.

B. Dust control must be effective in preventing visible fugitive dust from leaving the excavation area during construction and maintaining a safe environment for workers.

C. Non-potable water for dust control must be obtained from the Company.

D. If conditions exist that cause dust or soil to become windblown or otherwise entrained in the air by vehicular traffic or equipment activities, that Seller must employ methods to control and abate nuisance dust conditions including, but not limited to:

1. Covering excavated, graded, and disturbed areas or stockpiles with tarps or sheeting until removed from the Site or finished in accordance with the Contract Documents

2. Cleaning, sweeping or vacuuming areas to remove the dust source

3. Removing or relocating dust-creating materials or activities to other areas that will eliminate the dust problem

4. Applying dust-control agents, such as water, or water misting, to the dust source; application of any other wetting agents other than water is not permitted by the Company:

   a) Runoff from wetted material is strictly prohibited.

   b) The Seller must achieve a balance between effective dust control and overwatering.

3.12 CONSTRUCTION OPERATIONS

A. Seller must construct and install all TESC BMPs prior to commencing land-disturbing work and must fully stabilize all graded and disturbed areas prior to removal of TESC BMPs in accordance with the Contract Documents and as designated by the Company.

B. TESC BMPs must remain in operation until completion of the Work or until the Company approves the level of long-term stabilization that has been achieved within the Limits of Work.

C. Seller must limit construction operations to the area within the Limits of Work as shown on the Drawings. Any areas outside the Limits of Work that are disturbed without the express approval of the Company must be revegetated at the sole expense of the Seller.

D. The Seller must maintain good housekeeping practices for the duration of the Work, especially with the use of oils, fuel, and chemicals.

3.13 OVER-WINTER EROSION CONTROLS

A. Prior to the over-winter time period between construction seasons, the Seller must install additional TESC measures, as shown on the Drawings. These measures include additional silt fence at the toe of the slopes around East Landfills No. 1 and No. 2 and straw wattles at the grade breaks shown on the Drawings.

B. The Seller will be required to conduct inspections of TESC measures during the time period between construction seasons to review TESC measures for effectiveness. If inspections note deficiencies in TESC measures, the Seller must provide a corrective course of action. The Seller must then implement the corrective course of action within 3 days of identifying the deficiency or sooner if the deficiency is determined to cause significant concerns for health and safety or environmental impacts.

C. The Seller must also be prepared to place additional contingency measures during the over-winter time period, including placing straw if Hydroseed Mix No. 3 (Bonded Fiber Matrix) does not perform as expected.

3.14 PROTECTION OF WETLAND RESOURCES

A. The Seller must implement sufficient means for showing the boundary of existing wetland resources to be protected from disturbance, such as high-visibility fencing.

B. Fencing or other approved means of identifying protected resources must be maintained throughout the duration of the Work, subject to review by the Company.

3.15 REMOVAL OF TEMPORARY EROSION CONTROL FEATURES

A. Following completion of construction at all Project areas, the Seller must fully remove all non-degradable temporary erosion control features, including silt fences. The removed materials must become the property of the Seller and be disposed of properly.

END OF SECTION

SECTION 01 64 00
COMPANY-FURNISHED PRODUCTS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the components (equipment and materials) the Company is supplying and will have delivered and staged on site prior to the Seller's mobilization or start of related activity. The Seller will be responsible for installing these components as shown on the Drawings and as described in these Technical Specifications. Some of the components require priority or early installation to support management of water generated during construction or pre-replacement of critical demolished infrastructure.

B. Manufacturer information, including submittal information and shop drawings reviewed as part of the procurement process, are included in Appendix C.

1.02 RELATED SECTIONS

A. Section 02 71 10 – Permeable Reactive Barriers

B. Section 31 05 16 – Soils and Aggregates

C. Section 33 42 16 – HDPE Stormwater Force Main Piping

D. Section 33 44 13 – Packaged Stormwater Pump Stations

E. Section 33 44 14 – Valves for Stormwater Control

1.03 COMPANY-FURNISHED PRODUCT CLASSIFICATIONS

A. Stormwater Collection and Conveyance Components

1. Stormwater collection and conveyance improvements are being installed to manage runoff from new landfill surfaces. In addition to supporting permanent runoff conditions, some of the stormwater improvements will be used to manage stormwater, groundwater, and incidental water generated during landfill construction and related site work. The majority of the components of the stormwater system are being supplied, or pre-purchased, by the Company. Those components needed for construction phase water management, as specified herein and annotated on the Drawings, are designated herein as the Advanced Stormwater System.

2. The stormwater collection and conveyance systems that are supported by pre-purchasing include:

    a) East Landfill (ELF) Pump Station, including pumps; wet well and appurtenances; supporting electrical and controls systems; discharge piping, fittings, and valves;

and approximately 4,000 feet of 16-inch HDPE discharge force main pipe and gate valves that will connect the ELF Pump Station to the existing Outfall 002A.

b) West Landfill (WLF) Pump Station, including pumps; wet well and appurtenances; supporting electrical and controls systems; discharge piping, fittings, and valves; and approximately 3,200 feet of 14-inch HDPE discharge force main pipe and gate valves that will connect the WLF Pump Station to the existing Outfall 002A.

c) Pump Station 004 electrical and controls systems that will replace the existing electrical and controls systems to accommodate demolition.

3. The Advanced Stormwater System components include the ELF Pump Station and its inlet pipe as shown on Drawing TSC-02, the ELF Pump Station discharge force main, and the branch tee and valves annotated on Drawing TSC-03. The Advanced Stormwater System also includes components needed to maintain continuous operation of Pump Station 004. As noted above, most of these components, with the exception of the gravity inlet piping that will convey runoff from the East Work Area to the ELF Pump Station, will be pre-purchased by the Company.

B. Activated Alumina

1. Activated Alumina is being used as a reactive amendment in the PRBs and as the reactive media for the Reactive Backfill in SU2, SU3, SU4, and SU5 to provide long-term treatment.

2. The percentage of Activated Alumina to be used within the PRB and Reactive Backfill areas is described in Section 31 05 16 – Soils and Aggregates.

PART 2 PRODUCTS

2.01 STORMWATER COLLECTION AND CONVEYANCE COMPONENTS

A. The Company-furnished components are annotated on the Drawings and described in Appendix C.

B. The Company-supplied stormwater collection and conveyance components are being pre-purchased in three packages as follows:

1. Pump Station Packages: The pump stations are being provided by the Pump Station Package Supplier (PSP Supplier). The PSP Supplier is PumpTech, LLC. Refer to the PSP Supplier shop drawings and submittal information in Appendix C.1. This information was reviewed and approved by the Company and their engineering consultant as part of the procurement process.

2. Each of the two pump station packages includes wet wells, duplex vertical turbine pumps, discharge piping and valves, and an HDPE piping stub for connection to the force mains. The PSP Supplier will provide oversight support to the Seller during pump

station package installation and will participate in pump station package startup and testing.

3. Electrical and Controls Systems: The electrical and controls panels needed to monitor and operate each pump station are being provided by the Electrical Package Supplier (EP Supplier). The EP Supplier and system integrator is Powers of Automation. The IC Drawings in the Drawing set were primarily prepared for the fabrication of the panels by the EP Supplier. Field wiring and related panel work by the Seller is described by the Construction Notes on each of the IC Drawings.

4. Each of the two electrical and controls systems includes the following:

    a) Pump station main panels, including power and controls, programmable logic controller (PLC), human-machine interface (HMI) touch screen, and main disconnect switch

    b) Instrumentation

    c) Replacement power and controls for Pump Station 004 (ELF Pump Station only)

    d) PLC programming and integration with Site supervisory control and data acquisition system

    e) Oversight support to the Seller during EP installation, including PLC input/output checks and ELF and WLF Pump Station and Pump Station 004 ring out, startup, and testing

5. Force Main Piping and Valve Packages: Discharge force main components and materials will be provided by the Company's selected pipe vendor for this package, Consolidated Pipe and Supply, Inc.

6. The materials and equipment to be provided by Consolidated Pipe and Supply are generally described below and as listed in the approved purchase agreement for the materials included in Appendix C. That information includes manufacturer catalog information and materials specifications submitted by Consolidated Pipe and Supply for the materials that they will supply for the Project. The materials will be staged and ready for installation by the Seller. The material supplier will have not have a construction phase role.

    a) DR 32.5 14-inch HDPE for the force main from the WLF Pump Station to connections near Outfall 002A (3,150 feet purchased)

    b) DR 32.5 16-inch HDPE for the force main from the ELF Pump Station to connections near Outfall 002A (4,850 feet purchased)

    c) DR 32.5 20-inch HDPE for the combined force main connection to Outfall 002A (200 feet purchased)

d) DR 17 HDPE fittings of various sizes and configurations needed to connect segments of force main pipe; fittings will be counter-bored or tapered to allow for fusion to DR 32.5 pipe

e) One (1) 16-inch ductile iron blind flange

f) One (1) 14-inch and two (2) 16-inch flanged gate valves with cast iron valve boxes

g) Schedule 40 steel pipe needed for pipe sleeves to be installed under existing rail lines

h) Four (4) flexible couplings to seal the ends of pipe sleeves

i) Two (2) combination air-vacuum release valves

2.02 ACTIVATED ALUMINA

A. The Company-supplied Activated Alumina is being pre-purchased from Axens Solutions.

B. The pre-purchased product is Axens ActiGuard® F 14x28 Activated Alumina adsorbent.

C. The specification sheet and Safety Data Sheet for this material are included in Appendix C.

PART 3 EXECUTION

3.01 SEQUENCING AND COORDINATION

A. The Company has pre-purchased all components and materials described above and established delivery on dates that precede the Seller's time of installation. All materials and components will be delivered to the Seller's staging and lay down areas for offload by the Seller.

B. The Seller is responsible for materials component storage and protection beginning with, and including, offloading. The Seller must coordinate with the ARP to schedule delivery and must be responsible for stockpiling, storing, and staging materials until installation.

C. The Seller must provide installation schedules that comply with the sequencing requirements of the Project.

D. Scheduling must highlight the dates of services needed by the PSP Supplier and EP Supplier, including oversight of testing and startup, to allow those suppliers to adequately plan and schedule their services.

E. Additional materials will be needed to complete installation of all the stormwater facilities shown on the Drawings. The Seller will be responsible for reviewing the quantities of each item that has been pre-purchased by the Company and must identify and furnish all other materials needed to complete the Work. For the stormwater system, these materials include, but are not limited to, the following:

1. Stormwater manholes and appurtenances

2. Gravity stormwater collection pipe

3. Perforated stormwater underdrain pipe

4. Fittings, valves, utility boxes, and other equipment needed to complete the installation of air release valve assemblies

5. Steel pipe and fittings needed to permanently connect force main piping to the existing Outfall 002A

6. Bedding and backfill materials

7. Concrete and reinforcing steel for the reinforced concrete slab needed to support discharge pipe, fittings, valves, and electrical equipment adjacent to each pump station

8. Other pipe, fittings, and appurtenances needed to complete installation of the stormwater system

3.02 INSTALLATION

A. Coordinate delivery of pump station packages with the ARP. Prepare the Site and complete all earthwork and excavations prior to installation. Install pump station packages in accordance with the PSP Supplier's installation instructions, the approved shop drawings provided in Appendix C, and Section 33 44 13 – Packaged Stormwater Pump Stations.

B. Coordinate delivery of electrical and controls systems for each pump station with the ARP. Install electrical and controls systems as shown on the Drawings and outlined in the Division 26 Technical Specifications.

C. Coordinate delivery of pipe and related materials for force main installations with the ARP. Install pipe, valves, fittings, and other pre-purchased equipment as shown on the Drawings and as outlined in Section 33 42 16 – HDPE Stormwater Force Main Piping and Section 33 44 14 – Valves for Stormwater Control.

D. Coordinate delivery of Activated Alumina with the ARP. Blend the Activated Alumina at the percentages described in Section 31 05 16 – Soils and Aggregates for Reactive Backfill and the PRBs. Install the Reactive Backfill to the elevations shown on the Drawings and outlined in Section 31 20 00 – Earthwork. Install the PRBs at the locations and depths shown on the Drawings and outlined in Section 02 71 10 – Permeable Reactive Barriers.

END OF SECTION

SECTION 01 70 00
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. The purpose of this section is to specify the execution requirements for the Project, including notification responsibilities and general criteria for performance of the Work.

1.02 INSPECTION OF THE WORK AREA

A. Examine the Work Areas and become satisfied as to the existing conditions within the Limits of Work. The Seller must verify existing conditions and report discrepancies to the Company before proceeding with the Work.

1.03 WORK IN RIGHT-OF-WAYS

A. Notify the ARP 1 week prior to Work within the CDID levee right-of-way. The ARP will notify the CDID of the Work.

B. Notify the ARP 1 week prior to work within the Cowlitz County Public Utility District No. 1 or Cascade Natural Gas right-of-ways. The ARP will notify the utilities of the Work.

C. In Service Rail

1. Notify the ARP a minimum of 4 calendar days prior to work within 20 feet of the centerline of any on-site, in service rail right-of-way. This includes trenching under rail. This will require a temporary lockout of the rail.

2. Maximum duration of a rail lockout is 48 hours. After the initial 48-hour lockout period expires, the Seller must renew its lockout request a minimum of 4 calendar days prior to recommencing work in the area.

3. It is the Seller's responsibility to verify that the lockouts have been made.

1.04 VERIFICATION OF MEASUREMENTS

A. Verify elevations and measurements and be responsible that executed dimensions fit actual conditions, regardless of the Drawings, and report discrepancies to the ARP before proceeding with the Work. The Seller will not receive extra compensation for verification of measurements or for labor or material expended on account of such differences.

B. Seller must verify all quantities of material required for the performance of the Work and report discrepancies to the ARP before proceeding with the Work.

1.05 VERIFICATION OF CONDITIONS

A. The Seller is to coordinate field conditions with the ARP to prioritize conformance to the sections and details provided in the Drawings when laying out and executing the Work.

B. Existing topography and design contours reflect conditions at the time the existing topography was surveyed. Verify all lines, limits, and grades prior to beginning construction activities. Adjust as necessary to accommodate settlement that may have occurred between the design survey and construction.

C. Verify that the survey control system is installed and properly protected from construction operations prior to commencing earthwork.

1.06 PROTECTION OF NEW WORK AND EXISTING PROPERTY

A. All streets, roads, grading, structures, utilities, and other improvements that are not specifically designated to be cleared, removed, stripped, or altered as a part of the Work must be protected from damage throughout the construction period. Any damage caused by the Seller or its Subcontractors must be immediately repaired to the original condition and to the satisfaction of the ARP at no additional cost to the Company.

B. The Seller must protect existing structures, property, parking lot surfaces, cultivated or planted areas, public roads, and other surface improvements from damage.

C. When excavating immediately adjacent to structures, property, utilities, or other areas, and when an unsupported excavation could be reasonably expected to cause damage, the Seller must provide bracing, shoring, or other Work necessary to protect said structures, property, or areas.

D. The Seller must protect installed Work and provide special protection where required by the Technical Specifications.

E. The Seller must repair or replace damaged structures, vegetation, materials, or equipment to a condition equal to or better than the condition prior to the damage at no additional cost to the Company. Any such repair and/or replacement must be approved by the ARP.

F. The Seller must repair roadbeds and surfaces to a condition equal to or better than the condition prior to damage, ensuring that proper drainage is facilitated at no additional cost to the Company. Any such repair and/or replacement must be approved by the Company.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 71 23
SURVEYING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes survey work required to locate the extents of the waste, control grades, develop As-Built Surveys, and otherwise perform the Work required by this Contract.

1.02 RELATED SECTIONS

A. Section 01 77 00 – Closeout Procedures

1.03 SUBMITTALS

A. Submit the Pre-Construction Survey for ARP review and approval 14 days prior to commencing Season 1 Work.

B. Submit Progress Surveys to the ARP with the Seller's Daily Activity Reports.

C. Season 2 Baseline Survey 14 days prior to commencing Season 2 Work.

D. Submit As-Built Surveys for each component of Work within each SU, as described in this section and in accordance with Section 01 77 00 – Closeout Procedures.

1.04 SELLER'S SURVEY WORK

A. The Seller must provide all survey work required to locate the extents of excavation; control grades; conduct Pre-Construction Surveys, Progress Surveys, Season 2 Baseline Surveys, and As-Built Surveys; and otherwise perform the Work required by the Contract.

B. It is the Seller's responsibility to perform all Work required by the Contract Documents. Other sections may also be related to the proper performance of this Work.

1.05 QUALITY ASSURANCE

A. The Company may conduct its own Pre-Construction Survey to compare against the Seller's Pre-Construction Survey for Quality Assurance. If there are discrepancies between the two surveys, the Seller's surveyor must coordinate with the Company's surveyor to determine which survey is inaccurate, and if the Company determines that the Seller's surveying means and methods are inaccurate, the Seller must adjust and correct its surveying means and methods at no extra cost to the Company.

B. The Company may review the Seller's survey work or conduct additional surveys throughout the construction work as a Quality Assurance check of the Seller's

Pre-Construction, Progress, and As-Built Survey work. The Seller must accommodate the Company's surveyor. If there are discrepancies between the Seller's surveys and the Company's surveys, the Seller's surveyor must coordinate with the Company's surveyor to determine which survey is inaccurate, and if the Company determines that the Seller's surveying means and methods are inaccurate, the Seller must adjust and correct its surveying means and methods at no extra cost to the Company.

1.06 PROJECT DATUM

A. All topographic and hydrographic surveys must be prepared using the Project datum listed in these Technical Specifications and as shown on the Drawings.

1. Horizontal Datum: Washington State Plane South Zone, North American Datum Of 1983 (NAD83), U.S. Survey Feet

2. Vertical Datum: North American Vertical Datum of 1988 (NAVD88)

1.07 EXISTING CONDITIONS

A. Existing contours shown on the Drawings may not reflect contours at the time of construction.

B. Seller must verify all grades, lines, levels, and dimensions shown on the Drawings and report any errors or inconsistencies to the ARP before commencing Work. Failure to do so will make the Seller responsible for any resulting changes that may be required.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. The Seller must conduct daily Progress Survey checks during the performance of the Work and must make a final survey check after completion of each stage of Work in each SU. Surveys must be made available to the Company in a timely manner so that any discrepancies can be resolved in the field. All quantities must be approved/verified by the ARP before payment.

B. Survey Monuments and Benchmarks

1. There are no maintained survey monuments or benchmarks located on the Site. The Seller must establish survey controls necessary to survey and control the Work.

C. Surveying and Layout

1. Work from lines and levels established by the survey control provided in the Drawings.

2. Establish secondary benchmarks and control points to set lines and levels through the Work Area.

3. Locate and flag/stake the property line corners that are within 500 feet of the Project area.

4. Locate and flag/stake the clearing and disturbance limits prior to commencing Work.

   a) Flagging must consist of continuous orange safety fencing.

   b) Keep the fencing in place, fully functional, until directed to remove it by the Company.

5. Locate and flag/stake utilities within and adjacent to the Limits of Work.

6. Locate and lay out Project elements, including but not limited to grading stakes, grading, excavation, fill placement, cut slopes, and invert elevations.

7. Provide and maintain temporary means of checking and rechecking layout to confirm correct and accurate removal and placement of materials.

8. Accurately record information on the as-built drawings not less than once per month.

9. The Seller must exercise care in the preservation of stakes and must reset them at their own expense if they are damaged, lost, displaced, or removed.

D. Do not scale Contract Documents provided by the Company.

E. Surveyor Log:

1. Maintain a surveyor log of control data and survey work on the Project Site.

2. Provide access to the surveyor log when required by the ARP.

3.02 QUALITY CONTROL

A. Pre-Construction Surveys, Season 2 Baseline Surveys, and As-Built Surveys must be performed by a licensed Professional Land Surveyor registered in the State of Washington.

B. Progress Surveys may be performed by a licensed Professional Land Surveyor or by the Seller.

C. Corrections of Work due to survey errors and omissions are the responsibility of the Seller.

D. Survey Accuracy

1. Measurements performed in accordance with requirements of this Section are to be accurate within 0.01 foot in both vertical and horizontal planes.

3.03 PRE-CONSTRUCTION SURVEY

A. The Seller must conduct a Pre-Construction Survey to fully identify the original ground surface elevations and planimetric features throughout the Project areas where Work will be conducted.

1. Pre-Construction Surveys must be performed by a licensed Professional Land Surveyor registered in the State of Washington.

2. The Seller's survey must show 1-foot contour intervals at a minimum.

3. The Pre-Construction Survey must cover all areas of Work as shown on the Drawings and extend at least 50 feet past the extents of land-disturbing activity boundaries.

4. The Seller must provide a Digital Terrain Model (DTM) of the Seller's survey to the ARP upon completion of the survey.

5. Survey must be provided in Autodesk Civil3D 2022 *.dwg file format.

6. Seller must also provide a printout in *.PDF format of all surveys that includes contour lines and labels, Site features, a scale bar, north arrow, extents of SUs, and a legend.

7. The Seller must not begin Work prior to Company and Seller mutual acceptance of the Pre-Construction Survey.

3.04 PROGRESS SURVEYS

A. The Seller must perform Progress Surveys to document progress of construction activities completed as part of the Contract. Progress Surveys will be distributed to the ARP with the Seller's Daily Activity Reports.

1. For removal SUs (e.g., SU3, SU5, SU8, SU10, and part of SU2): Surveys must be conducted at a minimum frequency of documenting pre-excavation, post-excavation, and post-backfill.

   a) If the Seller elects to partially backfill any of the SUs prior to the full completion of excavation, the Seller must conduct surveying at the maximum extents of excavation and may be required to conduct multiple surveys to document conditions. The Seller must compile an aggregate surface of the full extent of excavation for the Company.

   b) Do not place backfill materials in an SU until the excavation activities in that SU have been accepted as complete by the Company. Acceptance will include an inspection of the excavation and review of completed required surveys.

2. For landfill caps: Perform surveys documenting pre-construction and post-waste grading elevations, the thickness of each aggregate cap layer (or some other

Company-accepted Quality Control method to verify that the minimum thicknesses are achieved), and the final cap surfaces including ditches.

B. Progress Surveys will be used to determine progress payment quantities for pay items listed on the Bid Form, as measured by survey.

3.05 SEASON 2 BASELINE SURVEY

A. The Seller must conduct a Season 2 Baseline Survey before starting Work for the second season. The Season 2 Baseline Survey must include East Landfill Nos. 1 and 2.

B. Requirements associated with the Pre-Construction Survey also apply to this survey.

3.06 AS-BUILT SURVEYS

A. Upon physical completion of the Work, and in support of the Seller's Request for Substantial Completion, the Seller must submit an As-Built Survey for each component of Work within each SU (e.g., upon completion of excavation, completion of each backfill type), where stormwater infrastructure has been installed, where the PRB has been installed, and where all other land-disturbance activities have been conducted (e.g., ditches, regrading). As-Built Surveys must show dimensions, locations, angles, and elevations of the Work and provide a summary of volumes of materials excavated or backfilled/placed.

B. The As-Built Survey must include all aspects of the Work including, but not limited to, the following:

1. All changes in grades

2. Final post-excavation and post-backfill elevations and horizontal extents in areas where material was removed from SU3, SU5, SU8, SU10, and SU2

3. As applicable, horizontal and vertical extents of locations where Waste Material was not excavated

4. Final post-waste placement elevations and horizontal extents of the final caps constructed for each of the On-Site Landfills, including extents of GCL placement

5. Horizontal and vertical extents including slope grades of ground improvement and perimeter berms within East Landfill No. 1

6. Horizontal and vertical extents of PRB installation

7. Utility system locations, grades, and elevations, including rim and invert elevations of all structures and the location and elevation of all valves and fittings

C. Surveys must be submitted in electronic Autodesk Civil3D 2022 *.dwg file format, including a DTM. Seller must also provide a printout in *.PDF format of all surveys that

includes contour lines and labels, Site features, a scale bar, north arrow, extents of SUs, and a legend.

D. The Company will check the Seller's As-Built Survey and report any discrepancies to the Seller for resolution as part of the Substantial Completion Punch List.

E. Prior to issuance of the Certification of Substantial Completion, discrepancies must be corrected and resurveyed, and the As-Built Survey must be updated and resubmitted.

END OF SECTION

SECTION 01 74 19
WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the management, recycling, transport, and disposal of solid waste generated during execution of the Work. These materials may include, but not be limited to, the following:

1. Recyclable scrap metal and wood may be included with the material excavated from SU8 and SU10. This material must be sorted, as practicable, and transported to Staging Area for inspection and evaluation for off-site recycling.

2. As the excavation of SU8 and SU10 progresses, large concrete blocks and other angular Waste Materials may be generated. These materials will need to go off site if they are too close to the surface of the East Landfill No. 1 and would protrude above the surface of the landfill into the overlying cover material.

3. If the extent of proposed excavations exceed the receiving capacity of the proposed landfills, the excess material will need to be disposed of off site at a Company-approved landfill.

4. Excess soils from the PRB installation and infrastructure improvements (e.g., pump stations and force mains) must be stockpiled and characterized by the Seller. Based on the results, the Seller will be directed to transport the material to a Company-approved off-site landfill or be stockpiled on-site for future Company reuse. On-site reuse is discussed in the On-site Media Management Plan included for reference in Appendix C.

5. Excavated material removed from SU9, SU11, and diesel AST area must be stockpiled and characterized by the Seller. Based on the results, the Seller will be directed to transport the material to a Company-approved off-site landfill.

6. Salvaging, recycling, and disposing of other construction waste (e.g., excess construction material, demolition waste, labor-generated waste).

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 02 71 00 – Water Management and Treatment

C. Section 02 41 00 - Demolition

D. Section 31 11 00 – Clearing and Grubbing

E. Section 31 20 00 – Earthwork

1.03 REGULATORY REQUIREMENTS

A. Conduct construction waste management activities in accordance with RCW 70.95.240 and all other applicable laws and ordinances.

1.04 SUBMITTALS

A. Seller must prepare and submit a Waste Management and Disposal Plan as part of the Construction Work Plan, in accordance with Section 01 33 00 – Submittal Procedures.

B. Weight tickets and manifests or bills of lading for all material transported off site for disposal, submitted with Application of Payment.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Unless specified elsewhere in this Contract, recycle or waste material must be removed the site in accordance with local, state and federal regulations. The Seller will be responsible for all profiling, manifesting, bills of lading, and transportation.

B. The Seller shall reuse, recycle, compost, or mulch as many demolition and yard waste materials as is feasible and cost-effective. The Seller shall coordinate all reuse and recycling operations with the ARP. These operations will be separate from areas used for management of waste materials.

C. Salvaged parts or materials remain the property of the Company, unless specifically specified otherwise, and must be protected from damage while in the possession of the Seller.

D. Burning, burying, or otherwise disposing of rubbish or Waste Material on site is strictly prohibited.

E. Disposal of Waste Material within the area cleared, a river, stream, wetland, or other waterway or waterfront is strictly prohibited.

F. Remove waste materials, material for recycling, and debris from the Site at frequent intervals so that its presence will not delay the progress of the Work or create unsafe or unsanitary conditions.

G. Classification and potentially recyclable material, and clearing and grubbing activities will be considered as the Work occurs in coordination with the Company.

3.02 TRANSPORTATION OF MATERIAL

A. Soil, groundwater, subsurface debris, and waste removed during excavation will not be taken off site for any reason without prior approval from the ARP.

B. The Contactor must coordinate with the Company for the on-site collection and proper accumulation of Seller-generated dangerous waste. The waste will be characterized by the Seller. The Seller must have a qualified person available on site to designate such wastes. The Seller will be responsible for the shipment of Seller-generated dangerous waste in accordance with all applicable regulations. The Company will bear the cost of such disposal.

C. The following landfills are Company approved for waste transport, at the direction of the ARP:

1. Waste Management's Hillsboro Landfill (Solid Waste), 3205 SE Minter Bridge Rd #5350, Hillsboro, OR 97123

2. Waste Management's Columbia Ridge Commercial Landfill (Dangerous and Hazardous Waste), 18177 Cedar Springs Ln, Arlington, OR 97812

3.03 RECYCLED MATERIALS

A. As part of the excavated Waste Material, solid waste, such as scrap metals and wood, may be separated, as practicable, for potential recycling. The exact quantity, type, and condition of solid wastes will be determined in the field by the Seller.

B. Concrete and bricks generated as part of the excavated Waste Material are likely to contain regulated Waste Material and must be considered waste. These will be disposed of in the designated on-site landfills, unless it is necessary to refrain from placing large, angular materials in the upper layers of the landfill for concerns of cover stability/puncture potential, at which point the Seller will notify the ARP and may be required to dispose of this excess waste at an off-site landfill.

C. The Seller must clean and stockpile materials that are suitable for recycling at the Seller Staging Area. Scrap metal and wood recyclable material does not require decontamination; however, it must be reasonably free of soil, as achieved through physically removing excess soil and/or rinsing with clean water.

D. The Company will inspect the stockpiled material for recycling and accept the material as suitable for recycling prior to the Seller taking the material off-site for recycling. Inspection of solid wastes to be removed from the Site for recycling purposes will consist of visual inspections to verify that all Waste Material and potentially contaminated soils have been removed from the material to be recycled prior to transporting off site. If Waste Material or potentially contaminated material is observed, the Company will direct the Seller to further clean the debris prior to transporting off site and reinspect the results of the additional cleaning prior to transport. Seller must have written authorization from the ARP prior to any material being removed from the Site and provide sufficient notice to the ARP for inspection prior to removing any material from the Site.

E. The Seller must legally transport materials to a transfer station or disposal facility that can legally accept the materials for the purpose of recycling.

3.04 CLEARED AND GRUBBED MATERIALS

A. Clearing and grubbing must occur in accordance with Section 31 11 00 – Clearing and Grubbing

B. Cleared and grubbed material removed from SUs must be stockpiled and recycled or disposed of by the Seller. The Seller will be responsible for the transportation of this material to the recycler or landfill. The Company will bear the cost of such disposition.

C. Seller shall maximize recycle, composting, or mulching of trees removed from regrading of the U-Ditch.

3.05 ADDITIONAL MATERIAL WITH POTENTIAL CONTAMINANTS

A. The Seller may encounter additional generated soil material with known or suspected contaminants that has not been identified in the SUs shown on the Drawings, including but not limited to materials excavated as part construction of the PRBs or infrastructure improvements (e.g., installation of the force main pipes, pump stations, or related structures). This additional material may also consist of excess material that exceeds the receiving capacity of the proposed landfills. If excess material is anticipated based on excavations, the Seller must notify the ARP to determine how to proceed.

   1. The Seller must stockpile material removed from these areas with known or suspected contaminants at an approved Staging Area for characterization to determine the material's potential for reuse or off-site disposal.

   2. Characterization of additional material will be performed by the Seller.

   3. Upon the completion of characterization, the Seller must dispose of, or place for reuse, the material as directed by the Company. The Company will bear the cost of such disposition.

B. If the Seller encounters unanticipated materials or wastes while excavating the SUs, e.g., drums or other potential hazardous Waste Material, the Seller must notify the Company immediately to determine the appropriate course of action for the encountered material.

3.06 OBJECTIONABLE MATERIALS

A. As part of the execution of the Work, the Seller is anticipated to generate garbage and other materials ("objectionable materials"). These materials could include but are not limited to sediment controls, miscellaneous refuse, spent gravel, PPE, and demolition materials in support of utility connections. The Seller must dispose of these materials at an off-site landfill or disposal facility accepted by the Company.

B. No objectionable materials are to be placed in the landfills or disposed of anywhere on the Site.

C. As part of the Construction Work Plan, the Seller must provide written documentation of their disposal plan for objectionable materials, including information on how and where material will be disposed of. The disposal plan is subject to the ARP's approval.

D. The Seller must ensure regulated material is not inadvertently or purposely mixed in with objectionable materials for disposal.

3.07 RECEPTACLES

A. Receptacles must be used to store recycled material and Seller-generated wastes (objectional materials; e.g., garbage or spent silt curtains). Receptacles must meet the following requirements:

1. All drop boxes, bins, totes, and cans located in areas exposed to wind or precipitation must be equipped with metal, canvas, or plastic covers. Drop boxes, bins, totes, and cans must be kept closed at all times, except when adding material.

2. Where possible, large receptacles such as drop boxes, bins, and totes must be placed on an impervious area such as concrete or asphalt pavement at locations away from traffic, rail, storm drain inlets, ditches, or other conveyances.

3. If any receptable is observed to be leaking any liquid, the Seller will immediately take action to contain the leakage.

4. Discarding of aerosol cans, used oil, paints, solvents, or any dangerous waste into a solid waste receptacle is strictly prohibited.

5. Ensure that all recyclable and solid waste receptacles are kept closed/covered, are not overfilled, are not leaking, and general housekeeping is performed in the area.

6. All recyclable and general solid waste hauled must be secured prior to leaving the Site so that no waste material blows out, falls out, or leaks out during transportation to the designated off-site location.

3.08 DECONTAMINATION WATER

A. Decontamination water generated by cleaning solid waste from recycled material, decontamination of equipment, or incidental to other cleaning activities will be managed in accordance with Section 02 71 00 – Water Management and Treatment.

END OF SECTION

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. This section includes information and requirements regarding Substantial Completion, Punch List procedures, Final Completion, Record Documents, and Warranties.

B. The Seller must ensure that all procedures and actions identified in this section and elsewhere in the Contract Documents necessary to fully complete the Work are accomplished in a timely and effective manner. Lack of compliance with the closeout requirements will result in delays to any or all of the milestones identified herein.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 71 23 – Surveying

1.03 CLOSEOUT SUBMITTALS

A. Closeout Submittals, as described in this section, include Project As-Built Documents, Record Documents, Contract Documents with Change Orders, and O&M Manuals. Submittals must be provided in accordance with Section 01 33 00 – Submittal Procedures.

1.04 SUBSTANTIAL COMPLETION AND PUNCH LIST PROCEDURES

A. Seller must notify the ARP in writing that the Work is Substantially Complete within 20 calendar days of completion of the Work.

B. The Seller must within its Request for Substantial Completion:

1. Provide the As-Built Survey in accordance with Section 01 71 23 – Surveying.

2. Document that Work has been tested and inspected during construction.

3. Document that Work is complete in accordance with Contract Documents and ready for the Company’s final inspection.

C. Upon receipt of the Seller’s Request for Substantial Completion, the Company will promptly inspect the Work, and if the Company does not agree that the Work is substantially complete, they will prepare a Punch List (list of items to be completed or corrected).

1. The Company reserves the right to add to, modify, or change the Substantial Completion Punch List as circumstances dictate.

2. Failure by the Company to include any items on such list does not alter the responsibility of the Seller to complete or correct the Work in accordance with the Contract.

D. At the Seller's request, the ARP will identify those Punch List items that must be completed or corrected in order for the Seller to achieve Substantial Completion.

1. When the ARP determines that those Punch List items have been completed or corrected by the Seller, the Company will make a determination that the Work is Substantially Complete.

2. A certificate of Substantial Completion will be issued by the Company, which will establish the date of Substantial Completion.

3. This certificate of Substantial Completion will state the responsibilities of the Company and the Seller for security, maintenance, utilities, damage to the Work, insurance, and the time to complete remaining Punch List work before liquidated damages begin to accrue for the Seller's failure to achieve Final Completion in a timely manner.

E. Within 5 days of achieving Substantial Completion, the Seller must:

1. Allow the Company's full and unencumbered use of the Work, including access to utilities.

2. Make arrangements for final changeover of locks, keys, gates, and other access restriction measures consistent with removal of the Seller's personnel from the Project Site.

3. Deliver tools, spare parts, extra stock of materials, and similar physical items to the Company in accordance with requirements of the Contract Documents.

1.05 FINAL COMPLETION, FINAL ACCEPTANCE, AND PAYMENT

A. All remaining items that were not corrected prior to Substantial Completion must be successfully completed by the Seller prior to Seller's request for Final Acceptance. When the Seller considers that all Contract Work is ready for final inspection and Final Acceptance, the Seller must provide written notice to the ARP.

B. The ARP and the Seller will follow procedures in the Contract for determining Final Completion, Final Acceptance, and Final Payment.

C. The Seller must submit to the ARP the following documentation 21 calendar days before Final Acceptance unless noted otherwise:

1. Final Affidavit of Amounts Paid

2. Final, complete Record Documents following issuance of Certificate of Substantial Completion.

3. Final Application for Payment.

4. In addition, complete the following:

    a) Complete Project Site cleanup.

    b) Complete all remaining obligations as set forth within this section.

1.06 PROJECT AS-BUILT DOCUMENTS

A. Provide As-Built Drawings electronically in Autodesk Civil3D 2022 *.dwg file format. Provide other Project closeout submittals in format acceptable to ARP (e.g., PDF, paper hard copy).

B. Provide an O&M Manual for each installed system. Each O&M Manual must include, at a minimum:

1. Fly sheet: Project title; Company's name; manufacturer's name, address and telephone number; and local supplier or representative's name, address, and telephone number

2. Parts list and bill of materials, complete with manufacturer's part or serial numbers and contact information for parts supply

3. Preventative and periodic maintenance summary

4. Operating instructions

5. Overhaul and parts replacement instructions

6. Source for parts

7. Testing and troubleshooting procedures

8. Factory test data

9. List of recommended spare parts

10. Warranty information

C. Seller must red-line the Project As-Built Drawings and Technical Specifications on a weekly basis concurrent with construction progress. The Seller must supply a red-line of the Record Documents that must address all additions and modifications to the original Contract Documents as follows:

1. Technical Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

    a) Manufacturer's name and product model and number.

b) Product substitutions or alternates used.

c) Changes made by Addenda and modifications.

2. Record Documents and Drawings: Legibly mark each item to record actual construction including (as applicable):

a) Measured horizontal and vertical location of underground utilities and appurtenances reference to permanent surface improvements.

b) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

c) The Seller must record the utility locations on the Record Drawings.

d) Field changes of dimension and detail.

e) Details not on original Contract Documents.

D. Submit the following items to the Company no later than 10 working days after Final Completion of the Work:

1. One scanned version complete set of field changes of dimension and detail

2. One electronic version of finalized As-Built Drawings

3. One complete set of finalized Project Record Specifications

4. One complete set of Contract Documents, including approved Change Orders

5. One electronic version set of O&M Manuals

1.07 FINAL CLEANING

A. Upon completion of the Work and prior to final inspection, the Seller must decontaminate and remove all of its equipment, signs, facilities, construction materials, and trash from the Site and perform any other reasonable clean-up activities requested by the ARP. All disturbed areas must be revegetated or otherwise put into a condition satisfactory to the ARP.

1.08 WARRANTIES

A. Provide manufacturer's warranties and installation warranties as required by other Technical Specification sections.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for demolition and removal of structures and foundations and removal or in-place decommissioning and capping of utilities shown on the Drawings.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 74 19 – Waste Management and Disposal

C. Section 31 20 00 – Earthwork

1.03 REGULATORY REQUIREMENTS

A. 29 CFR Part 1926: Safety and Health Regulations for Construction

B. WAC 296-155 Part S: Demolition

1.04 SUBMITTALS

A. Submit a Demolition Plan, as part of the Construction Work Plan, in accordance with Section 01 33 00 – Submittal Procedures.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. The Seller must remove, abandon, relocate, decommission or modify all pipes, fittings, foundations, structures, fences, utilities, and other obstructions as indicated on the Drawings, as necessary to complete the Work and as reviewed by the ARP.

B. Perform demolition work in accordance with approved Demolition Plan, as well as 29 CFR 1926, with particular attention to requirements to Subpart T, “Demolition” and WAC 296-155 Part S: Demolition. Demolish and remove existing construction only to the extent required, and as indicated in the Contract Documents.

C. The Seller must field-verify the location of the facilities, including but not limited to utilities and structures, prior to any excavation. Seller is advised that the Drawings may not show all utilities and structures in the areas of construction and that location, depth and condition of

utilities and structures may not be as shown or implied. The Seller must communicate with the ARP to ensure that all utilities have been disconnected, abandoned, or de-energized before removal. The Seller must field-verify that the disconnection, abandonment, or de-energization work has been completed.

D. If suspected hazardous materials or unexpected structures such as underground storage tanks or asbestos cement pipe are encountered, the Seller must stop work and notify the ARP immediately for further direction.

E. The Seller must demolish all utilities within SUs or ditches to be modified and other areas that will be excavated or otherwise altered by the Work, as shown on the Drawings, and obtain acceptance from the ARP that demolition is complete prior to starting earthwork, excavation, or regrading in those individual SUs, ditches, or areas.

F. The Seller must demolish and remove the control structure that currently houses the control and power supply panels for Pump Station 004, as shown on the Drawings, prior to clearing and grading of the ditches adjacent to East Landfill No. 1. The Seller must also remove conduits, wiring, and other equipment associated with Pump Station 004 and provide temporary power and controls to Pump Station 004 while permanent controls and power supply to the pump station are being constructed. Pump Station 004 must remain in operation throughout the duration of the Work.

G. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

H. Remove materials, waste, and debris from the Site at frequent intervals so that its presence will not delay the progress of the Work or create usage or unsanitary conditions.

I. Any useable parts or materials removed or replaced by the Seller remain the property of the Company, unless specifically specified otherwise. Recycle material to the extent feasible and practicable in accordance with Section 01 74 19 – Waste Management and Disposal.

J. Dispose of demolished materials per Section 01 74 19 – Waste Management and Disposal.

3.02 PREPARATION

A. Conduct demolition operations to prevent injury to people. Ensure safe passage of people around demolition area.

   1. Provide temporary barricades and other forms of protection as required for safety and security.

B. Conduct demolition operations to prevent damage to adjacent structures and facilities to remain.

C. Protect existing Site improvements, appurtenances, and landscaping that are designated to remain in place.

D. Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of the structures and adjacent facilities that are not part of demolition.

3.03 STRUCTURAL DEMOLITION

A. Structures identified for demolition on the Drawings must be demolished and removed from the Site.

1. Demolish the pump structure and associated utilities at the cryolite ditch.

2. Demolish concrete electrical sheds/structures that house the Pump Station 004 controls and electrical equipment adjacent to SU7 prior to regrading of the ditch along Berth Road.

3. Remove the catwalk over drainage ditch adjacent to SU7.

B. Where existing culverts and other structures to be removed coincide with excavation, the earthen material must be removed in accordance with Section 31 20 00 – Earthwork.

C. Unless determined as unsalvageable by the Company, all items designated for salvage must be removed with care to prevent damage.

D. Dispose of demolished materials per Section 01 74 19 – Waste Management and Disposal

3.04 CAPPING AND REMOVAL OF EXISTING UTILITIES

A. Existing utilities must be removed as indicated on the Drawings.

1. Remove the aboveground former leachate pipe, located between the Closed Black Mud Pond Facility and the U-Ditch, prior to U-Ditch reconfiguration.

2. Remove the leachate pump. Removal must occur prior to U-Ditch reconfiguration.

3. Remove piping within SU3 at the time of excavation, and remove or plug culverts within SU4 prior to placing reactive backfill.

4. Remove culverts from the drainage ditch adjacent to SU7.

5. Remove culvert at the western end of the north leg of the U-Ditch during regrading and filling activities.

6. Remove a portion of the existing aboveground 006 Reroute Pump Station discharge line prior to U-Ditch reconfiguration.

B. Provide adequate means of support and protection during removal operations for utilities that are to remain in service.

C. Utilities to be removed beneath railroad tracks must be removed by excavating below and without removing or displacing railroad tracks to the extent feasible.

D. Power poles and power lines must be removed as shown on the Drawings. Unless deemed unsalvageable by the Company, power poles must be removed with care to prevent damage.

1. Remove power poles (6) and power line associated with leachate pump at time of leachate pump and piping removal.

2. Remove power poles (4) and power lines within and adjacent to SU5 prior to excavation of SU3, SU4, and SU5.

3. Remove portions of power line and power poles (4) between SU3 and Berth Road that supplied Pump Station 004 prior to installation of the East Landfill Pump Station as shown on the Drawings.

4. Remove buried power along northwestern edge of SU7 prior to ground-disturbing activities and soil mixing stabilization work.

5. Remove transformer box near Pump Station 004.

E. Lighting identified for removal must be disconnected and removed, including foundations and associated wiring.

F. Remove staff gauges within the U-Ditch, SU4 and SU5 and adjacent to SU6 at the time of excavation.

G. Where shown on the Drawings or where designated by the Company, existing utility structures such as pipes and culverts must be cut at ditch lines, and the ends must be plugged for a distance of at least two diameters with concrete. Inlets to structures that are to be abandoned must be considered pipe ends and plugged in a similar fashion. Care must be used in placing the concrete in the pipe to ensure that the opening of the pipe is completely filled and thoroughly plugged.

1. Culverts and pipes within and adjacent to SU4 and SU5 must be capped and plugged prior to backfilling with reactive backfill.

3.05 SURVEYING

A. Provide surveyed coordinates (x, y, z) of all objects and structures decommissioned in place. The survey must be sealed by a licensed Professional Land Surveyor and include, but not be limited to, the following:

1. Utility conduits abandoned in place

2. Foundations or utility piles abandoned in place

3.06 ACCEPTANCE

A. The Seller retains all responsibility for the removal of structures and obstructions until written acceptance by the Company.

B. The Company will accept the removal of structures and obstructions when:

1. The removal is complete;

2. Verification that the quality control requirements of this Technical Specification have been achieved;

3. Documentation of removal is complete; and

4. Required surveying is complete and submitted.

END OF SECTION

SECTION 02 71 00
WATER MANAGEMENT AND TREATMENT

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the management (collection and conveyance) of water generated during execution of the Work.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 50 00 – Temporary Facilities and Controls

C. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

D. Section 01 64 00 – Company-Furnished Products

E. Section 31 23 19 – Dewatering

1.03 REFERENCES

A. NPDES Waste Discharge Permit No. WA0000086, March 1, 2018

B. *Remediation Water Management Plan*, Appendix K to the Final Revised EDR

1.04 SUBMITTALS

A. The Seller must submit a Water Management Plan as part of the EPP in accordance with Section 01 33 00 – Submittal Procedures.

1.05 WATER MANAGEMENT

A. The Site has an NPDES individual permit that requires all construction-related water generated in the remediation areas to be collected and treated. Water to be collected and conveyed by the Seller during the cleanup action includes dewatering, remediation, and decontamination water. The Seller will be responsible for collecting all water generated as part of the Work and conveying that water to temporary storage at Facility 77. Once this water is conveyed to Facility 77, the Company will be responsible for characterization and treatment.

    1. Remediation Water is defined in the NPDES permit as follows: “contaminated groundwater from the upper shallow water bearing zone of the east and west groundwater areas and stormwater that comingles with contaminated groundwater and/or contaminated soils.”

a) The east groundwater area will be accessed during the following construction: East Landfill Nos. 1 and 2, waste excavation at SU3, and east side stormwater infrastructure installation, including the pump station and the force main.

b) The west groundwater area will be accessed during the following construction: the West Landfill, the PRBs, and west side stormwater infrastructure, including the pump station and force main.

c) There may be other construction that also generates Remediation Water, but it is known that Remediation Water will be generated during these construction activities.

2. Because of the areas of Work, the Seller must collect and convey all water generated during the project to the Facility 77 temporary water storage area, regardless of whether the activity is specified herein.

3. Anticipated types of water to be managed:

a) Dewatering Effluent: Any effluent that is generated from dewatering of excavations as part of execution of the Work.

b) Remediation Water: Groundwater accessed during the Work or stormwater that contacts site soils or groundwater during the Work within the east and west groundwater areas, as defined above. This will include groundwater accessed or stormwater that contacts exposed Site soils between construction seasons, in the case of East Landfill Nos. 1 and 2, which will not be fully closed until Season 2 and will create an exposure to stormwater that will contact area groundwater.

c) Decontamination Water: Water used to decontaminate equipment and materials used during construction that comes in contact with site soils, waste, groundwater, and stormwater that has contacted Site soils, waste, or groundwater.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 WATER DURING CONSTRUCTION

A. General

1. The Seller must provide all means and methods for capturing and conveying all dewatering effluent, Remediation Water, and decontamination water generated during the Work. The captured water must be conveyed by the Seller to existing storage tanks at Facility 77 for characterization and treatment by the Company.

B. Facility 77 Extension

1. The Contactor must furnish and install at least 1 million gallons of temporary supplemental water storage as an extension to existing storage tanks at Facility 77.

    a) The supplemental water storage can consist of Baker tanks, aboveground storage ponds, or another means of water storage proposed by the Seller.

    b) The Facility 77 extension will be located by the Seller at the former sandblast area, west of Facility 77, as shown on the Drawings.

    c) The Seller will be responsible for installing temporary piping to convey overflow from the Facility 77 storage tanks to the Facility 77 extension and temporary pumps and piping needed to convey water stored in the Facility 77 extension back to the Facility 77 storage tanks.

C. Water Collection and Conveyance

1. Collection and conveyance of water will require temporary infrastructure that must be provided by the Seller. The Seller also may use existing infrastructure, such as the existing stormwater line that extends to the Facility 77 storage tanks from the west groundwater area, to convey water from the west groundwater area to the Facility 77 water storage area. The Seller may also use new permanent infrastructure being constructed as part of this project, such as the East Landfill Pump Station (ELF Pump Station) and force main, to convey water to the Facility 77 water storage area. These facilities are shown on the Drawings. New facilities to be used to convey water during construction must be installed at the beginning of the Work and then used to convey water during excavation and landfill construction.

2. The Drawings and Section 01 64 00 – Company-Furnished Products describe the Company-furnished equipment and materials that may be used for water collection and conveyance during construction.

3. The Drawings and Technical Specifications also describe construction sequencing that must be implemented to allow new facilities, including the ELF Pump Station and force main, to be operational in time for use as part of the Seller's Water Management Plan.

4. The Seller is responsible for managing, collecting, and conveying all water generated during the Project. The construction activities that are expected to generate water include, but may not be limited to, the following:

    a) East Side Dewatering Activities:

        1) The Seller will be responsible for dewatering excavations associated with constructing the ELF Pump Station. The Seller will be responsible for furnishing and installing temporary pumps, pipes, cofferdams, sheeting, and other equipment needed to dewater excavations, as needed to construct the ELF Pump Station, in accordance with Section 31 23 19 – Dewatering. The estimated pumping rate for dewatering of these excavations based on an

excavated depth to -4 feet North American Vertical Datum of 1988 (NAVD88) for the ELF Pump Station installation is between 30 gallons per minute (gpm) and 50 gpm depending on the groundwater elevation at the time of excavation.

2) The Seller will also be responsible for dewatering trenches and excavations associated with constructing the force main that will deliver water from the ELF Pump Station to Facility 77. The Seller will be responsible for furnishing and installing temporary pumps, pipes, cofferdams, shoring, and other equipment needed to dewater the trenches and excavations for the force main and appurtenances, in accordance with Section 31 23 19 – Dewatering. The estimated pumping rate for dewatering of these excavations based on the force main alignment, depth, and placement is 5 gpm.

3) The pumping rates presented in this section must be considered estimates only. The Seller must be prepared to manage water in excess of these rates as needed to perform the Work in accordance with the Technical Specifications.

b) East Side Stormwater That Becomes Remediation Water:

1) During the excavation and consolidation work of the East Landfills, groundwater will be accessed, and waste and impacted soils will be exposed. Stormwater that comes in contact with these media will become Remediation Water. To collect and convey this Remediation Water, the Seller must install and make operational the following:

a. The ELF Pump Station force main and related appurtenances, including temporary and permanent valves shown on the Drawings

b. The ELF Pump Station or other temporary pumping capable of delivering all remediation water collected from areas disturbed in the east groundwater area, including from landfill construction, through the East Landfill force main to the storage tanks at Facility 77

c. A temporary cofferdam or culvert plug, near the northeast corner of East Landfill No. 1, upstream of Pump Station 004, so that the water collected in the existing ditches can be managed as Remediation Water. The ditches will also require slight grading, as shown on the Drawings, for proper drainage.

2) Remediation Water must then be conveyed from the east side to existing thickener storage tanks at Facility 77 by the Seller. See Article 3.02 for additional requirements for the collection and conveyance of Remediation Water between construction seasons.

c) West Side Dewatering Effluent Activities

1) The Seller will be responsible for dewatering excavations associated with constructing the West Landfill Pump Station (WLF Pump Station). The Seller will be responsible for furnishing and installing temporary pumps, pipes, cofferdams, sheeting, and other equipment needed to dewater excavations, as needed to construct the WLF Pump Station, in accordance with Section 31 23 19 – Dewatering. The estimated pumping rate for dewatering of these excavations based on an excavated depth to 0 feet NAVD88 for the WLF Pump Station installation is between 15 and 25 gpm depending on the groundwater elevation at the time of excavation.

2) The Seller will also be responsible for dewatering trenches and excavations associated with constructing the force main that will deliver water from the WLF Pump Station to Facility 77. The Seller will be responsible for furnishing and installing temporary pumps, pipes, cofferdams, shoring, and other equipment needed to dewater the trenches and excavations for the force main and appurtenances, in accordance with Section 31 23 19 – Dewatering. The estimated pumping rate for dewatering of these excavations based on the force main alignment, depth, and placement is 5 gpm.

3) The pumping rates presented in this section must be considered estimates only. The Seller is responsible for performing any necessary field tests to verify these pumping rates. The Seller must be prepared to manage water in excess of these rates as needed to perform the Work in accordance with the Technical Specifications.

d) Installation of PRBs

1) The Seller must manage all water that is generated as part of the installation of the PRBs. The Seller must collect all groundwater that is displaced as part of the PRB installation process and convey the water to Facility 77.

2) PRBs will be installed during construction Season 2. It is estimated that no significant volume of water will be generated through the use of One-Pass Trenching for installation of the PRBs.

3) If the Seller elects to use a different method for installation of the PRBs and that method is accepted by the Company, the Seller would be required to determine how much dewatering effluent would be generated as part of the installation and how to get the water to the Facility 77 water storage area, and the Seller must coordinate with the Company to make sure that water volumes can be managed in conjunction with other Site water being managed in Facility 77.

e) West Side Stormwater That Becomes Remediation Water

1) During the excavation and consolidation work of the West Landfill, groundwater is not expected be accessed; however, if a storm occurs during the

excavation and consolidation of SU2, waste and impacted soils will be exposed to stormwater. Stormwater that comes in contact with these media will become Remediation Water. To collect and covey this Remediation Water, the Seller must install the following:

a. The perimeter ditch north of the West Landfill, as shown on the Drawings. Excavation and consolidation of SU2 cannot begin until the perimeter ditch has been constructed.

b. During the excavation and consolidation of SU2, the Seller will collect water at the northeast corner of the perimeter ditch located between the West Landfill and the U-Ditch. The Seller must pump this water to the Facility 77 water storage area.

c. The Seller may elect to use the existing stormwater line for conveyance to Facility 77. This line is in close proximity to the southeast corner of the Closed Black Mud Pond Facility and discharges to the existing Thickener Tank No. 3 at Facility 77. Connection from the West Landfill to this line will be made by the Seller.

d. Once the West Landfill is capped, there should be no further exposure of stormwater to waste or impacted soils, and the management of west side Remediation Water should conclude.

D. Decontamination Water

1. The decontamination station where decontamination will accumulate must be in accordance with Section 01 50 00 – Temporary Facilities and Controls.

2. The Seller must procure a containment system capable of holding, at a minimum, a volume equal to 2 weeks of effluent generated from active use of the decontamination system.

3. The decontamination station water must be conveyed to the Facility 77 water storage area by the Seller.

3.02 WATER BETWEEN CONSTRUCTION SEASONS

A. Remediation Water management on the east side will be required during all of construction Season 1, between the two construction seasons, and for most of construction Season 2.

B. The Seller must continue to convey water to Facility 77 water storage area as shown on the Drawings between construction seasons until the perimeter ditches, roadside ditch reconfiguration, and low permeable caps are installed over the East Landfills. Once the ditches and capping are complete and final connections are made to the new pump station, the Seller will remove the temporary dam near Pump Station 004 and decommission the batch system extension at the former sandblast area.

3.03 RESTORING WATER MANAGEMENT FOLLOWING CONSTRUCTION

A. As shown on the Drawings, the new stormwater conveyance facilities that will be constructed at the beginning of the Work to convey water from the east and west groundwater areas during construction include isolation valves to prevent east side Remediation Water from contacting the force main pipelines from the West Landfill and the connection to Outfall 002A. The isolation valves also allow for the hydrostatic pressure testing of these two pipelines.

B. The valves must remain locked shut throughout the use of the East Landfill force main and related appurtenances for Remediation Water management and will be temporarily routed to Facility 77 until the permanent system has been flushed.

C. The volume of water required for flushing will be approximately 100,000 gallons for each force main, yielding a total of approximately 200,000 gallons of flushing water to be managed by Facility 77.

D. The Facility 77 extension may be disassembled as long as the thickener tanks have reserve to accept the flushing water. The connection from the Facility 77 temporary valve to the Facility 77 storage tanks must remain in place until flushing is complete. Generation of the required flushing volume will be dependent on weather conditions at the time, and the ARP will notify the Seller when the connection can be removed. Once removed, the Facility 77 temporary valve will remain in place and locked shut.

END OF SECTION

SECTION 02 71 10
PERMEABLE REACTIVE BARRIERS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the performance requirements that must be achieved for installation of PRBs.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

C. Section 01 74 19 – Waste Management and Disposal

D. Section 02 71 00 – Water Management and Treatment

E. Section 31 05 16 – Soils and Aggregates

F. Section 31 05 19.13 – Geotextiles for Earthwork

G. Section 31 11 00 – Clearing and Grubbing

H. Section 32 90 00 – Hydroseeding

1.03 REFERENCES

A. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

B. OSHA Part 1926 (Safety and Health Regulations for Construction), Subpart P (Excavations)

C. OSHA Pamphlet 2226, Trenching and Excavation Safety

1.04 SUBMITTALS

A. The Seller must submit a PRB Design Plan as part of the Construction Work Plan in accordance with Section 01 33 00 – Submittal Procedures.

1.05 QUALITY CONTROL

A. The Seller must provide the Company samples of the PRB Media at a rate of one sample for every 150 cubic yards of PRB Media placed in situ. The Company will test the samples to verify that the minimum percentage of Activated Alumina is included in the mix. The Company will report the results to the Seller on a daily basis.

B. The Seller must be able to adjust the ratio of reactive media and non-reactive aggregate in real time based on the results of the verification sampling to ensure the minimum percentage of reactive materials are placed within the trench.

C. The Seller must coordinate with the Company to allow for a pre-production test of the mixing equipment prior to PRB installation, such that the Company can perform multiple tests of the blended reactive media to verify the minimum percentage. The Company will discuss the results of the testing in real time during this day, and the Seller must make adjustments to the ratio of reactive media and non-reactive media based on the results. It is intended that the Company will conduct three separate tests during the pre-production testing phase to verify the mixture.

D. PRB thickness will be verified by the Seller by tracking the backfill quantity and linear length of PRB installed.

E. The Seller must survey final elevations of all earthen backfill material placed above the PRB to ensure design elevations have been achieved.

PART 2 PRODUCTS

2.01 MEDIA

A. Aggregates and PRB Media used in the PRB must conform to the Technical Specifications outlined in Section 31 05 16 – Soils and Aggregates.

B. The Geotextile Type 2 placed above the PRB must conform to the Drawings and Section 31 05 19.13 – Geotextiles for Earthwork.

PART 3 EXECUTION

3.01 GENERAL

A. The Seller must provide a base bid employing trenchless technology (e.g., Dewind One-Pass Trenching), but the Seller may propose alternate trenching or installation methods that achieve the requirements of the Drawings and Technical Specifications. Any proposed alternate methods must be accepted by the Company before the Seller may proceed with the Work related to the PRBs. Alternative proposals must be submitted with the Seller's base bid.

B. All excavations, trenching, and shoring must comply with the rules and regulations as established by OSHA Construction Safety and Health Regulations, Part 1926, Subpart P, Excavations. OSHA Pamphlet 2226, Trenching and Excavation Safety, can be used as an additional aid.

C. The Seller must achieve the depths, elevations, and widths of the PRB trench as noted on the Drawings.

D. The Seller must not disturb the adjacent Closed Black Mud Pond Facility. If any signs of disturbance to the Closed Black Mud Pond Facility are observed, the Seller must stop Work immediately and notify the Company.

E. Preparation

1. The Seller must verify the location of and protect all of existing utilities, including fiber optic line and infrastructure to the south (outfall and electrical transformers) as shown on the Drawings.

2. Seller must not start clearing or grading until the proposed Work has been staked out. The Company must verify the staked extents prior to starting any soil disturbance activities.

3. The Seller must install BMPs to protect the adjacent CDID ditches in accordance with Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control. The Seller's installed BMPs must be accepted by the Company prior to any ground disturbance activities.

4. The Seller must remove and reinstate the adjacent existing fencing as part of the Work. Any damages to existing fencing must be fixed or will require replacement at no additional cost to the Company.

5. Perform clearing and grubbing prior to excavation and on-site consolidation activities, as described in Section 31 11 00 – Clearing and Grubbing.

6. Prior to trenching, the Seller may perform leveling of the ground surface to facilitate the Work. Material generated from leveling must be managed in accordance with Section 01 74 19 – Waste Management and Disposal.

F. Restoration

1. After installation of the PRB media has been accepted as complete by the Company, Seller must install a Geotextile Type 2 over the PRB media. Cover geotextile with General Backfill and fill back to pre-construction grades.

2. Place each layer of General Backfill in 8-inch lifts and compact to 80% of maximum dry density as determined by ASTM D1557. The Seller must compact backfill by means of an appropriately sized static, vibratory, or impact-type compactor suited to the soil and physical restrictions of the area to be compacted. Although the Seller is responsible for the selection of the method of compaction, selection of an inappropriate method will not relieve the Seller of the responsibility to achieve the specified result.

3. Topsoil must not be compacted.

4. As part of final Site restoration, the Seller must match pre-construction surface types (gravel or Topsoil and Hydroseed Mix No. 1) as noted on the Drawings and in

accordance with Section 31 05 16 – Soils and Aggregates and Section 32 90 00 – Hydroseeding.

G. Waste Material

1. Any excavated soils from constructing the PRBs must managed in accordance with Section 01 74 19 – Waste Management and Disposal.

2. Waste material removed during PRB installation must be stockpiled and characterized by the Seller at an approved Staging Area to determine the material's potential for reuse or off-site disposal.

3. The Seller must take precautions to ensure that no waste material, backfill materials, or other by products of the Work from entering the adjacent CDID ditches or any other adjacent surface waters.

H. Water Management

1. The Seller must manage all water that is generated as part of the installation of the PRBs. The Seller must collect all groundwater that is displaced as part of the PRB installation process and coordinate characterization and disposal with the Company. If water is generated in quantities that require management, the Seller must be responsible for temporarily storing and pumping water to on-site treatment facilities at the direction of the Company based on Company-performed characterization results. Water management requirements are described in Section 02 71 00 – Water Management and Treatment.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the furnishing and installation of miscellaneous metal for hydraulic structures and pipe appurtenances, including, but not limited to, valve boxes, debris racks, manhole frames and covers, manhole steps, piping supports, access hatches, anchor bolts, and other miscellaneous metal hardware.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 33 05 61 – Concrete Manholes

C. Section 33 44 13 – Packaged Stormwater Pump Stations

D. Section 33 44 14 – Valves for Stormwater Control

1.03 REFERENCES

A. AISC 316-89 – Manual of Steel Construction – Allowable Stress Design – Ninth Edition

B. ASME B18.2.1-1996 – Square and Hex Bolts and Screws (Inch Series)

C. ASTM Standards:

1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel

2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

4. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

5. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

6. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength

7. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength

8. ASTM A385 – Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)

9. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

10. ASTM A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

11. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts

12. ASTM A668/A668M – Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use

13. ASTM F436 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions

14. ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

D. American Welding Society, Inc. (AWS):

1. AWS D1.1/D1.1M Structural Welding Code – Steel

2. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination

E. Federal Specifications (FS):

1. FS FF-S-85C – Screw, Cap, Slotted and Hexagon Head

1.04 SUBMITTALS

A. Prior to ordering materials, submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. For the following, submit shop and fabrication detail drawings and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Indicate welded connections using standard AWS A2.4 welding symbols.

a) Manhole debris racks. Show anchorage and accessory items.

1.05 QUALIFICATION OF WELDERS

A. The Welder must be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the Work.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. The Seller must protect metal fabrications from corrosion, deformation, and other types of damage.

B. The Seller must store items in an enclosed area free from contact with soil and weather.

C. The Seller must remove and replace damaged items with new items.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Materials

1. Shapes: Standard structural sections, shapes, plates, and bars, as indicated, conforming with ASTM A36. Bars conforming with ASTM A108 will be accepted.

2. Tubing: Steel tubing, conforming with ASTM A500 or ASTM A501, of size and shape indicated.

3. Pipe: Steel pipe or round tubing, conforming to ASTM A53, Type E or S, Grade A, of diameters and sizes indicated. Pipe for sleeves and exterior locations must be galvanized pipe as specified in ASTM A53.

B. Arc-Welding Electrodes

1. Filler metal and required shielding gases or fluxes: AWS D1.1

2. Filler metal for steel, minimum tensile strength: 70,000 psi

3. Aluminum alloy filler metal: AWS classification 4043

C. Bolts, Nuts, and Washers

1. Eyebolts: Forged steel, ASTM A668, class C

2. Nuts: ASTM A563

3. Capscrews: FS FF-S-85C

4. Washers

a) For use with ASTM A325 bolts: ASTM F436

b) Unhardened for general use: ASTM F844

5. Bolts

a) ASTM A307, except for anchor bolts and stud bolts

b) Provide anchor bolts as shown on the Drawings.

c) ASTM A36 steel

d) Length of bolt threads: ASME B18.2.1

e) Thread class: 2 free-fit, American National coarse-thread series

6. Stud Bolts

a) Suitable for end welding to steel with automatically timed stud-welding equipment

D. Miscellaneous Structural Steel

1. Steel Plate: ASTM A36

2. Angles: ASTM A36

3. Other Shapes: ASTM A36

4. Galvanized per ASTM A123

2.02 ANCHORS

A. Expansion Anchors

1. American Iron and Steel Institute (AISI) Type 316 stainless steel, when submerged in water, or hot-dip galvanized

2. Self-drilling anchors, snap-off or flush type

3. Bolt length as shown on the Drawings

B. Wedge Anchors

1. AISI Type 316 stainless steel, when submerged in water, or hot-dip galvanized

2. Bolt length as shown on the Drawings

C. Stud Anchors

1. ASTM A108, deformed bar anchors and stud anchors

2. Flux-filled ends suitable for end welding to steel with automatically timed stud-welding equipment

2.03 FABRICATION

A. Metalwork must be fabricated in accordance with AISC 316 and these Technical Specifications.

1. Perform welding in accordance with AWS D1.1.

2. Grind all welds smooth.

B. If straightening is necessary, use methods that will not injure the metal.

C. After shop work completion and before galvanizing, clean material of rust, loose scale, dirt, oil, grease, slag, and other foreign substances from welded areas.

D. Galvanizing

1. Galvanize items of metalwork unless otherwise specified or shown on the Drawings in accordance with ASTM A123 and A385.

2. Galvanize bolts, nuts, washers, and lockouts in accordance with ASTM A153. Remove excess spelter or centrifugal spinning.

3. Galvanizing Repair

a) Re-dip material with damaged galvanizing unless damage is local and can be repaired by zinc primer.

b) If the galvanized coating becomes damaged after being dipped twice, material will be rejected.

c) Repair procedure where local paint repair is authorized:

1) Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.

2) Re-clean areas with solvent to remove residue.

3) Apply two or more coats of zinc primer:

a. Total minimum dry-film thickness: 4 mils

b. Zinc primer: MIL-DTL-24441/19

PART 3 EXECUTION

3.01 PREPARATION

A. Where locations and dimensions of miscellaneous metalwork shown on the Drawings are tentative and subject to change dependent upon equipment furnished, the Seller must confirm locations and dimensions prior to fabrication of miscellaneous metalwork.

3.02 INSTALLATION

A. Anchors

1. The Seller may use suitable adhesive, expansion, or wedge anchors meeting the requirements of this section in lieu of embedded anchors shown on Drawings, provided that anchors are approved by the Company.

2. The Seller must drill holes for anchors straight, true, and of the diameter recommended by the anchor manufacturer.

3. The Seller must install anchors in accordance with manufacturer's recommendations.

4. The Seller must follow manufacturer's recommendations when embedded steel or reinforcement is encountered during drilling of anchors.

5. When drilling water is used, the Seller must clean surfaces of concrete to remain exposed immediately to prevent discoloration.

B. Galvanizing Repair

1. The Seller must clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.

2. The Seller must re-clean areas with solvent to remove residue.

3. The Seller must apply two or more coats of zinc primer:

   a) Total minimum dry-film thickness: 4 mils

   b) Zinc primer: MIL-DTL-24441/19

C. Holes in Metalwork

1. The Seller must drill, or drill and tap as required, holes in metalwork required for installation.

END OF SECTION

SECTION 13 34 60
PREFABRICATED EQUIPMENT SHELTERS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for furnishing and installing prefabricated equipment shelters at each stormwater pump station for electrical and control equipment. The shelters are intended to facilitate operation of that equipment and to shield the Company's operators from rain and other elements while operating the equipment.

B. The Seller is responsible for identifying a two-post shelter that fits the general dimensions and configuration shown on the Drawings and meets the requirements of this Technical Specification, submitting fabrication Drawings and installation instructions from the shelter manufacturer to the Company for review and approval, furnishing the prefabricated shelter and all appurtenances, and installing each shelter on the reinforced concrete slab to be constructed at each pump station by the Seller as indicated in the shelter supplier's installation instructions.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 05 50 00 – Metal Fabrications

C. Section 26 00 00 – Electrical Work – General

D. Section 31 05 16 – Soils and Aggregates

E. Section 32 13 13 – Concrete Paving and Miscellaneous Concrete

F. Section 33 44 13 – Packaged Stormwater Pump Stations

1.03 SUBMITTALS

A. Prior to ordering materials, submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Fabrication drawings for a two-post shelter for each pump station, as indicated on the Drawings; the fabrication drawings should reflect the following requirements:

a) Drawings must be signed and stamped by an engineer licensed in the State of Washington.

b) Drawings must include structure plan view, elevations, and details sufficient to show all dimensions, layout, materials of construction, connections, and other fabrication information.

c) Drawings must include a list of all materials needed to fabricate the shelter.

2. Installation instructions from the shelter fabricator

3. Complete structural calculations

a) Structural calculations must be signed and stamped by an engineer licensed in the State of Washington.

b) Structural calculations must demonstrate compliance with local building codes.

1.04 GENERAL REQUIREMENTS

A. The shelter will be designed to house electrical panels, electrical equipment, and control panels, as shown on the Drawings.

B. The shelter will be designed to provide sufficient space for equipment access and removal in accordance with applicable codes and regulations.

C. The shelter must be fire resistant.

D. The shelter must include a roof with dimensions as shown on the Drawings designed to protect operators accessing the electrical panels, electrical equipment, and control panels from rain, hail, snow, and sunlight.

E. The shelter must be supported by two posts designed to be mounted at the bottom to a reinforced concrete slab, as shown on the Drawings. The shelter must be compatible with mounting on the reinforced concrete slab shown on the Drawings.

F. The shelter supplier must have experience in fabricating equipment shelters and be able to provide at least five examples of installations of prefabricated shelters that demonstrate the supplier's experience in engineering, designing, and supplying prefabricated shelters.

G. The shelter must be designed, fabricated, and constructed to meet all local building code requirements.

H. The shelter must be designed, fabricated, and constructed to meet all site-specific conditions, including wind and snow loading and seismic parameters.

I. For welded-steel shelter components, the welder must be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the Work.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. The Seller must protect shelter components from corrosion, deformation, and other types of damage.

B. The Seller must store items in an enclosed area free from contact with soil and weather.

C. The Seller must inspect all components upon delivery and compare the materials provided against a bill of materials and installation instructions provided by the shelter supplier to verify that the prefabricated shelter package is complete. The Seller must replace any damaged or missing components prior to installation of the shelter.

1.06 WARRANTY

A. The shelter supplier must provide a warranty that will be passed to the Company from the Seller against any defects in materials and workmanship for a period of at least two (2) years from the date of delivery of the prefabricated shelter package to the Site.

B. The Seller must also warranty building installation against defects and workmanship for a period of at least two (2) years from acceptance of the completed shelter.

C. The shelter supplier and the Seller must pass through to the Company all relevant warranties associated with individual products and components of the prefabricated shelter package.

PART 2 PRODUCTS

2.01 PREFABRICATED SHELTER

A. Frame and Posts

1. The prefabricated shelter must include two posts supporting a roof, as shown on the Drawings. Each post must mount to the reinforced concrete slab to be constructed at each pump station, as shown on the Drawings.

2. The Company's engineer has designed the slab and recommended anchoring of the prefabricated shelter to the slab based on the assumed structure dimensions and configuration shown on the Drawings. The shelter fabricator must review and verify that the anchoring detail provided on the Drawings is compatible with the structure to be provided and recommend an alternative mounting configuration, if the anchoring shown on the Drawing is not compatible with the structure to be provided.

3. The posts and framing for the prefabricated structure must be fabricated from one of the following materials:

    a) Steel Truss and Post Construction

        1) Steel components must meet the minimum requirements for steel materials listed below.

2) Steel must be powder-coated black, unless otherwise approved by the Company.

b) Other

1) Other materials or types of construction, such as timber frame and post construction, may be used if approved by the Company as generally conforming to the configuration and design requirements for the structure indicated on the Drawings.

B. Roofing

1. Sheet metal roofing, minimum 29-gage thickness.

2. Color to be approved by the Company.

C. Downspouts and Gutters

1. No downspouts or gutters will be required.

D. Steel Materials

1. Must meet the requirements listed in Section 05 50 00 – Metal Fabrications

E. Arc-Welding Electrodes

1. Must meet the requirements listed in Section 05 50 00 – Metal Fabrications

F. Bolts, Nuts, Washers, and Anchors

1. Must meet the requirements listed in Section 05 50 00 – Metal Fabrications

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Locate and install conduit penetrations.

B. Place and compact structural backfill, as shown on the Drawings and in accordance with Section 31 05 16 – Soils and Aggregates.

C. Furnish and place the reinforced concrete slab that will support the shelter and other equipment related to the pump station, as shown on the Drawings and in accordance with Section 32 13 13 – Concrete Paving and Miscellaneous Concrete.

3.02 INSTALLATION

A. Install each shelter according to the approved shelter fabrication drawings and installation instructions provided by the shelter supplier.

B. Install electrical and control equipment under each shelter as shown on the Drawings and in accordance with the shelter supplier's installation recommendations for that equipment.

END OF SECTION

SECTION 26 00 00
ELECTRICAL WORK – GENERAL

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Electrical Work" Work is shown in the Drawings. This Section includes general requirements for accomplishing electrical Work as specified herein and indicated on the Drawings.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NFPA 70: National Electrical Code (NEC)

B. NFPA 70 E: Standard for Electrical Safety in the Workplace

C. Power Company

D. State of Washington Dept. of Labor & Industries.

E. Underwriters Laboratories, Inc.

F. WAC 296-45

G. State requirements for highway signage, flagging, and re-routing traffic

H. State of Washington safety rules and health standards

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions.

B. Submittals shall include the following:

1. Review of Shop Drawings and Brochures shall not relieve the Seller of responsibility for dimensions and/or errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the noting of some errors, but the overlooking of others does not grant the Seller permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the review of the Shop Drawings and Brochures.

2. Manufacturer Approval Drawings: Equipment that is laid out, configured, or designed by manufacturer based on performance specifications only shall be submitted to the ARP for approval prior to release of drawings for manufacturing.

3. Wooden poles for overhead cable:

   a) Product data

   b) Mounting hardware

   c) Installation details

1.04 DRAWINGS

A. The electrical drawings are diagrammatic and are not intended to show all raceway, wiring, exact locations of equipment, terminations, or number or types of fittings required by the electrical system. Provide all related electrical Work which is specified herein, diagramed, or scheduled on the electrical drawings, required by code enforcing agencies and as indicated on other details or elevations for complete and operating electrical systems. Since the drawings of floor, wall, and ceiling installation are made at a small scale, outlets, devices, equipment, etc. are indicated only in their approximate location unless dimensioned or otherwise indicated. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinate such locations with the Work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings. Refer to mechanical shop drawings by pump station and equipment suppliers and project drawings for dimensions as applicable.

1.05 PRODUCTS

A. General: Products are specified by manufacturer name, description, and/or catalog number to show intended function and quality. Report discrepancies, such as discontinued equipment or catalog numbers, to the ARP prior to bidding. If the Seller is unable to interpret any part of the plans and/or specifications, he shall notify the ARP, who will issue interpretation and/or additional clarifications to Bidders before the project is bid.

B. Manufacturers: Provide only equipment specified in the Contract Documents or approved by addendum. Manufacturers' catalog numbers and descriptions establish the quality of product required.

C. Warranty: Warranty shall be manufacturer’s standard or a minimum of one year unless noted otherwise in Division 26 Electrical Sections.

1.06 SUBSTITUTIONS

A. Substitutions shall be approved in writing by the ARP.

1.07 QUALITY ASSURANCE

A. All materials shall be new, unless noted otherwise. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.

B. Review accessibility of equipment for operation, maintenance and repair prior to installation. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Equipment Manufacturer Qualifications: Equipment manufacturers shall have at least 10 years experience in manufacturing products and accessories similar to those for this Project, with a record of successful in-service performance.

1.08 COORDINATION AND SCHEDULING

A. Coordinate and schedule electrical Work with the Work of other trades. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, code required working spaces, access openings, drawout and removal spaces or other matters tending to obstruct or delay the Work of other trades. All changes caused by failure to coordinate shall be made at the Seller's expense.

1.09 SAFETY AND PROTECTION

A. Safety Measures To Be Taken: The Engineer has not been retained or compensated to provide design and construction review services relating to the Seller's safety precautions or to the means, methods, techniques, sequences or procedures required for the Seller to perform his Work. The Seller will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction observations of the Seller's performance is not intended to include review of the adequacy of the Seller's safety measures, in, on or near the construction site. It shall be the Seller's responsibility to comply with applicable safety and health regulations for construction. The Seller shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether they are or are not in compliance with state or federal regulations.

B. Protection: The Seller shall take whatever measures are required to ensure that electrical safety and protection are maintained, including the proper covering, signage, and securing of “live” circuits.

C. Comply with the following safety rules:

1. Electrical circuits operating at over 300 volts phase to ground, or circuits serviced by a transformer over 150 kVA, shall be de-energized before proceeding with the Work.

2. Insulated cables, operated at over 300 volts to ground, shall be handled when energized only with rubber gloves tested to 22,000 volts by a Washington State approved testing laboratory.

3. Insulated cables that have been in operation shall be cut only with grounded cable shears, or shall be grounded by driving a grounded sharp tool through the shielding and the conductors before cutting.

4. All personnel working around energized electrical equipment shall comply with NFPA 70 E per equipment labels. If no label is present personnel shall wear standard insulated, non-conducting hard hats and shall wear fire retardant garments with no metallic zipper fasteners.

5. Ladders used in any electrical Work shall be of wood or fiberglass construction.

6. All panelboards, junction boxes, electrical devices and other similar equipment which is being worked on and which have exposed live wires, bus bars, or terminals operating above 50 volts shall be covered adequately for the voltage with an electrical insulating material and labeled with a "Caution" sign when Seller personnel are not present. The Caution sign shall advise that exposed electrical parts are behind the temporary protective cover.

1.10 ELECTRICAL SERVICE

A. Continuity of Service: Provide temporary service to existing systems as required to maintain continuous operation without reducing equipment efficiency. Coordinate the extent of temporary services with the ARP.

B. Power Outages: Outages shall be kept to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers, or testing, shall be closely coordinated with the ARP and shall occur at times approved by Company.

1.11 DEMOLITION

A. General: De-energize circuits in demolition areas to ensure a safe condition.

B. Existing material that is not to be reused or is not requested to be retained shall be removed from the site and shall become the property of the Seller for salvage. All materials removed from the site shall be disposed in accordance with Section 01 74 19 - Waste Management and Disposal.

C. In areas of where alterations are to be done, existing conduits may be reused, with the approval of the ARP, in their original location, unless noted otherwise.

1. Wiring that is discovered with damaged or deteriorating insulation shall be replaced with new.

2. No existing conduit or wiring once removed may be reused, unless noted otherwise.

D. Remove all unused exposed conduit except where located in or above existing construction, which is not being altered and would require removal and replacement of the existing construction.

1.12 ELECTRICAL EQUIPMENT INSTALLATION

A. Comply with Division 1 General Requirements Sections for environmental regulatory requirements, quality control, construction facilities and temporary controls, traffic control, access control, and signage requirements.

B. Provide electrical connection of all equipment having electrical requirements. Refer to Division 26 Electrical for motor starters and controls furnished integrally with equipment.

1. Make electrical connections in accordance with manufacturer's written instructions, with recognized industry practices, and complying with requirements of the National Electrical Code.

2. Verify all electrical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division.

3. Meet with each subcontractor furnishing equipment requiring electrical service to review electrical characteristics for each equipment item before rough-in begins. Report any variances from electrical characteristics noted on the electrical drawings to the ARP before proceeding with rough-in Work.

C. National Electrical Code Compliance: Comply with applicable portions of National Electrical Code as to the type of products used and provisions for electrical power connections.

D. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL Re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.

E. Cutting and Patching: Provide and coordinate the locations of all openings required in the building construction for installation of the Work.

1. Drill penetrations required through existing concrete slabs or walls with a diamond core drill. In no case shall any structural member be cut.

2. Provide approved sleeves as required for electrical penetrations through floors and walls. Seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.

3. Obtain written approval from a Structural Engineer licensed in the State of Washington prior to cutting any reinforcing bars.

4. Provide weekly updated Submittal Log of all penetrations and cuts performed.

F. Equipment Bases and Fastening: Comply with seismic anchorage and bracing requirements of Section 26 05 48 - Seismic Controls for Electrical and Communication Work.

G. Equipment Accessibility: Comply with applicable codes and install equipment to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be reported to the ARP, and relocated as directed.

H. Electrical Work Exposed to Weather: Provide weatherproof enclosures and corrosion protection for all ferrous metal portions of electrical Work exposed to weather, including conduit, clamps, supports, and hardware.

1. All galvanized electrical equipment exposed to the weather shall be painted to prevent leaching of zinc into the stormwater system. Paint coating shall be a minimum of 3 mils thick, and application as part of the manufacturing process is preferred over painting in the field.

1.13 COORDINATION

A. The Seller will be responsible for installation control panels and other equipment to be supplied by the Company, in accordance with Section 01 64 00 – Company-Furnished Products.

B. The Seller will be responsible for coordinating with the EP Supplier for the following activities:

1. Receiving, storage, and installation of control panels, disconnects, and instruments provided by EP Supplier.

2. I/O checkout, loop testing, troubleshooting, startup, and commissioning of the entire system.

C. The Seller will be responsible for coordinating with the Pump Station Package provider for all Work related to the pump stations.

1. Review shop drawings and coordinate final placement of instruments, equipment, and raceways.

2. Review pump motor nameplate and set overloads accordingly.

1.14 EARTHWORK

A. Existing Underground Utilities: Verify, before any excavation, the location of all existing utilities in the area of new construction. Exercise extreme care with all Work adjacent to

these utilities. A designated representative of the Seller shall advise ARP and local power company where they can be contacted in any emergency.

1. Review drawings and notify the ARP of any deviations in duct runs to avoid conflicts with existing utilities. Any changes in the Work resulting in the same quantities of trenching material shall not entitle the Seller to any claim for an addition to this Contract.

2. The Seller is responsible for any damage done to existing utility installations during the course of the Work. All damaged installations shall be replaced to the satisfaction of the utility or agency involved at the expense of the Seller.

B. Comply with the Division 1 General Requirements and Division 31 Earthwork requirements for site Work, including excavation, bracing and shoring, erosion control, requirements for temporary pumping equipment, backfilling, patching and paving, sod replacement, removal of surplus material, and requirements for traffic control during construction.

1.15 PROJECT FINALIZATION

A. Fully test and adjust all equipment installed under this specification and demonstrate its proper operation.

B. Where circuits have been added, removed or relocated on panelboards and switchboards, the Seller shall provide to the Company as-built panel and switchboard schedules in the Company's standard format. Coordinate submittal of schedules with the ARP.

C. Present the Company with Certificate of Inspection from the Authorities Having Jurisdiction upon completion of the Work stating that all Work complies with all applicable Codes and Ordinances.

D. Comply with Division 1 General Requirements for cleaning, closeout procedures, commissioning, training, operations and maintenance manuals, and record drawings.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 26 05 19
600 VOLT OR LESS WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "600 Volt or Less Wire and Cable" Work is shown in the Drawings. This section includes requirements for insulated copper stranded conductors and associated connections for general power and control use at voltages below 600 volts, for sizes #14 AWG through 750 kcmil.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ASTM B3 (American Society for Testing and Materials) – Standard Specification for Soft or Annealed copper Wire

B. ASTM B8 (American Society for Testing and Materials) – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. NECA (National Electrical Contractors Association) – National Electrical Installation Standards

D. ANSI/NEMA WC 70/ICEA S-95-658 – Power Cables Rated 2,000 V or Less for the Distribution of Electrical Energy

E. NFPA 70 (National Fire Protection Association) – National Electrical Code

F. NETA (International Electrical Testing Association) – Acceptance Testing Specifications

G. UL 44 (Underwriters Laboratories) – Thermoset-Insulated Wires and Cables

H. UL 62 (Underwriters Laboratories) – Flexible Cords and Cables

I. UL 82 (Underwriters Laboratories) – Electric Gardening Appliances

J. UL 854 (Underwriters Laboratories) – Service-Entrance Cables

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for each type of product.

B. Submittals shall include the following:

1. Product Data: For each type of product.

2. Field Test Reports: Submit reports on tests required in Part 3.

1.04 QUALITY ASSURANCE

A. All wire and cable shall be new and made of copper. No aluminum wire and cable allowed, unless otherwise noted.

B. Listing and Labeling: Provide wire and cable that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for specific types, sizes, and combinations of conductors and connected items.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cables according to NEMA WC 26.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Wire and Cable
2. Brand-Rex Division of Leviton.
3. General Cable: Carol Brand.
4. Southwire Company.
5. Or Approved Equal

2.02 PRODUCTS

A. Provide wire and cable with conductor material and insulation type as specified in Part 3.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-2, Type THHN-2-THWN-2, Type XHHW-2, Type UF, Type USE, and Type SO.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for, mineral-insulated, metal-sheathed cable, Type MI, Type SO and, Type USE with ground wire.

E. Flexible Metal Clad (Type MC) wiring shall not be used for general wiring purposes.

2.03 CONNECTORS AND SPLICES

A. UL listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

B. For #14 through #10 AWG wire sizes, provide insulated spring wire connectors or insulated compression connectors.

C. For #8 AWG wire, use solderless pressure connectors with insulating sleeves.

D. For #6 AWG and larger cable, use split bolt connectors with manufactured insulation covers or tape sufficient to provide 150% insulation level. As an option, compression connectors are acceptable using compression dies designed for the exact connector being used. Provide insulating sleeves manufactured specifically for the connector being used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine raceways and building finishes, to receive wire and cable for compliance with requirements for installation tolerances and other conditions affecting performance of wire and cable. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRE AND INSULATION APPLICATIONS

A. Use THHN/THWN stranded copper for all wet and dry interior locations.

B. Use XHHW stranded copper for all exterior locations.

C. Use RHW/USE stranded copper for all underground lighting applications.

D. Service Entrance: Type SE or Type USE multiconductor cable.

E. Exposed Feeders: SE, USE sunlight exposed rated conductors.

F. Grounding conductors: #6 AWG and larger shall be stranded copper, bare soft drawn. #8 and smaller shall be stranded copper with green insulation.

G. Provide plenum and/or tray rated cable where required by the application.

H. Overhead conductors shall be aluminum.

I. Provide lead-free jacketing and/or insulation where available.

3.03 INSTALLATION

A. Remove existing wire from raceway before pulling in new wire and cable.

B. Install wire and cable as indicated and according to manufacturer's recommendations. Use NECA's "National Electrical Installation Standards" where applicable.

C. As standard practice, route control conductors in separate raceways from power conductors. When dictated in contract document, control conductors may be routed in power raceway under the following conditions:

   1. All conductor insulation shall have a voltage rating for the highest voltage in the raceway.

   2. The largest power conductor in the raceway is #4 or smaller.

D. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary. Compound used must not deteriorate conductors or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

E. Use pulling means including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

F. For parallel conductors of a single phase, ensure that conductor lengths are equal by actual length comparison before installation.

G. Minimum conductor size for lighting and power circuits shall be #12 AWG, and for control circuits #14 AWG.

H. Provide dedicated neutrals for branch circuits. Shared neutrals shall not be allowed.

I. Provide separate raceways for 480/277V feeders/circuits and 208/120V feeders/circuits.

J. Provide phase testing for proper rotation of all motors.

K. All cables shall have their ends protected during installation.

L. Restricted Conductors: Seller's subcontractors or personnel in possession of aluminum conductors or solid copper conductors in their vehicles, storage or work areas may be removed from the site until such material is no longer on the premises.

3.04 CONNECTIONS

A. Splices in raceways are not allowed. Splice only in junction or outlet boxes in accessible locations.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B (reprinted in the National Electrical Handbook Article 110-14).

1. For bolted connections in equipment, mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed. Use copper lugs only on main circuit breakers and feeder breakers. No CU/AL lugs allowed.

2. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

C. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.05 COLOR CODING AND PHASING

A. Provide colored insulation for wires #4 AWG or smaller.

B. Color code conductors for all feeders as indicated in subparagraphs below. Provide a 2" wide minimum band of colored plastic tape, at terminations when colored insulation is not available. Tape shall be 3M Scotch No. 33, or Approved Equal all weather vinyl plastic tape.

1. 480Y/277-Volt, 3-phase, 4-wire systems:

Phase A (left or top)	Brown
Phase B (center)	Orange
Phase C (right or bottom)	Yellow
Neutral	Gray
Ground	Green
Travelers	Pink

2. 208Y/120-Volt, 3-phase, 4-wire systems:

Phase A (left or top)	Black
Phase B (center)	Red
Phase C (right or bottom)	Blue
Neutral	White
Ground	Green

Isolated ground	Green with yellow or orange stripe
Travelers	Pink

3. 120/240-Volt, 1-phase, 3-wire systems (non-standard):

Phase A	Black
Phase B	Red
Neutral	White
Ground	Green

4. 575V, 3Ø, 4-wire systems

Phase A (left or top):	Brown with purple stripe
Phase B (center):	Orange with purple stripe
Phase C (right or bottom):	Yellow with purple stripe
Neutral:	Gray with purple stripe
Ground	Green

5. For 240-volt delta systems (obsolete) the color of the high leg (approximately 200-Volts to ground) shall be red. Label the interior of panel as follows:

   a) "CAUTION - HIGH LEG (RED) IS OVER 120V TO GROUND. DO NOT USE HIGH LEG FOR 120V CIRCUITS"

C. Control system color coding:

120 VAC Control	Red
120 VAC Control Neutral	White
DC Control (+)	Blue
DC Control (-)	Blue/White
Ground	Green

3.06 IDENTIFICATION

A. Identify wires and cables according to Section 26 05 53 - Electrical Identification.

B. Provide wire markers on each conductor in pull boxes, junction boxes and at all load connections.

3.07 FIELD QUALITY CONTROL

A. Coordinate installation and final testing with the ARP.

B. Wire and Cable Tests: Test feeder and control circuits before they are placed in service.

1. 600-Volt Power Cable: Perform a continuity test for all cables. Megger testing for one half minute is required for all 600-volt insulated wire #2 AWG and larger using a 500-volt megger for 208- and 240-volt systems, and a 1000-volt megger for 480-volt systems. Test between phase conductors and from each conductor to ground before energizing service equipment, switchgear, switchboards, MCC's (including all connected motors) and panelboards. Determine the values with cable disconnected at both ends. Megger wire and cable only after installation, not on the cable reel. Replace cables that do not meet the Company's insulation resistance requirements.

    a) Provide phasing tests:

        1) Test and make all changes necessary to assure proper rotation of all motors.

        2) Correct phasing and phase sequence of all circuits susceptible to being paralleled.

        3) Perform other such phasing tests as may be required for the equipment being connected under this Contract.

    b) Using a volt/ohm meter, test all power conductors below #2 AWG for possible continuity to ground.

2. Check all control wiring for tightness of terminal contacts and continuity (especially current transformer leads) through each "run" of control circuiting. Thoroughly verify all wiring by means of battery-powered lights, buzzers, bells, or telephones. After completing these continuity checks and tests on a given control circuit, attach a temporary cardboard tag on each end of cable tested which bears the date and name of Seller's representative responsible for checking. Follow this procedure for each control circuit cable.

3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

4. Correct deficiencies and retest to demonstrate compliance.

5. Record test information for all cables tested, and provide Engineer with a copy.

END OF SECTION

SECTION 26 05 23
CONTROL/SIGNAL TRANSMISSION MEDIA

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Control/Signal Transmission Media" Work is shown in the Drawings. This section includes the requirements for the installation, termination and testing of the following types of control and signal transmission media connectors:

1. Twisted shielded pair cable (TSP).
2. Unshielded twisted pair cable (UTP).
3. Coaxial cable.
4. Video pair cable.
5. Optical fiber cable.
6. Optical fiber connectors and couplers.

B. Definitions:

1. PTFE: Polytetrafluoroethylene.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NFPA 70 (National Fire Protection Association) - National Electrical Code

B. OSHA (Occupational Safety and Health Standards)

C. UL (Underwriters Laboratories)

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Product Data: For control/signal transmission media.
2. Product Certificates: Signed by manufacturers of transmission media certifying that the products furnished comply with requirements and that they have been coordinated with and accepted by manufacturer of connected equipment.

3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

4. Maintenance Data: For transmission media to include in the maintenance manuals specified in Division 1 General Requirements.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain all cable of each type through one source from a single manufacturer.

B. Listing and Labeling: Provide cable and accessories that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use for the location and environment in which they are installed.

C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect cable from dirt, water, construction debris, and traffic.

1.06 COORDINATION

A. Have the connected equipment manufacturers review characteristics of cable and certify use with the connected system equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: All UTP cables shall be Cat 5e or better, all terminal blocks; connector blocks and accessories shall be fully Gigabit Ethernet compatible.

1. Electronic Cables:

a) Alpha Wire Company

b) Berk-Tek, Inc.

c) BICC Brand-Rex Company.

d) Cooper Industries; Belden Division.

e) Or Approved Equal.

2. Optical Fiber Cables:

    a) AT&T Technology, Inc.; Cable and Wire Division.

    b) Berk-Tek

    c) BICC Brand-Rex Company.

    d) Comm Scope; Systimax Solutions.

    e) Cooper Industries; Belden Division.

    f) Corning Cable Systems.

    g) Or Approved Equal.

2.02 ELECTRONIC CABLE

A. Control Wiring

1. Individual Low-Voltage Status Wiring (Digital Input/Digital Output - DI/DO): #14 and #16 AWG tinned-copper conductors; color-coded, low-loss polyvinyl chloride (PVC) insulation; unshielded; 600V; -20°C to 80°C.

2. Multiconductor Cable (DI/DO): Quantity of conductors indicated; #18 AWG tinned-copper conductors; color-coded, low-loss polyvinyl chloride (PVC) insulation; unshielded; PVC jacket; 600V; -20°C to 80°C.

B. Category 5e Cables

1. UL verified to Category 5e, ANSI/TIA/EIA-568-A requirements

2. ANSI/TIA/EIA-568-A compliant and TSB-36 with respect to attenuation, DCR unbalance and SRL

3. 24 AWG, solid bare copper, plenum rated FEP insulated, unshielded twisted pair cables (UTP)

4. Efficient high speed, low bit error rate link for emerging network protocols

C. Instrumentation Wiring:

1. Single Twisted Pair (Analog Input/Analog Output - AI/AO): #18 AWG tinned-copper conductors; color-coded; polyvinyl chloride (PVC) insulation; overall aluminum/polyester shield and #18 AWG tinned-copper drain wire; 600V; -20°C to 80°C.

D. Digital Communication Media

1. Unshielded Twisted Pair (Category 5 Local Area Network Cables)

    a) #24 AWG, solid bare copper, plenum rated FEP insulated, unshielded twisted pair cables (UTP)

    b) UL verified to Category 5, ANSI/TIA/EIA-568-A requirements.

    c) ANSI/TIA/EIA-568-A compliant and TSB-36 with respect to attenuation, DCR unbalance and SRL.

    d) Efficient high speed, low bit error rate link for emerging network protocols.

    e) Large (> than 5 dB) average PS-NEXT margin relative to specification limits.

    f) Easy to terminate on type 110 terminal blocks.

2. Coaxial Cables

    a) Comply with IEEE 802.3.

    b) Single-Conductor Coaxial: 75-ohm characteristic impedance, solid polyethylene core, 97 percent coverage, copper-braid shield, polyethylene jacket; complying with MIL-C-17, Type RG-6A/U.

PART 3 EXECUTION

3.01 GENERAL

A. Examine raceways and other elements to receive cables for compliance with requirements for installation tolerances and other conditions affecting performance.

    1. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Separate low-voltage signal wiring from 120V power and contact-status wiring.

3.02 INSTALLATION

A. Install cables as indicated, according to manufacturer's written instructions.

B. Install cables without damaging conductors, shield, or jacket.

    1. Do not bend cable, in handling or installation, to smaller radii than minimum recommended by manufacturer.

C. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

    1. Pull cables simultaneously if more than one is being installed in same raceway.

2. Use pulling compound or lubricant where necessary. Compound used must not deteriorate conductor or insulation.

3. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage media or raceway.

D. Install exposed cables parallel and perpendicular to surfaces or exposed structural members where possible.

E. Support cables according to, Section 26 05 48 - Seismic Controls for Electrical and Communication Work.

F. Use splice and tap connectors compatible with cable material.

1. Keep splices to a minimum.

2. If splices are necessary, they shall be accessible in junction boxes or pull boxes.

G. Seal around cables penetrating fire-rated elements.

H. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

I. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Install lacing bars and distribution spools.

J. Do not install bruised, kinked, scored, deformed, or abraded cable. Install cables without damaging conductors, shield or jacket. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

K. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.

L. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Monitor cable pull tensions. Pull tensions shall not exceed manufacturer’s recommended pulling tensions.

M. Support: Do not allow cables to lay on removable ceiling tiles.

N. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.

O. Provide plenum and/or tray rated cable where required by the application.

P. Run low-voltage signal wiring in separate raceway from 120V power and contact status wiring.

Q. UTP Cable Installation:

1. Comply with TIA-568-C.2.

2. Install termination hardware as specified in Section 27 15 00 - Horizontal Cabling unless otherwise indicated.

3. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.

R. Bond shields and drain conductors to ground at only one point in each circuit - the power supply end. Securely tape the ungrounded end of the shield. Do not ground the shield along the cable or in junction boxes. Maintain shield-to-shield isolation.

S. Follow manufacturer's instructions for connecting components to wiring system and grounding.

T. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 IDENTIFICATION

A. Identify cables according to Section 26 05 53 -Electrical Identification.

B. Label Types:

1. Use preprinted pre-tensioned wraparound plastic sleeve labels.

2. Use self-adhesive vinyl labels in areas not subject to temperatures over 100°F.

C. Label Locations: Provide labeling at all accessible locations, including each termination or interconnection of wiring.

3.04 FIELD QUALITY CONTROL

A. Visually inspect UTP and optical-fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.

B. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

C. Visually inspect cables for physical damage.

D. Test UTP cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test cable segments for faulty connectors, splices and terminations. Test for overall integrity of the cable and the component parts. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross-connection.

E. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration. Material must be NIST traceable.

F. Testing: Perform field quality control testing as follows:

1. Copper Cable Testing Procedures:

a) Inspect for physical damage and test cable for continuity and shorts.

b) Use time domain reflectometer with strip-chart recording capability and anomaly resolution to within 12 inches in runs up to 1000 feet in length.

c) Test cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts.

3.05 DEMONSTRATION

A. Operate control/signal systems to demonstrate proper functioning.

B. Replace malfunctioning cables with new materials. Retest to demonstrate compliance.

END OF SECTION

SECTION 26 05 26
GROUNDING

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Grounding" Work is shown in the Drawings. This section includes grounding of electrical systems and equipment. Grounding requirements specified in this section may be supplemented by special requirements of systems described in other Sections.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ASTM B8 (American Society for Testing and Materials) - Standard Specification for Concentric-Lay-Stranded Copper conductors, Hard, Medium-Hard, or Soft.

B. NFPA 70 (National Fire Protection Association) - National Electrical Code.

C. ANSI/NFPA 780 (National Fire Protection Association) - Standard for the Installation of Lightning Protection Systems.

D. ANSI/UL 96 (Underwriter's Laboratory) - Lightning Protection Components.

E. ANSI/UL 467 (Underwriter's Laboratory) - Grounding and Bonding Equipment.

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, calibration reports, and installation instructions for all products.

B. Submittals shall include the following:

1. Submit product data for the following:

    a) Grounding conductors and cables.

    b) Grounding connectors.

    c) Grounding electrodes.

    d) Exothermic weld kit

    e) Grounding plans and calculations for Seller's designed ground system.

2. Field Test Reports: Submit written test reports to include the following:

a) Test procedures used.

b) Test results that comply with requirements.

c) Results of failed tests and corrective action taken to achieve test results that comply with requirements.

d) Soil types and conditions where ground tests were performed.

3. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

a) Test wells.

b) Ground rods.

c) Ground rings.

d) Grounding arrangements and connections for separately derived systems.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide electrical components, devices, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for specific types, sizes, and combinations of conductors and connected items.

B. Comply with IEEE 837 and UL 467.

C. Comply with IEEE Std. 142 (Green Book).

D. Comply with NFPA 70.

E. Comply with IEEE C2 for overhead-line construction and medium-voltage underground construction.

F. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductor Fittings:

a) Erico Inc.

b) Chance/Hubbell.

c) Fushi Copperweld.

d) Erico Inc.; Electrical Products Group.

e) Framatome Connectors; Division of Bain Capital.

f) Burndy Electrical; Division of Hubbell.

g) Ideal Industries, Inc.

h) ILSCO.

i) Kearney/Cooper Power Systems.

j) Lyncole XIT Grounding; Division of VFC.

k) O-Z/Gedney Co.

l) Raco, Inc.; Division of Hubbell.

m) Thomas & Betts, Electrical; Division of ABB.

n) Or Approved Equal.

2. Grounding Connectors and Rods:

a) Harger

b) Galvan

c) Erico.

d) ILSCO.

e) Lyncole XIT Grounding; Division of VFC.

f) O-Z/Gedney.

g) Raco, Inc.; Division of Hubbell.

h) Thomas & Betts; Division of ABB.

i) Or Approved Equal.

3. Acceptable Manufacturers Ground Bars

a) Harger GBI series

b) Erico EGBA series

c) Or Approved Equal.

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 05 19 - 600 Volt or Less Wire and Cable.

B. Material: Stranded Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation in sizes available.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.

G. Bare Copper Conductors: Assembly of stranded conductors, ASTM B 8.

H. Copper Bonding Conductors:

1. Bonding Conductor: #4 or #6 AWG, stranded copper conductor, sized per drawings.

2. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

I. Bonding Straps: Soft copper.

2.03 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Pressure Connectors: High-conductivity-plated units.

C. Bolted Connectors: Heavy-duty, copper, bolted-pressure type only.

D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.04 GROUNDING ELECTRODES

A. Ground Rods: Solid copper clad steel, 3/4-inch diameter by 10-feet length.

B. Plate Electrodes: Copper, 0.10 inch thick minimum

2.05 GROUND BUS

A. Ground bus: predrilled rectangular bars of annealed copper, 1/4 inch x 4 inches in cross section with 9/32-inch holes spaced 1-1/8 inches apart arranged to allow for two-point termination of ground lugs. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V Size and location as shown on drawings.

   1. Provide a 12” long bus bar for small telecom and electrical rooms and closets. Provide a 20” long for large telecom rooms. Ground bar shall have double holes for two-point termination of lugs.

PART 3 EXECUTION

3.01 APPLICATION

A. Copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Manholes: Use bolted pressure clamps with at least two bolts.

F. Underground Grounding Conductors: Install bare stranded copper conductor, size as indicated on drawings.

   1. Copper conductor, #2/0 AWG minimum. Bury at least 24 inches below grade.

   2. Ductbank Ground Conductors: Install a #4/0 AWG bare copper conductor embedded in concrete of each medium voltage ductbank. Provide a ground conductor with each medium voltage feeder circuit sized per the NEC.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in raceways with all feeders and branch circuits unless otherwise noted.

C. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater, heat-tracing, and anti-frost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide #4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, cable try and central equipment location. All segments of cable tray shall be bonded together with ground conductor or flexible ground straps.

    1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4 inch x 2 inch x 12 inch grounding bus.

    2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

F. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate insulated equipment grounding conductor with supply branch-circuit conductors. Reference Section 26 56 00 - Exterior Lighting.

G. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lighting protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

3.03 INSTALLATION

A. Ground Rods: Install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes and connect to the service grounding electrode conductor.

    1. Drive ground rods until tops are 2 inches below finished floor or final grade.

    2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment.

1. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp.

2. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts.

3. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building.

1. Connect grounding conductors to main metal water service pipes by grounding clamp connectors.

2. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting.

3. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Gas Piping: Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Test Wells: Drive ground rod through drilled hole in the bottom of the handhole. Ground rod shall be at a minimum 12" deep. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

H. Metallic Fence and Railing: Comply with the requirements of IEEE C2, current edition.

1. Grounding conductor shall be bare copper not less than 8 AWG.

2. Gates shall be bonded to grounding conductor with flexible bonding jumper.

3. Barbed wire shall be bonded to the grounding conductor.

3.04 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For #8 AWG and larger, use pressure-type grounding lugs. #10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Provide flexible grounding strap mounted to raceway exterior where raceway crosses a seismic joint.

1. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing.

2. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.05 IDENTIFICATION

A. Identify grounding system components as required by the Authority Having Jurisdiction and as specified in Section 26 05 53 - Electrical Identification.

3.06 FIELD QUALITY CONTROL

A. All ground system test shall be performed in the presence of the ARP or Engineer.

B. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a) Measure ground resistance no fewer than two full days after last trace of precipitation and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

    b) Test by one of the following methods for resistance measurement, and correct any deficiencies detected during testing:

        1) Perform fall of potential test per IEEE Standard No. 81, Section 9.04 on the main grounding electrode or system for each substation and building.

        2) Perform the two-point method test per IEEE No. 81 Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.

        3) Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. Conduct test by passing a minimum of ten amperes dc current between ground reference system and the ground point to be tested. Measure voltage drop and calculate resistance by voltage drop method.

    c) Test Requirements:

        1) Equipment Rated 500 kVA and Less: 10 ohms.

        2) Equipment Rated 500 to 1000 kVA: 5 ohms.

3) Equipment Rated More Than 1000 kVA: 2 ohms.

4) Power Distribution Units or Panelboards Serving Electronic Equipment: 2 ohms.

5) Substations, substation manholes, and Pad-Mounted Switching Equipment: 1 ohms.

6) Manhole Grounds: 10 ohms.

d) Excessive Ground Resistance: If resistance to ground exceeds specified values at any single ground location and as a collective ground system, notify ARP promptly and include recommendations to reduce ground resistance.

4. Record test results. Provide bi-weekly Ground Resistance Test Report results to ARP.

C. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes.

1. Identify each ground rod by letter in alphabetical order, and key to the record of tests and observations.

2. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Raceways and Boxes" Work is shown in the Drawings. This section includes raceways, fittings and boxes for electrical wiring.

1. Raceways include the following:

a) Rigid Metal Conduit (RMC).

b) Aluminum Conduit (RMC).

c) Electrical Metallic Tubing (EMT).

d) Flexible Metal Conduit (FMC).

e) Liquidtight Flexible Metal Conduit (LFMC)

f) Rigid Nonmetallic Conduit (RNC).

g) Metal Wireway.

h) Nonmetallic Wireway.

i) Surface Metal Raceway.

j) Surface Nonmetallic Raceway.

k) Strut-type Channel Raceway.

2. Boxes include the following:

a) Device boxes.

b) Floor boxes.

c) Outlet boxes.

d) Pull and junction boxes.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated

C. ANSI C80.5 - Rigid Aluminum Conduit

D. NECA (National Electrical Contractors Association) - National Electrical Installation Standards

E. NEMA FB 1 (National Electrical Manufacturers Association) - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing (EMT) and Cable.

F. NEMA OS 1 (National Electrical Manufacturers Association) - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports

G. NEMA OS 2 (National Electrical Manufacturers Association) - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

H. NEMA TC 3 (National Electrical Manufacturers Association) - PVC Fittings for Use with Rigid PVC Conduit and Tubing

I. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum)

J. NFPA 70 (National Fire Protection Association) - National Electrical Code

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Product Data: For surface raceways, Conduit, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

2. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

3. Surface raceways.

4. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including internal components, from manufactures.

5. Conduit, Wireways and fittings.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide raceway and boxes that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use for the location and environment in which they are installed.

B. Comply with NECA's "National Electrical Installation Standards."

C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.05 COORDINATION

A. Raceway and boxes are shown on drawings in approximate locations unless dimensioned. Locate raceway and boxes as shown and at other locations where required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access, and to complete the wiring system.

B. Galvanized electrical equipment installed exposed outdoors shall be painted with a minimum 3 mil coating of paint to prevent zinc runoff to the stormwater system. Paint application by manufacturer is preferred to field painting for coverage and quality.

PART 2 PRODUCTS

2.01 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit (RMC): ANSI C80.1.

B. Rigid Aluminum Conduit (RMC): ANSI C80.5. For use with 400Hz systems only.

C. Electrical Metallic Tubing (EMT): ANSI C80.3.

D. Intermediate Metallic Conduit (IMC) is not allowed.

E. Flexible Metal Conduit (FMC): Zinc-coated non-reduced wall steel.

F. Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket.

G. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

1. Fittings for EMT: Steel Compression type. Setscrew type is not allowed.

2.02 NONMETALLIC CONDUIT AND TUBING

A. Rigid Nonmetallic Conduit (RNC/PVC): NEMA TC 2, Schedule 40 or 80 PVC.

B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

2.03 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover, ground flange and stainless steel cover screws.

C. Sheet Steel Gauge Requirements (Any Direction):

1. Less than 24”: 14 USS gauge.

2. 24” to 36”: 12 USS gauge.

3. 36” or larger: 10 USS gauge.

2.04 ENCLOSURES AND CABINETS

A. Cabinets:

1. NEMA 250, Type 4X or 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.

B. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

C. Nonmetallic Enclosures: Plastic or Fiberglass.

D. Interior Panels: Steel; all sides finished with manufacturer's standard enamel or with radio-frequency paint.

2.05 TERMINAL BLOCKS

A. Minimum 600-volt rating for 480-volt circuits

B. Clamp or screw terminals sized for maximum conductor size

C. Individual identification for each terminal block

D. Phenolic block separators or barriers shall be used to isolate low-voltage and control terminations from analog and DC circuits.

2.06 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Description:

1. General Requirements for Handholes and Boxes:

a) Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70 (NEC), for intended location and application.

b) Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70 (NEC), by a qualified testing agency, and marked for intended location and application.

c) Comply with handhole requirements in Section 26 05 43 Underground Ducts and Manholes.

2. Fiberglass Handholes and Boxes: Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of reinforced concrete or cast iron.

    a) Standard: Comply with SCTE 77.

    b) Color of Frame and Cover: Gray.

    c) Configuration: Designed for flush burial with closed bottom unless otherwise indicated.

    d) Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.

    e) Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

    f) Cover Legend: Molded lettering, "ELECTRIC.".

    g) Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

    h) Handholes 18 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

3. Manufacturers:

    a) Armorcast Products Company.

    b) Carson Industries LLC.

    c) NewBasis.

    d) Nordic Fiberglass, Inc.

    e) Oldcastle Precast, Inc.; Christy Concrete Products.

    f) Quazite: Hubbell Power System, Inc.; Hubbell Power Systems.

    g) Or Approved Equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive raceways and boxes for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel conduit (RMC).

    a) Use of aluminum RMC is limited to 400 Hz, grounding, and special applications.

2. Concealed: PVC Schedule 40 is the standard for use in rebar reinforced duct banks. Aluminum is excluded. Rigid steel conduit (RMC) shall be used under roadways in non-reinforced duct banks.

3. Underground: See Section 26 05 43 – Underground Ducts and Manholes.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): Liquidtight flexible metal conduit (LFMC).

5. Boxes: Type shall be as specified in the drawings. NEMA 3R in non-corrosive, non-dusty outdoor locations, NEMA 4 in interior or exterior dusty or dirty locations, NEMA 4X in interior and exterior corrosive locations.

B. Indoors: Use the following wiring methods:

1. Aluminum RMC limited to 400Hz, grounding and special applications. Aluminum conduit, boxes or fittings shall not come in contact with concrete. Provide non-metallic sleeve where aluminum conduit passes through concrete structure.

2. Exposed: Rigid steel conduit (RMC) or electrical metallic tubing (EMT).

    a) Rigid steel conduit shall be used up to 8 feet above finish floor in traffic areas subject to damage, such as in the conveyor, shop and ramp areas.

3. Concealed: Rigid steel conduit (RMC) or electrical metallic tubing (EMT).

    a) Use EMT in sizes 1/2” to 1-1/2” only, except larger EMT may be used for communications wiring such as telephone or fire alarm systems.

    b) Power raceways 2-inches and larger shall be rigid steel conduit.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): Flexible metal conduit (FMC), except in wet or damp locations, use liquidtight flexible metal conduit (LFMC).

5. Damp or Wet Locations: Rigid steel conduit (RMC).

6. Boxes: NEMA 250, Type 1, except as follows:

a) Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

b) Indoor Dusty Locations: NEMA 12

c) Damp or Wet and Corrosive Locations: NEMA 250, Type 4X, stainless steel.

d) Hazardous Locations: NEMA 250, Type 7.

3.03 INSTALLATION

A. Install raceways and boxes as indicated, according to manufacturer's written instructions. Use raceway fittings compatible with raceways and suitable for use and location.

B. Seal all conduits which pass through the building roof, through outside walls of the building above or below grade, and through floor slabs on grade. Seal on the end inside the building using a pliable duct-sealing mastic, non-hardening compound packed around the wire in the conduit. Compound shall be a type specially designed for such service on electrical wiring systems, shall be non-combustible and shall have the approval of the code-enforcing agency.

C. Clip type conduit fasteners are not allowed. All fasteners and clamps for conduit and raceway support shall be bolted mechanical hardware type.

D. Raceways:

1. Minimum Raceway Size:

a) 1/2" trade size for end use devices and communications.

b) 3/4" trade size for homeruns, conduit embedded in slabs, and for outdoor applications.

2. Cut conduit square using a saw or pipe cutter and ream to remove burrs.

3. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.

4. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

a) Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

5. Conveyor areas should be considered a NEMA 12 installation because of dust. Conduit shall be RMC up to 10' AFF or within a 10' radius of conveyors.

a) Device and pull boxes within 10' of conveyors shall be gasketed.

6. Conduits shall not be supported from ducts, pipes or other systems foreign to the electrical installation. The entire electrical installation shall be kept independent from any other trade.

7. Provide separate conduits for 480/277V, 208/120V and low voltage and controls cabling.

8. Planning: the layout of all raceways shall be carefully planned by the Seller to ensure an installation which is neatly done and workmanlike. Any Work showing improper care in planning will be ordered removed by the ARP, and shall be replaced in a neat and proper manner, without any additional cost to the Company.

9. Run concealed raceways with a minimum of bends, in the shortest practical distance considering type of building construction and obstructions. Install no more than the equivalent of four 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

10. Expansion-Joints:

    a) Provide Liquid tight flex conduit at expansion joints with sufficient slack to accommodate seismic movement, unless Structural Engineer requires expansion joint fitting. Wrap flex conduit with ground wire, connected to steel fittings at either end of flex.

11. Flexible Conduit: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors. Flexible conduit is also allowed at expansion joints. Any other use of flexible conduit must be approved by the ARP. Install a separate external ground connector across flexible connections. See Section 26 05 26 – Grounding.

    a) Use LFMC in damp or wet locations subject to severe physical damage.

12. Install raceways parallel and perpendicular to structure and at proper elevations. Group multiple conduit runs and neatly rack and support from the structure. Provide adequate headroom.

    a) Maintain 6-inches minimum clearance between raceways and mechanical piping and 12-inches minimum to heat sources such as flues, steam piping and heating appliances. Install horizontal raceway runs above water and steam piping.

    b) Give right of way to raceways and piping systems installed at a required slope.

    c) Keep electrical conduits free from contact with other dissimilar metals.

13. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.

a) Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

b) Space raceways laterally to prevent voids in concrete.

c) Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement.

d) Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit or rigid steel conduit at all bends and before rising above floor.

14. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment.

    a) Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

    b) Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor.

    c) Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor.

    d) Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

15. Flexible Connections:

    a) Use a maximum of 6 feet of flexible conduit for recessed and semi-recessed lighting fixtures. Use a maximum of 18” for equipment subject to vibration, noise transmission or movement, and for all motors. Use liquid tight flexible conduit in wet or damp locations.

    b) Install combination deflection/expansion fittings, including bonding jumper, where raceway system crosses building seismic, control or expansion joints.

16. Sleeves: Install for cable and raceway penetrations of concrete slabs and walls, except where core-drilled holes are used. Install for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

17. Avoid moisture traps. Provide junction box with drain fitting at low points in conduit system.

18. Install raceway sealing fittings according to manufacturer’s written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with

a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

a) Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.

b) Where otherwise required by NFPA 70 (NEC).

19. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box.

    a) Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

20. Use temporary closures to prevent foreign matter from entering raceways.

21. Complete raceway installation before starting conductor installation.

22. In public areas, exposed raceways shall be painted to match surroundings. In other exposed areas of the Terminal, raceways may be painted to match existing finishes.

23. Install pull-ropes in empty raceways except at sleeves and nipples. Use #14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

24. Surface Conduits: Install a separate, green, ground conductor in conduits from junction box supplying the conduits to receptacle or fixture ground terminals.

    a) Select each surface raceway outlet box, to which a lighting fixture is attached, of sufficient diameter to provide a seat for the fixture canopy.

    b) Where a surface raceway is used to supply a fluorescent lighting fixture having central-stem suspension with a backplate and a canopy (with or without extension ring), no separate outlet box is required.

    c) Provide surface metal raceway outlet box, and the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end-stem suspension.

    d) Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, no additional surface-mounted outlet box is required. Provide a backplate slightly smaller than the fixture canopy.

E. Outlet Box Installation:

1. Provide cast outlet boxes in exterior or wet locations.

2. Provide recessed outlet boxes in finished areas.

    a) Do not install boxes back-to-back in walls.

    b) Provide 6-inch minimum separation; 24-inch in acoustic rated walls.

3. Sectional boxes are not permitted.

4. Provide knockout closures for unused openings.

5. Where receptacle boxes and telecom devices are adjacent to one another, install receptacles not closer than 6” to and not greater than 12” from telecom device.

6. Support boxes independently of raceway. Mount device boxes to wall studs using blocking material behind the box to insure that the box will remain square to the finished wall surface.

7. Outlet and device boxes mounted in masonry walls shall be set at the bottom or top of a masonry unit course.

8. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes.

9. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

10. Provide cast outlet boxes in exterior or wet location. Conduit shall not enter the top or sides of exterior wall outlet boxes. Conduit shall enter bottom only.

11. Coordinate location and mounting height of outlets mounted above counters, benches, and backsplashes.

12. Mount outlets at the following heights above finished floor, unless otherwise noted on drawings:

    a) Wall Switches: 48”

    b) Convenience Outlets – Utility areas: 48”

    c) Convenience Outlets – other areas: 18”

    d) Above Counter Outlets: 48” or 6” above counter or backsplash

    e) Telephone outlets : 18”

    f) Wall phone outlets: 54”

    g) Thermostats: 60”

F. Pull and Junction Box Installation:

1. Provide as required to facilitate installation of the Work or as required by NFPA 70 (NEC).

2. Locate so that covers are accessible at all times.

3. Support boxes independently of raceway. Fasten junction and pull boxes to or support from building structure.

G. Floor Box Installation:

1. Set floor boxes level and adjust to finished floor surface.

2. Use cast iron floor boxes for installations in slab on grade.

3.04 GROUNDING

A. Provide grounding connections for raceway, boxes, and components as specified in Section 26 05 26 - Grounding and as required by NFPA 70 (NEC).

3.05 SUPPORT

A. Support raceways as specified in Section 26 05 48 - Seismic Controls for Electrical and Communication Work.

3.06 IDENTIFICATION

A. Provide labels for raceway, boxes, and components as specified in Section 26 05 53 - Electrical Identification.

B. Raceways for medium-voltage circuits:

1. Apply self-adhesive labels on raceways leaving equipment and at 25-foot intervals indicating system voltage. Use 1-1/4” minimum black letters on yellow background.

2. Label raceways entering concealed locations from exposed locations as to the destination via the concealed area.

3. Apply self-adhesive labels on exterior door or cover of enclosures indicating system voltage. Use 1-1/4” minimum black letters on orange background.

C. Raceways for low-voltage circuits:

1. System Identification Color-Coding Bands for Raceways: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and

floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

2. 208/120V Blue

3. 480/277V Yellow

4. Controls Black

5. Accessible Raceways, More Than 600 V: Self-adhesive vinyl labels. Install labels at all conduit penetrations and along length of exposed conduit run at 25 foot maximum intervals.

6. Accessible Raceways within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage.

7. Provide labels on all raceways, junction and pull boxes indicating panel designation and circuit number for all circuits in raceway or box, and conduit destination.

8. Conduit Label Example: B2-P4-23G-1/1,3,5, B-2601-9.

9. Provide labels at all locations where conduit penetrates walls, floors and ceilings, on both sides of penetration.

10. Provide labels at all ends or breaks in conduit runs such as electrical rooms, junction boxes, pull boxes, cabinets, maintenance holes, fire penetrations, etc.

11. Provide labels on each conduit entering junction or pull box within 12” of junction or pull box.

12. Provide labels at 25 foot maximum intervals along conduit runs.

13. Provide labels on all junction and pullboxes, including in accessible ceiling spaces and exposed in unfinished areas. Refer to specification sections for identification requirements for systems contained within.

14. Install labels parallel to equipment lines.

15. Labels in unfinished locations, including in accessible ceiling spaces and exposed unfinished areas shall be plain colored vinyl adhesive tape, minimum ½ inch high, handwritten in black indelible ink.

16. Labels in finished locations shall be adhesive-backed plastic machine printed labels, minimum 3/8 inch high, white with black letters.

17. Lettering shall be a minimum of ¼” high.

18. In finished locations, provide labels on inside of junction or pull box cover.

19. Provide red lettering when served by an emergency source.

20. Label power junction and pull boxes with power source and circuit numbers.

21. Label raceways entering concealed locations from exposed locations as to the destination via the concealed area.

3.07 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure coatings and finishes are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.08 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

SECTION 26 05 43
UNDERGROUND DUCTS AND MANHOLES

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Underground Ducts and Manholes" Work is shown in the Drawings. This section includes the requirements for trenching, backfilling and installation of underground conduits, ducts and ductbanks, and the design, fabrication, delivery and installation of pull boxes, handholes and manholes.

B. Definitions

1. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground, embedded in earth or concrete.

2. Ductbank: 2 or more conduits or other raceway installed underground in the same trench or concrete envelope.

3. Handhole: An underground junction box in a duct or duct bank.

4. Manhole: An underground utility structure, large enough for a person to enter, with facilities for installing and maintaining cables.

5. Vault: An underground utility structure, large enough for a person to enter, with facilities for installing, operating, and maintaining equipment and wiring.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ASTM (American Society for Testing and Materials)

B. NFPA 70 (National Fire Protection Association) - National Electrical Code

C. WSDOT/APWA Specifications, Section 6-02.3

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Product data for accessories for manholes and handholes, conduit and duct, duct bank materials, and miscellaneous components.

2. Shop drawings showing details and design calculations for precast manholes and handholes, including reinforcing steel. Stamp drawings with seal of Professional Structural Engineer licensed in the State of Washington.

3. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures. Include plans and sections, drawn to scale and show bends and locations of expansion fittings. Drawing shall be signed and sealed by a qualified Professional Engineer licensed in the State of Washington.

4. Certificate for concrete and steel used in underground precast concrete utility structures, according to ASTM C 858.

5. Inspection report for factory inspections, according to ASTM C 1037.

6. Record Documents: Show dimensioned locations of underground ducts, handholes, and manholes from nearest building or permanent structure.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide products that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use for the location and environment in which they are installed.

B. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

C. Comply with ANSI C2 “National Electrical Safety Code” for components and installation.

1.05 COORDINATION

A. Coordinate layout and installation of ducts, manholes, and handholes with final arrangement of other utilities as determined by field verification. Revise locations and elevations from those indicated as required to suit field conditions and ensure that duct runs drain to manholes and handholes. The Seller shall coordinate all modifications with the ARP prior to final installation.

1.06 SAFETY REQUIREMENTS

A. Comply with safety and protection requirements of Section 26 00 00 - Electrical Work - General.

B. Perform Work in accordance with the safety requirements of the Department of Labor Occupational Safety and Health Administration, Volume 36, Number 75, Part II, Subpart P, “Excavations, Trenching, and Shoring,” and with Section 7 of the Manual of Accident Prevention in Construction as published by the Association General Contractors of America, Inc.

C. Educate supervisors and employees on safety requirements and practices to be followed during the course of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast concrete units at site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manholes, Handholes and Vaults: Subject to compliance with requirements, provide products by one of the following:

1. Utility Vault / Oldcastle Precast Company.

2. Shaw PIPE; Division of Shawcor Co.

3. American Concrete.

4. Or Approved Equal.

2.02 CONDUIT AND DUCTS

A. Metallic Conduit:

1. Galvanized Rigid Steel Conduit (GRC): ANSI C80.1

2. PVC-Coated Rigid Steel Conduit: ANSI RN 1. Coating thickness shall be 0.040 inch, minimum.

B. Nonmetallic conduit: Use underground only for medium-voltage and low-voltage applications

1. Rigid Plastic Underground Conduit: High-density polyethylene, Schedule 40 and Schedule 80.

2. LFNC: UL 1660.

2.03 CONDUIT FITTINGS

A. Steel Fittings: Zinc-coated, cast malleable, ferrous metal, threaded fittings, with neoprene cover gasket on each fitting installed outdoors.

B. PVC Conduit and Tubing Fittings: NEMA TC 3. Provide PVC fittings for PVC conduit and suitable watertight connections where PVC conduit connects to galvanized steel conduit.

C. "Mogul Fittings": Provide "Mogul" size fittings for all conduit.

D. Seal Bushings: O.Z. compound bushing on each conduit entering a building from outside underground and on each conduit passing from one space into another, which is normally at a lower temperature.

E. Hubs: Appleton "Hub" or "Hub-U" series, Thomas & Betts "370" series, Or Approved Equal hub on each conduit terminating in a box where a hub was not previously provided.

F. Unions: Appleton Type "EC", Thomas & Betts "Erickson Coupling" conduit unions, Or Approved Equal where necessary.

2.04 DUCT SUPPORTS/SPACERS

A. Rigid PVC spacers selected to provide 3 1/2" minimum duct spacings and concrete cover depths indicated, while supporting ducts during concrete pour. Refer to drawing details for additional duct spacing requirements.

2.05 PULL BOXES

A. Cast Metal Boxes: Cast aluminum, sized as indicated on Drawings, with outside flanges and recessed, gasketed cover for flush mounting. Non-skid finish on cover with legend reading "ELECTRIC" or "SIGNAL" as appropriate.

2.06 HANDHOLES

A. General: Precast concrete or structural plastic, as indicated on Drawings. Walls and bottom shall be constructed to support rating of cover. Frame and cover shall form top of enclosure, with the following standard features:

1. Cover with insert or other device to facilitate lifting.

2. Cover with locking devices similar to REA, FARGO, Or Approved Equal.

3. Drain hole in base, 2-inch minimum diameter.

4. Knockouts in sides of adequate number and spacing to accommodate ductbank shown.

B. Street Lighting: Reinforced plastic mortar designed and tested to temperatures of - 50°F meeting ASTM D635-91 flammability test.

C. Handhole Covers: Reinforced concrete or cast iron, capable of supporting designed loads. Where located in roadways or aprons, covers shall be designed to support H20 or H40, minimum loading. Cast iron cover with cast-in legend "ELECTRIC" or "SIGNAL" as appropriate. Machine cover-to-frame bearing surfaces. Precast concrete strength to support H40 covers. Cover hinges concealed, with hold-open ratchet assembly.

2.07 PRE-CAST MANHOLES AND VAULTS (AASHTO RATED)

A. Precast Concrete Units: Interlocking, mating sections complete with accessory items, hardware, and features as indicated on Drawings. Include concrete knockout panels 1-1/2 to 2 inches thick for future conduit entrances and sleeves for ground rods.

B. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.

1. Type and size shall match fittings to duct or conduit to be terminated.

2. Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.

C. Ground Rod Sleeve: Provide a 3-inch PVC conduit sleeves in manhole floors 2 inches from the wall adjacent to, but not underneath, the duct routed from the facility.

D. Design structure according to ASTM C 858.

E. Joint Sealant: Continuous extrusion of asphaltic butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand the maximum hydrostatic pressures at the installation location with the ground water level at grade.

F. Source Quality Control: Inspect structures according to ASTM C 1037. Units shall be capable of supporting specified loads.

2.08 ACCESSORIES

A. Frames, Covers and Ring Components: Comply with structural design loading specified for manhole.

1. Frame and Cover: Weatherproof, reinforced concrete or cast-iron and capable of supporting loads that are expected for the installed location.

a) Cover H20 highway rated in roadways or H40 highway rated in aprons. Designer shall evaluate other applications during design.

b) Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

c) Special Covers: Recess in face of cover designed to accept finish material in paved areas.

2. Cover Legend: Manhole ID welded into cover, cast iron with cast-in legend. Manhole Ring Components: Precast concrete rings with dimensions and strength matched to those of highway rated roof opening.

a) Mortar for Ring and Frame and Cover Joints: Strength to match highway rated cover.

b) Where required, seal joints watertight using preformed plastic or rubber conforming to ASTM C 990. Install sealing material according to the sealant manufacturers' printed instructions.

B. Sump Piping: Provide sump pipe and sump in high water table areas where low-voltage power can be made readily available.

C. Duct Supports: Rigid PVC spacers selected to provide 3 1/2" minimum duct spacings and concrete cover depths indicated, while supporting ducts during concrete pour.

D. Manhole and Vault Lifting Means

1. Pulling Eyes in Walls: Eyebolt with reinforcing bar fastening insert. 2-inch diameter eye, 1-inch by 4-inch bolt. Working load with 6 inch embedment in 4000 psi concrete: 13,000 pounds minimum tension.

2. Pulling and Lifting Irons in Floor: 7/8-inch-diameter, hot-dipped galvanized, bent steel rod, stress relieved after forming, and fastened to reinforced rod. Exposed triangular opening. Ultimate yield strength: 40,000 pounds shear and 60,000 pounds tension.

E. Sump Frame and Grate (Cast-in-place units only): ASTM A 48/A 48M, Class 30B, gray cast iron. Comply with FS RR-F-621, Type VII for frame and Type I for cover

F. Bolting Inserts for Cable Stanchions: Threaded precast channel inserts of hot-dipped galvanized or stainless steel; 3'-0" on center; 1/2-inch internal diameter by 2-3/4 inches deep, flared to 1-1/4 inch minimum at base. Tested ultimate pull-out strength: 12,000 pounds minimum.

G. Expansion Anchors for Installation After Concrete is Cast: Zinc-plated carbon steel wedge type with stainless-steel expander clip, 1/2-inch bolt size, 5300-pound rated pull-out strength, and 6800-pound rated shear strength minimum. Cast in-place inserts not allowed unless cast by vault manufacturer.

H. Cable Rack Assemblies – heavy duty non-metallic 50% glass reinforced nylon or other non-metallic material having equal mechanical strength, thermal resistance, chemical resistance, dielectric strength and physical properties

1. Cable Stanchions: Nominal 36 inches high by 4 inches wide, with multiple arm mounting holes and recessed bolt mounting holes.

2. Cable Arms: Arranged for secure drop in attachment in horizontal position at any location on cable stanchion, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches with 450 lb. minimum capacity to 20 inches with 250 lb. minimum capacity. Top of arm shall be nominally 4 inches wide and shall have slots along full length for cable ties.

I. Cable Support Insulators: High glaze, wet-process porcelain arranged for mounting on cable arms.

J. Ground Rods: Ensure rods are copper bonded 5/8-inch by 10-foot minimum.

K. Ground Rod Sleeves: 3 inch PVC conduit sleeve in manhole floors 2 inches from the wall adjacent to, but not underneath, the ducts routed from the facility.

L. Ground Wire: Stranded bare copper, #2 AWG minimum. #4, AWG

M. Duct Sealing Compound: 3M Fireseal, Or Approved Equal. Non-hardening, safe for human skin contact, not deleterious to cable insulation, workable at temperatures as low as 35°F withstands temperature of 300°F without slump, and adheres to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and the common metals.

N. Ladder: UL-listed, heavy-duty fiberglass material, specifically designed for electrical manhole use. Minimum length equal to the distance from the deepest manhole floor to grade plus 3 feet., fiberglass material,

2.09 BACKFILL MATERIAL

A. Comply with Section 31 23 33 – Trenching and Backfilling

B. Designer shall coordinate trenching and backfill with Civil trenching and backfill sections.

1. Lower Trench Portion (surrounding ductbank): Sandy silt, clay silt, sand clay or other material free of stones and conglomerates larger than 2”

2. Upper Trench Portion (one foot above ductbank up to grade): On-site backfill material consisting of rock, soil or soil-rock mixture containing no rocks or lumps over 6”

C. Direct-Burial Conduit

1. Initial Bedding: 3” of sand below conduits.

2. Secondary Bedding: Unsaturated excavated earth free of rocks, broken concrete and debris 2” and larger, and compacted to 6” minimum above conduits.

3. Upper Trench:

a) Areas Under Pavement: Controlled Density Fill.

1) Content: A mixture of Portland cement, fly ash, aggregates, water and admixtures proportioned to provide a non-segregating, self-consolidating and free flowing material which will result in a hardened, dense, non-settling and excavatable fill. Batch and mix in accordance with Section 6-02.3 of the WSDOT/APWA Specifications to provide a flowing, non-segregating mix with a slump between 6” and 8”.

b) Areas Not Under Pavement: Select Native Fill.

1) Unsaturated excavated earth free of rocks, broken concrete and debris 6” and larger, and compacted in 12” lifts to prevent settlement.

2.10 CONTROLLED DENSITY FILL (CDF)

A. CDF shall be a mixture of Portland cement, fly ash, aggregates, water and admixtures proportioned to provide a non-segregating, self-consolidating and free flowing material which will result in a hardened, dense, non-settling and excavatable fill.

B. CDF shall be used as fill above utilities wherever non-settling backfill is required.

C. CDF shall be batched and mixed in accordance with Section 6-02.3 of the WSDOT/APWA Specifications.

D. CDF shall be batched to provide a flowing, non-segregating mix with a slump between 6” and 8”.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site to receive ducts and manholes for compliance with installation tolerances and other conditions affecting performance of the underground ducts and manholes. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Existing Utilities: Locate all existing utilities in the area prior to performing any excavation.

3.02 EARTHWORK

A. Comply with Section 31 20 00 - Earthwork.

B. Trenching:

1. Comply with Section 31 23 33 – Trenching and Backfilling

2. Comply with OSHA/WISHA safety standards for trenching, including stable slope and shoring requirements.

3. Depth: Refer to Drawings for trench depth requirements. Correct points of over-excavation using mechanically-compacted backfill to form a smooth trench bottom. 18 inch minimum cover over top of conduit ductbank.

4. Width: Excavate to minimum width consistent with stability of sides.

5. Slope: Slope trenches so that conduit and ducts drain toward manholes and handholes and away from buildings and equipment.

6. Rock Excavation: Where rock pad is used for conduit trench, overexcavate 6” below the ductbanks and refill and compact with selected backfill material of same composition.

7. Muck Excavation: Where muck or unstable material is encountered, over-excavate and backfill to attain proper grade with coarse sand, gravel, or Controlled Density Fill.

8. Stockpile backfill material in an orderly manner; a sufficient distance from the trench to avoid overloading trench banks.

9. Bedding: The entire bottom of the excavation is to be firm, stable, and at uniform density.

C. Excavating for Handholes, Manholes and Vaults: Provide 12” minimum clearance between outer surfaces of unit and embankment or timber used for shoring.

3.03 CONDUIT AND DUCT INSTALLATION

A. Install conduit and ducts as indicated on Drawings and according to manufacturer’s written instructions.

B. Slope: For ductbanks and conduits without profiles, pitch ducts minimum of 4 inches per 100 feet to drain toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between 2 manholes to drain in both directions. For ductbanks with profiles, install the ductbank at the elevation as shown on the Drawings.

C. Curves and Bends: Use manufactured galvanized rigid steel elbows for stub-ups at equipment and at building entrances with a minimum radius of 36 inches. Use manufactured long sweep bends with a minimum radius of 25 feet both horizontally and vertically at other locations. Do not exceed 20 degrees for field bends.

D. Make joints in ducts and fittings watertight according to manufacturer’s instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.

E. Duct Entrances to Manholes and Handholes: Space end bells approximately 10 inches on center for 5-inch ducts and varied proportionately for other duct sizes. Change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line. Grout end bells into manhole walls from both sides to provide watertight entrances. Core drill entrances where knockouts do not exist.

F. Building Entrances: Transition from underground duct to rigid steel conduit 5 feet minimum outside the building wall. Use fittings manufactured for the purpose. Follow appropriate installation instructions below:

1. Concrete-Encased Ducts: Install reinforcing in ductbanks passing through disturbed earth near buildings and other excavations. Provide ductbank support at wall without reducing structural or watertight integrity of building wall.

2. Direct-Buried, Non-encased Duct Entering Non-waterproofed Walls: Provide a Schedule 40 galvanized-steel pipe sleeve for each duct. Caulk space between the conduit and sleeve with duct-sealing compound on both sides for moisture-tight seal.

3. Waterproofed Wall and Floor Entrances: Provide a watertight entrance-sealing device with the sealing gland assembly on the inside. Anchor device into masonry construction with one or more integral flanges. Secure membrane waterproofing to the device to make permanently watertight.

G. Separation Between Direct-Buried, Non-Encased Ducts: Provide 3 inches minimum separation for like services, and 12 inches minimum between power and signal ducts.

H. Concrete-Encased Nonmetallic Ducts: Support on plastic separators coordinated with duct size and required duct spacing, and install according to the following:

1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts or at 8 feet maximum, and secure separators to the earth and to ducts to prevent floating during concreting. Do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

2. Concrete: Do not pour concrete until conduit installation has been approved. Spade concrete carefully during pours to prevent voids under and between conduits and at the exterior surface of the envelope. Do not use power-driven agitating equipment unless specifically designed for duct bank application. Pour each ductbank between manholes or other terminations in one continuous operation. When more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into the concrete on both sides of the joint near the corners of the envelope.

3. Reinforcing: Reinforce ductbanks where they cross disturbed earth and where indicated on Drawings.

4. Forms: Use the walls of the trench to form the side walls of the duct bank where the soil is self-supporting and the concrete envelope can be poured without soil inclusions; otherwise, use forms.

5. Minimum Clearances Between Ducts: 3 inches between ducts and exterior envelope wall, 3 inches between ducts for like services, and 12 inches between power and signal ducts.

6. Depth: Except as otherwise indicated, install top of duct bank at least 18 inches below finished grade in non-traffic areas and at least 24 inches below finished grade in vehicular traffic areas.

I. Stub-Ups: Use rigid steel conduit for stub-ups through concrete to equipment. Install insulated grounding bushings at the conduit terminations. For equipment mounted on outdoor concrete pads, extend steel conduit a minimum of 2 feet beyond the edge of the pad.

Couple steel conduits to the ducts with adapters designed for the purpose and then encase the coupling with 3 inches of concrete.

J. Sealing: Provide temporary closure at all duct terminations in manholes and vaults installed in this Project. Use sealing compound and plugs to withstand a minimum of 15 psi hydrostatic pressure.

K. Pulling Cord: Install 100-pound- test nylon cord in installed ducts, including spares.

L. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of ductbank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.04 BACKFILLING

A. Backfill only after all necessary inspections and tests have been performed.

B. Remove all debris, rocks, broken concrete, and formwork before backfilling trenches.

C. Use Controlled Density Fill under pavement areas or wherever non-settling backfill is required.

D. Deposit backfill in layers with materials described in Article 2.11, “Backfill Material.” Uniformly spread and compact backfill with suitable power tampers to the density of the adjacent soil and in such a manner so as not to disturb the alignment of the conduit. If settlement occurs, refill, compact and smooth off to conform to the surface of the ground.

E. Restore surface features at areas disturbed by excavation, and reestablish original grades.

1. Replace removed sod as soon as possible after backfilling is completed.

2. Restore all areas disturbed by trenching, storing of dirt, cable laying, and other Work.

3. Restore vegetation and provide necessary topsoil, fertilizer, lime, seed, sod, sprigging, or mulching.

4. Replace disturbed paving.

3.05 VAULT, MANHOLE AND HANDHOLE INSTALLATION

A. Install as indicated on Drawings according to manufacturer’s written instructions and ASTM C 891.

1. In areas which are subjected to vehicular traffic, install units plumb and level and with orientation and depth coordinated with arrangement of connecting ducts to minimize bends and deflections required for proper entrances.

2. In areas which are not subject to vehicular traffic, install so that manhole lid is 2” above surrounding dirt or gravel, and with orientation and depth coordinated with arrangement of connecting ducts to minimize bends and deflections required for proper entrances

3. Support units on a level bed of crushed stone or gravel, graded from the 1/2-inch sieve to the No. 4 sieve and compacted to the same density as the adjacent undisturbed earth.

4. Drainage: Where manholes have drain holes in the bottom, provide two feet minimum of gravel below the drain hole or provide a drain line to the nearest storm drain.

B. Grounding:

1. Ground underground ducts and utility structures according to Section 26 05 26 - Grounding.

2. Handhole and Small Manholes: Install two ground rods through floor in each medium voltage handhole and small manhole with top protruding 4’ above floor

3. Large Manholes and Vaults: Install four ground rods through floor in each medium voltage manhole with top protruding 4” above floor. Refer to Section 26 05 26 Grounding.

4. Ensure rods are copper 5/8 inch by 10 foot minimum.

5. Provide #4/0 ground wire in ductbank. Provide #4/0 bare copper ground wire in manhole, attached to wall, attached at 24 inches on center and mounted minimum 6 inches above floor.

6. Provide #2 stranded copper equipment ground minimum in each raceway in use.

C. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cable and conductors and as indicated on Drawings. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

1. Field-Installed Bolting Anchors: Do not drill deeper than 3-7/8 inches for field-installed anchor bolts. Use a minimum of 2 anchors for each cable stanchion.

D. Train cables neatly around corners and secure to walls or ceiling using cable clamps with expansion anchors.

E. Field cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

F. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring, encircling and in contact with enclosure, and

with top surface secured to top of box cover frame. Bottom of ring shall rest on controlled density fill per Engineer of record.

1. Concrete: 3000 psi, 28-day strength with a troweled finish.

2. Dimensions: Minimum 10 inches wide by 12 inches deep or per Engineer of record.

3.06 SUMP PIPING

A. Provide sump pipe and sump in high water table areas where low voltage power can be made readily available.

3.07 GROUNDING

A. Ground underground ducts and utility structures according to Section 26 05 26 Grounding.

3.08 IDENTIFICATION

A. Identify raceways, cables and equipment as specified in Section 26 05 53 - Electrical Identification.

B. Label raceways entering concealed locations from exposed locations as to the destination via the concealed area.

3.09 TESTING AND CLEANING

A. Pull brush through full length of ducts. Use round bristle brush with a diameter 1/2-inch greater than internal diameter of duct. Clean internal surfaces of vaults, manholes and handholes, including sump.

B. Duct Integrity: Swab out ducts with a mandrel 1/4 inch smaller in diameter than internal diameter of ducts.

C. Grounding: Test manhole grounding to ensure electrical continuity of bonding and grounding connections. Measure ground resistance at each ground rod and report results. Use an instrument specifically designed for ground-resistance measurements.

END OF SECTION

SECTION 26 05 48
SEISMIC CONTROLS FOR ELECTRICAL AND COMMUNICATION WORK

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Seismic Controls for Electrical and Communication Work" Work is shown in the Drawings. This section includes seismic restraints and other earthquake-damage-reduction measures for electrical components.

B. Definitions

1. Seismic Restraint: A fixed device such as a seismic brace, an anchor bolt or stud, or a fastening assembly used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.

2. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independent of other mobile structural elements during an earthquake.

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

A. ACI 318 (American Concrete Institute) - Building Code Requirements for Structural Concrete.

B. ASCE 7 (American Society for Testing of Civil Engineers) - Minimum Design Loads for Buildings and Other Structures.

C. ASTM - American Society for Testing and Materials.

D. ICBO - International Conference of Building Officials.

E. IBC - International Building Code as adopted by the Authority Having Jurisdiction.

F. NFPA 70 (National Fire Protection Association) - National Electrical Code.

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Plan: Provide layout and details of seismic bracing assemblies, including relevant information about supporting structure and supported electrical system. Show attachment locations, methods, and spacings, and identifying components.

2. Calculations: Provide structural calculations for all seismic restraint assemblies, including calculation of loads for assembly design and reactions applied to supporting structure.

    a) Calculations shall include sufficiency of supporting as needed.

    b) Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

3. Product Data: For each component used, provide the following:

4. Illustration of component and its place in the associated assembly

5. Type and style, including model number if applicable.

6. Size.

7. Material.

8. Strength, including maximum working or ultimate loads in all applicable directions.

9. Fastening provisions.

10. Finish.

11. Limits of use as applicable, indicating suitability for specified application.

12. Additional Information for Anchor Bolts, Expansion Anchors, Epoxy Anchored Anchors, Studs, and other Anchors: In addition to characteristics listed above, provide the International Code Council Evaluation Services (ICC-ES) report. All anchors shall be certified for use in seismic systems.

13. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and show designs and calculations signed and sealed by a Professional Engineer licensed in the State of Washington.

14. Design Analysis: To support selection and arrangement of seismic [and wind] restraints. Include calculations of all loads and reactions. Where applicable, include analysis of structural element to from which bracing is supported.

15. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and spacings,

identifying components and listing their strengths. Indicate direction and magnitude of all forces and moments transmitted to the structure during seismic events.

a) Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

16. Pre-approval and Evaluation Documentation: By the ICC-ES, showing maximum ratings of restraints and the basis for approval (tests or calculations).

17. Product Certificates: For each type of seismic restraint system, provide a product certificate signed by manufacturer certifying that products furnished comply with requirements.

18. Qualification Data: Provide evidence of current licensure for firms and persons specified in "Quality Assurance" section.

1.04 QUALITY ASSURANCE

A. Comply with ASCE 7 Chapter 13, Seismic Design Requirements for Nonstructural Components, unless requirements in this section are more stringent.

B. Professional Engineer Qualifications:

1. All required calculations shall be provided by a Professional Engineer who is licensed in the State of Washington and who is experienced in providing seismic engineering services.

1.05 COORDINATION

A. Coordinate layout and installation of seismic bracing with building structural system and architectural features, and with mechanical, fire-protection, electrical, communication, and other building features in the vicinity.

B. Coordinate concrete bases with building structural system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bracing and attachment: Subject to compliance with requirements, provide bracing and attachment products by one of the following, or other manufacturer with at least 5 years of experience in seismic-specific bracing systems:

1. Cooper B-Line; Division of Eaton.

2. Erico

3. GS Metals; Division of Cooper

4. Hilti

5. Thomas & Betts; Division of ABB

6. Unistrut

7. Or Approved Equal.

B. Anchorage: Subject to compliance with requirements, provide anchorage products by one of the following, or other manufacturer with at least 5 years of experience in seismic-specific anchorage:

1. Hilti

2. Powers Fasteners

3. Red Head

4. Simpson Strong-Tie

5. Or Approved Equal.

2.02 MATERIALS

A. Use the following materials for restraints:

1. Indoor Dry Locations: Steel, zinc plated.

2. Outdoors and Damp Locations: Galvanized steel.

3. Corrosive Locations: Stainless steel.

B. Unless otherwise noted, steel materials shall be per Section 05 12 00 – Structural Steel.

2.03 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

A. Strength:

1. Strengths used for anchor design shall be as noted in the ICC-ES reports, including use of anchor design criteria specified in ACI 318.

a) Unless otherwise specifically approved by the ARP, all anchors located in concrete shall be ICC-approved for and designed using “cracked concrete” criteria.

2. For each seismic restraint assembly, either Allowable Strength or Ultimate Strength design shall be used. Methodologies shall not be mixed within a single assembly.

B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.

C. Concrete Inserts: Steel-channel type.

D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A325.

E. Welding Lugs: Comply with MSS SP-69, Type 57.

F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.

G. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.

H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.04 SEISMIC BRACING COMPONENTS

A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches on center in webs, and flange edges turned toward web.

1. Materials for Channel: ASTM A1011, Grade 33.

2. Materials for Fittings and Accessories: ASTM A575, ASTM A576, or ASTM A36.

3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.

4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.

B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.

C. Cable-Type Bracing Assemblies: Zinc-coated, high-strength steel wire rope cable attached to steel thimbles, brackets, and bolts designed for cable service.

1. Arrange units for attachment to the braced component at one end and to the structure at the other end.

2. Wire Rope Cable: Comply with ASTM A603.

D. Hanger Rod Stiffeners: Slotted steel channels with internally bolted connections to hanger rod.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install seismic restraints according to applicable codes and regulations and as approved by authority having jurisdiction, unless more stringent requirements are indicated by manufacturer's recommendation or this section.

3.02 STRUCTURAL ATTACHMENTS

A. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to transmit the design loads.

B. Attachments to New Concrete: Bolt to channel-type concrete inserts or use expansion anchors.

C. Attachments to Existing Concrete: Use expansion anchors.

D. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars and comply with anchor manufacturer's recommendations.

E. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.

F. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.

G. Attachments to Wood Structural Members: Install bolts through members.

H. Attachments to Steel: Bolt to clamps on flanges of beams and columns, or on upper truss chords of bar joists.

3.03 ELECTRICAL AND COMMUNICATION EQUIPMENT ANCHORAGE

A. Anchor rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.

B. All floor-mounted equipment shall be secured to the housekeeping bases with ductile steel anchor bolts, preset in the concrete base. Secure vibration mounts, where required, to the concrete bases such that the equipment is free to vibrate but cannot move from the base.

1. Housekeeping Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment unless noted otherwise. Size concrete bases so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base, or

the minimum required by the anchor manufacturer, whichever is larger. Bases shall be 4" [3 ½"] nominal thickness of concrete with #4 reinforcing bars each way on 12" centers and doweled to floor slab unless noted otherwise. Trowel finish with 1" bevel edge all around.

2. Bushings for Floor-Mounted Equipment Anchors: Install to allow for resilient media between anchor bolt or stud and mounting hole in concrete.

C. Wall-Mounted Equipment Fastening: Rigidly secure all flush- or surface-mounted equipment, such as panelboards or cabinets, to the structure. Use expanding type anchors for concrete or masonry construction.

1. Anchor Bolt Bushing Assemblies for Wall-Mounted Equipment: Install to allow for resilient media where equipment or equipment-mounting channels are attached to wall.

D. Torque bolts and nuts on studs to values recommended by equipment manufacturer.

1. Mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed.

3.04 SEISMIC BRACING INSTALLATION

A. Expansion and Contraction: Install all electrical system components to allow for thermal movement of braced components.

B. Cable Braces: Install snug tight unless otherwise recommended by the manufacturer. Do not exceed the maximum cable slack as recommended by the cable manufacturer.

C. Attachment to Structure:

1. All attachment to the structure shall be per the approved details.

2. If specific attachment is not indicated for cables, conduit or other lightweight elements, anchor bracing to the structure at flanges of beams and columns, upper truss chords of bar joists, or at concrete members.

3. If specific attachment is not indicated for panels, chases, racks, and other heavier equipment, submit planned attachment detail to the ARP for specific approval.

END OF SECTION

SECTION 26 05 53
ELECTRICAL INDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Electrical Identification" Work is shown in the Drawings. This section includes identification of electrical materials, equipment, and installations.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ANSI/IEEE C2 - National Electrical Safety Code

B. NFPA 70 (National Fire Protection Association) - National Electrical Code, References

1.03 SUBMITTALS

A. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. The Seller shall submit the following, in accordance with Section 01 33 00 – Submittal Procedures:

1. Product Data for each type of product specified.

2. Schedule of identification nomenclature to be used for identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

B. Comply with ANSI C2, ANSI A13.1., ANSI Z535.4, 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with the Company's standards for electrical equipment identification.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those

required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 LABEL TYPES

A. Manufacturer's standard products with colors prescribed by ANSI A13.1, NFPA 70, and these Specifications. Only temporary markings that are removable without damaging finish are permitted on equipment.

1. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Install labels and nameplates parallel to equipment lines. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

2. Provide engraved laminated phenolic plastic or melamine label for equipment as noted below. Securely attach engraved labels with blunt end, self-tapping stainless steel screws with blunt ends. Sheet metal screws are not allowed. Provide white letters on black background for normal power, white letters on red background for emergency power.

B. Heat-shrink preprinted tubes, flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 degree F. Comply with UL 224.

C. Preprinted, flexible, self-adhesive vinyl label laminated with a clear weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Engraved melamine plastic laminate flat stock, 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 15 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise. UV-inhibited when used outdoors. Secure with stainless steel drive screws, stainless steel self-tapping screws or stainless steel oval-head 6-32 screws tapped into enclosure, or with stainless steel bolts with elastic stopnut.

E. Adhesive-backed plastic machine-printed labels, white with black letters. Indicate panel name and circuit number(s).

1. For Raceway at more than 600V, provide black letters on an orange field label with the legend, “HIGH VOLTAGE”. Indicate feeder number.

F. Plain-colored vinyl adhesive tape, 3-mil minimum by 1-inch wide minimum. Apply 1/2-inch minimum over-wrap through 2-inch minimum length. Refer to Section 26 05 19 – 600 Volt or Less Wire and Cable for color.

G. Engraved plastic melamine laminate flat stock. 1/16 inch minimum thickness for sizes up to and including 15 square inches, 1/8” thick for larger than 15 square inches. White background with black letters for normal power, red background with white letters for emergency power. Holes at each end for attachment with nylon ty-wraps.

H. Underground line warning tape with pre-printed warning message identifying type of system. Material shall be pigmented polyolefin, continuous-printed on one side, and compounded for unlimited life when direct buried. 6-inch minimum width by 4-mils thick. Tensile strength of 1750 psi.

1. Inscriptions for Red-Colored Tapes: ELECTRICAL LINE, HIGH VOLTAGE.

2. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATION CABLE, OPTICAL FIBER CABLE.

I. Underground metallic line-warning tape with pre-printed warning message identifying type of system. Material shall be detectable three-layer laminate consisting of printed pigmented polyolefin, a solid aluminum-foil core with a clear protective film that allows inspection of the continuity of the conductive core, and compounded for unlimited life when direct buried. Use when metal-detection of line is required on Medium Voltage Systems. 6-inch minimum width by 4-mils thick.

1. Inscriptions for Red-Colored Tapes: “CAUTION: MEDIUM VOLTAGE ELECTRICAL LINE BELOW”

J. Warning signs: Baked Enamel on aluminum plate, punched or drilled for fasteners, with colors, legend, and size required for applications. ¼-inch grommets in corners for mounting. Minimum nominal size of 7 by 10 inches with 0.040-inch minimum thickness. OSHA standard wording where approved. Custom wording if required. Secure with non-corrosive fasteners.

1. Where applicable, provide labels for multiple power source warning: “DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES”

K. Warning labels: Self-adhesive, multicolor, flexible pressure-sensitive vinyl conforming to OSHA "Danger" and "Caution" standards. 2½ x1¾" minimum with black letters on yellow background.

1. Where applicable, provide labels for multiple power source warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES"

L. Stencils: Machine-punched patterns, nonfading waterproof paint with color and formulation appropriate for material and location. Minimum letter height shall be 1 inch.

M. Adhesive-backed metal labels manufactured with testing agency logo. Punched or engraved with actual settings and date. Label shall be 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 20 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise.

N. Stainless-steel machine or hand-stamped wire marker plates with one hole at each end for attachment with non-corrosive fasteners that do 0.010-inch minimum thickness (for outdoor application).

O. Adhesive machine-printed plastic tape, cut to length, black with white letters unless specified otherwise. 3/8-inch minimum width of tape in unfinished areas only. Provide white lettering on red background when served by an emergency source.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fasteners for labels and signs: Self tapping, blunt-ended stainless-steel screws, or stainless-steel machine screws with nuts and flat and lock washers. Sheet metal screws are not acceptable. Self-drilling screws are not allowed.

B. Install identification labels according to manufacturer's written instructions.

C. Install labels where indicated and as required by the Authority Having Jurisdiction and the Department of Labor and Industries. Locate for optimum viewing and without interference with the operation and maintenance of equipment.

D. Verify identity of each item before installing identification products.

E. Temporary markings allowed only if removable without damage to equipment or enclosure finish.

F. System Identification Color-Coding Bands for Raceways: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-

foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

1. 208/120V Blue

2. 480/277V Yellow

3. Controls Black

G. Cable Ties: For attaching tags. Use general-purpose type, fungus inert, self-extinguishing, one piece, self-locking Type 6/6 nylon, except as listed below:

1. Outdoors: UV-stabilized nylon.

2. In spaces handling environmental air: Plenum rated.

H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

I. Coordinate names, abbreviations, colors, graphics and other designations used for electrical identification with corresponding designations used in the Contract Documents or as required by codes and standards. Use consistent designations throughout the Project. Labeling abbreviations are not allowed.

J. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish Work.

1. Coordinate installing electrical identifying labels prior to installing acoustical ceilings and similar finishes that conceal such items.

K. Clean surfaces of dust, loose material, and oily films before applying painted or self-adhesive identification products.

L. Painted Identification Products:

1. Prime surfaces according to manufacturer’s instructions prior to applying painted labels:

a) For galvanized metal, use single-component, acrylic vehicle coating formulated for galvanized surfaces.

b) For concrete masonry units, use heavy-duty, acrylic-resin block filler.

c) For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.

2. Apply one intermediate and one finish coat of paint.

3.02 IDENTIFICATION SCHEDULE

A. Panelboard Schedules:

1. Panelboard schedules shall utilize the Company's standard panel schedule format.

2. This schedule shall be updated with as-built information upon the completion of the project. The Seller shall post a hard copy of the revised panel schedule in any panel modified and submit an electronic copy of the panel schedule.

B. Instrumentation Labels: Affix permanent type nameplate or tag on all field-mounted instruments, transmitters, pressure gauges, and control valves with proper identification number and service description.

1. Provide 3"x1" aluminum or stainless steel tag stamped with the instrument loop number designation and the calibrated range.

C. Medium Voltage Raceways: Provide 5/8 inch high stenciled or manufactured letters noting "HIGH VOLTAGE", black letters on yellow background on all exposed feeder conduits where entering or leaving switchboards and along conduit runs at 25 feet on center.

D. Accessible Raceways, More Than 600 V: Self-adhesive vinyl labels. Install labels at all conduit penetrations and along length of exposed conduit run at 25 foot maximum intervals.

E. Accessible Raceways within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage.

1. Provide labels on all raceways, junction and pull boxes indicating panel designation and circuit number for all circuits in raceway or box, and conduit destination.

a) Provide labels at all locations where conduit penetrates walls, floors and ceilings, on both sides of penetration.

b) Provide labels at all ends or breaks in conduit runs such as electrical rooms, junction boxes, pull boxes, cabinets, maintenance holes, fire penetrations, etc.

c) Provide labels on each conduit entering junction or pull box within 12" of junction or pull box.

d) Provide labels at 25 foot maximum intervals along conduit runs.

e) Provide labels on all junction and pullboxes, including in accessible ceiling spaces and exposed in unfinished areas. Refer to specification sections for identification requirements for systems contained within.

f) Install labels parallel to equipment lines.

g) Labels in unfinished locations, including in accessible ceiling spaces and exposed unfinished areas shall be machine printed vinyl labels minimum ½ inch high, white with black letters. Labels in finished locations shall be adhesive-backed plastic machine printed labels, minimum 3/8 inch high, white with black letters.

h) Lettering shall be a minimum of ¼" high.

i) In finished locations, provide labels on inside of junction or pull box cover.

j) Provide red lettering when served by an emergency source.

F. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for feeder and branch-circuit conductors.

a) Provide colored insulation when available, typically for wire sized #8 AWG and smaller.

b) Provide minimum 2 inch wide band of colored plastic tape at all terminations and splices (where allowed). 3M Scotch No. 35, or Approved Equal Electrical Color Coding Tape.

c) Colors for 480/277V 3Ø, 4-wire systems:

1) Phase A (left or top): Brown.

2) Phase B (center): Orange

3) Phase C (right or bottom): Yellow

4) Neutral: Gray

5) Ground: Green

d) Colors for 208/120V, 3Ø, 4-wire systems:

1) Phase A (left or top): Black

2) Phase B (center): Red

3) Phase C (right or bottom): Blue

4) Neutral: White

5) Ground: Green

6) Isolated Ground: Green with yellow or orange stripe

e) 575V, 3Ø, 4-wire systems

1) Phase A (left or top): Brown with purple stripe

2) Phase B (center): Orange with purple stripe

3) Phase C (right or bottom): Yellow with purple stripe

4) Neutral: Gray with purple stripe

5) Ground: Green

f) Colors for 120/240V, 1Ø, 3-wire systems: (non-standard)

1) Phase A: Black

2) Phase B: Red

3) Neutral: White

4) Ground: Green

g) For 240-delta systems (obsolete) the color of the high leg (approximately 200 volts to ground) shall be red. Label interior of all equipment "CAUTION: HIGH LEG IS OVER 120V TO GROUND. DO NOT USE FOR 120V CIRCUITS".

h) Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

2. Provide wire markers on each conductor in panelboards, gutters, pull boxes, outlet and junction boxes and at the load connection. Identify with branch circuit or feeder number for power and lighting circuits.

a) Install conductor labeling in panelboards and enclosures to ensure labels are visible.

G. Power-Circuit Conductor Identification, Medium Voltage: Provide labeling at all accessible locations including each termination or interconnection of wiring, and in vaults, pull and junction boxes, manholes, and handholes. Identify conductors with cloth type, split sleeve or tubing type wire and cable markers.

1. Label each cable with phase designation, operating voltage and circuit number.

2. Color Coding for Phase:

a) 4160Y/2400V AC 3Ø, 4-wire:

1) Phase A: Black/Pink

2) Phase B: Red/Pink

3) Phase C: Blue/Pink

4) Neutral: White/Pink

b) 4160V Delta AC, 3Ø, 4-wire

1) Phase A: Black/Brown

2) Phase B: Red/Brown

3) Phase C: Blue/Brown

c) 12,470V Delta AC, 3Ø, 4-wire

1) Phase A: Black/Orange

2) Phase B: Red/Orange

3) Phase C: Blue/Orange

3. Provide write-on tags or nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.

H. Install instructional sign including the color code for grounded and ungrounded conductors using adhesive-film-type labels.

I. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

1. Provide wire markers on each conductor in wire gutters, pull boxes, outlet and junction boxes and at the equipment connection. Identify with control wire number as indicated on schematics and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

J. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation

K. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

3. Coordinate identification with Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

L. Conductor Identification:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.

2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.

3. Multiple Control and Communications Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color coding, or cable marking tape.

M. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

N. Workspace Indication: Install floor marking tape or paint to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

O. Warning, Caution, and Instruction Signs:

1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Provide OSHA standard text where approved. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location. Mount permanently in an appropriate location. Comply with ANSI A13.1 standard color and design.

2. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

3. Emergency-Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

P. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide a single line of text with 1/4-inch high lettering on 1-inch high label. Use white lettering on black field. Apply labels parallel to equipment lines.

Q. Outdoor Equipment: Engraved, laminated acrylic or melamine label, to comply with requirements listed above. Provide panel schedule printed on 8.5x11 paper in the Company's standard format in each panelboard. Insert folded schedule in schedule holder on inside of panel door. Posted panel schedule shall be updated to reflect all new Work in panel. Include project completion date on schedule.

R. Provide self-adhesive tape labels on all receptacle cover plates. Labels shall be machine printed with black lettering on white or clear background.

1. Indicate source panel name and circuit number.

2. Provide red lettering on white or clear background for devices on emergency circuits.

3. Where receptacle faceplate is dark color, provide white letters on clear background.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROLS

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Lighting Controls" Work is shown in the Drawings. This section includes the following:

1. Lighting Control Contactors.
2. Photoelectric Cells and Time Clocks.
3. Programmable lighting control systems, and relay panels.
4. Illumination level and motion sensors.
5. Emergency shunt relays.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NFPA 70 (National Fire Protection Association) - National Electrical Code,

B. NFPA 101 (National Fire Protection Association) - Life Safety Code,

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide electrical components, devices, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.

B. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.

C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.05 SPECIAL WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Company of other rights Company may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Seller under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of dimming controls that fail in materials or workmanship within specified warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Contactors

    a) Square D.; Division of Schneider Electric.

    b) General Electric.

    c) Cutler-Hammer; Division of Eaton.

    d) Allen Bradley.

    e) Or Approved Equal.

2.02 CONTACTORS

A. Configuration: Electrically held with 20 Amp tungsten halogen rating, and 30 Amp ballast rating. Match branch circuit overcurrent protection considering derating for continuous loads.

B. Description: Electrically operated and mechanically held combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.

C. Auxiliary Contacts: Field convertible contacts with normally open contacts and normally closed indicators.

D. Poles: As required to match circuit configuration. 12-pole maximum.

E. Provide field convertible contacts with N.O. and N.C. indicators.

F. Provide contactors with mounting brackets.

G. Enclosure: NEMA ICS 6 and NEMA 250, as required to match conditions. Fabricate enclosure from steel finished with gray. Interior NEMA Type 1, Exterior NEMA Type 3R.

2.03 PHOTOELECTRIC CELLS

A. Description: Solid state, with dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

B. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Level Monitoring Range: 1-5 fc on, 3-15 fc off, with an adjustment for turn-on and turn-off levels within that range.

D. Photoelectric cells shall typically be conduit mounted.

E. Delay up to two minutes to prevent false switching.

F. Provide on/off adjustment by light level sensor.

G. Enclosure: Heavy-duty die cast zinc, gasketed for maximum weather protection.

H. Cell: Cadmium sulphide, epoxy coated.

I. Contacts: Closed between dusk and dawn.

J. Temperature range: -40°F to 140°F.

K. Manual bypass switch shall be installed in parallel to the photocell (keyed if accessible to general public).

L. For outdoor lighting, provide 60-minute timed on override in accessible location unless fog detection or time clock is included in photoelectric controller.

2.04 LOW-VOLTAGE WIRING

A. Digital and Multiplexed Signal Wire: Shielded, twisted-pair cable as specified in Section 26 05 23 - Control/Signal Transmission Media.

B. Low-Voltage Control Cable: Multiple conductor, color-coded, #20 AWG copper, minimum.

1. Sheath: PVC, except in plenum-type spaces use sheath listed for plenums.

2. Ordinary Switch Circuits: Three conductors, unless otherwise indicated.

3. Switch Circuits with Pilot Lights or Locator Feature: Five conductors, unless otherwise indicated.

PART 3 EXECUTION

3.01 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies. Comply with device manufacturer's recommendations for distance from HVAC equipment.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

C. Photoelectric Cells shall be oriented north, and shall be directed to avoid detection of artificial light source.

D. Install lighting contactors in NEMA enclosure appropriate for location. Provide disconnecting means and overcurrent protection at contactor enclosures.

E. Installation shall comply with sensor manufacturer's recommendations.

3.02 CONTROL WIRING INSTALLATION

A. Install wiring as specified in Section 26 05 19 - 600 Volt or Less Wire and Cable for low-voltage connections and Section 26 05 23 - Control/Signal Transmission Media for digital circuits.

B. Wiring Method: Install all wiring in raceway as specified in Section 26 05 33 - Raceway and Boxes.

C. Bundle, train, and support wiring in enclosures.

D. Ground equipment.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

F. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.03 IDENTIFICATION

A. Identify components and power and control wiring according to Section 26 05 53 - Electrical Identification.

B. Label lighting control panels with equipment designation, power source and circuit numbers, and power source location.

C. Label all relays and control devices.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Engage a factory-authorized service representative to test, adjust, and program programmable lighting control systems.

B. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.

C. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturer's recommended torque values.

D. Verify settings of photoelectric devices with photometer calibrated within previous six months.

E. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:

1. Continuity tests of circuits.

2. Operational Tests: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.

    a) Include testing of dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.

3.05 ADJUSTING

A. For daylighting controls, adjust set points and deadband controls to suit Company's operations.

3.06 CLEANING

A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of "Exterior Lighting" Work is shown in the Drawings. This section includes exterior lighting units with luminaires, lamps, ballasts, poles/support structures, and accessories.

B. Definitions:

1. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.

2. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NFPA 70 (National Fire Protection Association)- National Electrical Code (current edition)

B. NFPA 101 (National Fire Protection Association) - Life Safety Code (current edition)

1.03 SUBMITTALS

A. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Plan: Provide layout and details of exterior lighting assemblies, including relevant information about supporting structure and supported lighting system. Show structural and electrical attachment locations, methods, and components.

2. Product Data: For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

a) Materials and dimensions of luminaires and poles, including Effective Projected Area.

b) Luminaire materials.

c) Photoelectric relays.

d) Ballasts, including energy-efficiency data.

e) Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.

f) Anchor bolts for poles.

g) High-intensity-discharge luminaire ballasts.

3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

a) Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

b) Light poles and other supports.

c) Anchor-bolt templates keyed to specific poles and certified by manufacturer and anchor bolt assemblies.

d) Light and camera support and attachment assemblies.

4. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

5. Maintenance Data

6. Calculations: Submit calculation package prepared and signed by a Professional Engineer licensed in the State of Washington verifying that the light pole, light pole anchorage, and attached lighting fixtures meet indicated loading requirements and other codes requirements of authorities having jurisdiction.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide fixtures and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.

B. Comply with ANSI/IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

D. Comply with UL requirements.

E. Professional Engineer Qualifications:

1. All required calculations shall be provided by a Professional Engineer who is licensed in the State of Washington and who is experienced in providing seismic engineering services.

1.05 DELIVERY, STORAGE, AND HANDLING OF POLES

A. Package aluminum poles for shipping according to ASTM B660.

B. Store poles on decay-resistant treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent surface more than 1/4 inch deep. Do not apply tools to section of poles below ground-line.

D. Retain factory-applied pole wrappings on fiberglass poles until just before pole installation. Handle poles with web fabric straps.

E. Retain factory-applied pole wrappings on metal poles until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.06 SPECIAL WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Company of other rights Company may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Seller under requirements of the Contract Documents.

1.07 EXTRA MATERIALS

A. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manuals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers

1. LED lamps

    a) Atlas

    b) Cree

    c) Philips

    d) Or Approved Equal.

2. Steel Poles

    a) Valmont

    b) Holphane

c) Philips

d) Or Approved Equal.

B. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Lighting Fixture Schedule located on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Concrete Foundations: Construct according to Section 32 13 13 - Concrete Paving and Miscellaneous Concrete

1. Comply with details for reinforcement and for anchor bolts, nuts, and washers. Verify anchor-bolt templates by comparing with actual pole bases furnished.

2. Finish for Parts Exposed to View: Trowel and rub smooth. Comply with Section 32 13 13 - Concrete Paving and Miscellaneous Concrete for exposed finish.

3. Pole shall not be installed on anchor bolts until the following has occurred:

a) 14 days minimum after concrete placement.

b) Concrete has reached a minimum compressive strength of 2500 psi.

B. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

1. Pole fixtures shall be installed plumb to true vertical to the satisfaction of the Company.

C. Provide handhole at base of each pole. See section 26 05 33 - Raceways and Boxes and Section 26 05 43 - Underground Ducts and Manholes.

D. Embedded Poles: Set poles to indicated depth, but not less than one-sixth of pole length below finish grade. Dig holes large enough to permit use of tampers the full depth of hole. Backfill in 6 inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.

E. Install poles as follows:

1. Use web fabric slings (not chain or cable) to raise and set poles.

2. Label poles with number per the Company’s Standard.

3. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

4. Use heavy duty galvanized anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.

5. Provide cover for nuts exposed above base plate. Covers to be painted to match pole finish.

6. Secure poles level, plumb, and square.

7. Grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space.

8. Use a short piece of 1/2-inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

9. Install base covers unless otherwise indicated.

F. Luminaire Attachment: Comply with luminaire manufacturer's mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated. Fasten to indicated structural supports.

1. Fixture shall be level, in straight lines, aligned, and coordinated with ceiling construction and other trades.

2. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

G. Provide fuses mounted in fuse holder. Where fixed fuse holder is not provided standard by manufacturer, provide in-line fuse holder such as Bussmann HFB, Littelfuse, Or Approved Equal, accessible through standard handhole and furnish with enough slack wire to extract the fuse holder for servicing.

3.02 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Ground metal poles/support structures according to Section 26 05 26 - Grounding.

1. Nonmetallic Poles: Ground metallic components of lighting units and foundations. Connect luminaires to grounding system with #6 AWG conductor.

3.03 IDENTIFICATION

A. Comply with Section 26 05 53 - Electrical Identification.

3.04 FIELD QUALITY CONTROL

A. Inspect each installed unit for damage. Replace damaged units.

B. Advance Notice: Give dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:

E. Prepare a written report of tests, inspections, observations and verifications indicating and interpreting results.

F. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

3.05 CLEANING AND ADJUSTING

A. Clean units after installation. Use methods and materials recommended by manufacturer.

3.06 EXTERIOR LIGHTING FIXTURE SCHEDULE

A. Refer to Lighting Fixture Schedule on the Drawings.

END OF SECTION

SECTION 31 05 16
SOILS AND AGGREGATES

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the material requirements for soils and aggregates to be used on the Project.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 43 00 – Quality Assurance and Control

C. Section 02 71 10 – Permeable Reactive Barriers

D. Section 31 20 00 – Earthwork

1.03 REFERENCES

A. ASTM Standards

1. ASTM D422: Standard Test Method for Particle-Size Analysis of Soils

2. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

3. ASTM D2434: Standard Test Method for Permeability of Granular Soils (Constant Head)

4. ASTM D2487: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

5. ASTM D2974: Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils

6. ASTM D4972: Standard Test Methods for pH of Soils

7. ASTM D4972: Standard Test Methods for pH of Peat Materials

B. USEPA Publication SW-846 Methods

1. 6000/7000 Series: Priority Pollutant Metals

2. Method 8081B: Pesticides

3. Method 8082A: PCBs

4. Method 8260D: Volatile Organic Compounds

5. Method 8270E: Semivolatile Organic Compounds

6. Method 9012B: Cyanide

C. USEPA Clean Water Act (CWA) Methods

1. Method 300.0 or 340.2: Fluoride

D. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction*, 2022 Edition (WSDOT/APWA Standard Specifications)

1.04 SUBMITTALS

A. Prior to installation of materials specified in this section, the Seller must submit a certificate from the Manufacturer or material supplier for approval by the ARP certifying that the materials are free of contamination and meet all requirements stated in these Technical Specifications.

B. The Seller must submit test reports in accordance with Section 01 33 00 – Submittal Procedures for the characteristics listed in Article 2.02 of this section.

1. Documentation that the Backfill and Cover Material Quality Control requirements are met must be submitted for all materials to be used during the Work as detailed in Part 2 of this Specification.

2. Borrow Source and Material Characterization: Prior to borrow source sampling, the Seller must provide documentation of the origin of borrow source materials and maps identifying specific location(s) of borrow sources. The Company may reject a proposed source of soil or aggregate materials for any reason.

1.05 QUALITY CONTROL

A. The Seller must provide testing and inspection services, as required (see Section 01 43 00 – Quality Assurance and Control). Sampling and testing to assure compliance with the Contract provisions must be in accordance with these Technical Specifications and are the Seller's responsibility. The Company reserves the right to require additional testing as deemed necessary.

PART 2 PRODUCTS

2.01 GENERAL

A. The Seller must provide all required materials for the Project. Materials must be of the quality, size, shape, and gradation as specified herein.

2.02 MATERIAL SOURCES AND CHARACTERIZATION

A. The Seller must import required soils and aggregates from off-site sources, provided that the proposed off-site sources are approved by the Company and that the materials meet the requirements of these Technical Specifications, except as noted elsewhere in this section.

B. All soil and aggregate materials used for the Project must be natural, native, virgin materials; be free of contaminants, including debris or recycled materials; and meet all Technical Specification requirements.

C. The Company maintains the right to reject any materials imported from off-site or on-site sources if they are determined to be substandard for any reason. No imported materials may be delivered to the Site until the proposed materials have been accepted in writing by the Company.

D. Characterization of all imported material must be performed by the Seller prior to any on-site placement. The characterization will include analysis of a borrow source sample for physical and chemical properties and Site inspection.

E. Sample(s) Provided to the Company

1. The Seller must provide the Company with a 2-gallon sample of each material planned for use on site. Each sample should be composited from no less than five subsamples taken throughout any one borrow source. The Seller must assure that the samples(s) are representative of all materials to be imported. Sample(s) will be provided to the Company at least 10 working days before the materials represented by the sample(s) are delivered to the Site.

F. Inspection of Source

1. The borrow source must be inspected by the Seller. During such inspection, the Seller must assure that the materials to be delivered to the Site are likely to meet the appropriate Technical Specifications. The Seller must provide the Company with 2 weeks' notice of such inspections. At the Company's discretion, the ARP or a representative may accompany the Seller to witness such inspections. This witnessing will in no way release the Seller from complying with the Technical Specifications and will in no way be construed as approval of any particular source of material.

G. Testing, Reporting, and Certification

1. The Seller must provide test results(s) to demonstrate the physical properties of materials to be imported, using the specified test methods, for all material types, as described in the following table.

Material Category and Tests	Frequency (minimum)
Select Backfill, General Backfill, and Gravel Surface Material	
Particle Size (Method ASTM D422)	1 per 10,000 cubic yards placed
Unified Soil Classification System (Method ASTM D2487)	1 per 10,000 cubic yards placed
Modified Proctor Test (Method ASTM D1557)	1 per borrow source per construction season
Soil Subgrade and Temporary Cover Material	
Particle Size (Method ASTM D422)	1 per 5,000 cubic yards placed
Unified Soil Classification System (Method ASTM D2487)	1 per 5,000 cubic yards placed
Modified Proctor Test (Method ASTM D1557)	3 per borrow source per construction season
Coarse Sand	
Particle Size (Method ASTM D422)	3 per material and per source
Unified Soil Classification System (Method ASTM D2487)	3 per material and per source
Pea Gravel	
Particle Size (Method ASTM D422)	1 per material and per source
Unified Soil Classification System (Method ASTM D2487)	1 per material and per source
Drainage Layer Material	
Particle Size (Method ASTM D422)	1 per 10,000 cubic yards placed
Unified Soil Classification System (Method ASTM D2487)	1 per 10,000 cubic yards placed
Permeability (Method ASTM D2434)	1 per 10,000 cubic yards placed
Quarry Spalls	
Particle Size (Method ASTM D422)	1 per material and per source
Unified Soil Classification System (Method ASTM D2487)	1 per material and per source
Topsoil	
Particle Size (Method ASTM D422)	1 per major material type and per source
Unified Soil Classification System (Method ASTM D2487)	1 per major material type and per source
Organic Content (Method ASTM D2974)	1 per 5,000 cubic yards placed
pH (Method ASTM D4972)	1 per 5,000 cubic yards placed

2. The Seller must provide documented results of such tests at least 2 weeks before delivery of the materials to the Site. Results previously obtained from the material suppliers will be acceptable documentation provided that the testing was accomplished no more than 1 year prior.

H. Chemical Requirements for Import Materials

1. All import material except Pea Gravel, Drainage Layer Material, and Gravel Surface Material must be demonstrated to meet Model Toxics Control Act (MTCA) Industrial Cleanup Standards, as determined from the following suite of chemical analyses:

a) Priority Pollutant Metals (USEPA publication SW-846, the 6000/7000 method series)

b) Volatile Organic Compounds (USEPA publication SW-846, Method 8260D])

c) Semivolatile Organic Compounds (USEPA publication SW-846, Method 8270E)

d) PCBs (USEPA publication SW-846, Method 8082A)

e) Pesticides (USEPA publication SW-846, Method 8081B)

f) Cyanide (USEPA publication SW-846, Method 9012B)

g) Fluoride (Extraction: de-ionized water, Analysis: USEPA CWA Method 300.0 or 340.2)

2. It is the Seller's responsibility to perform any analyses to ensure that the physical and chemical criteria stated in these Technical Specifications are met.

3. Chemical data must be provided in a tabular format, comparing results against the MTCA Industrial Cleanup Standards, with a cover letter statement confirming the suitability of the material for backfill as part of the Project, and include the original laboratory data.

I. Inspection of Materials at the Site

1. Truckloads of import material must be visually inspected by the Seller upon delivery. Materials must be inspected for the presence of foreign, recycled, or reprocessed material and to verify consistency with required gradations. The Company may at any and all times perform an independent inspection. Material may be rejected if identified as substandard or test results show it to be substandard. Materials may be segregated for testing based on appearance or odor. Segregated materials may be tested according to designated procedures at the Company's discretion.

2.03 MATERIAL SUBSTITUTIONS

A. Material with equivalent or superior performance characteristics may be substituted for those specified by providing written notice to the Company. The written notice must include a certification by the Seller that the performance of the substitute material must be equivalent or superior to that of the specified material. Any applicable testing must be included with the certification. The Seller must be solely liable for the cost of replacing materials and/or substitute materials that do not have performance characteristics equivalent or superior to those of the specified materials. Approval of substitutions by the Company will not eliminate this liability.

2.04 SELECT BACKFILL

A. Select Backfill will be used for construction of engineered retaining berm in East Landfill No. 1 and berm between the West Landfill and the U-Ditch; for accomplishing final grades in SU2, SU3, SU4, SU5, SU8, SU9, SU10, and SU11; and for base material of Reactive Backfill in SU2, SU3, SU4, and SU5, as described in Section 31 20 00 – Earthwork.

B. Select Backfill must consist of granular, free-draining soil, and/or aggregate that is free of deleterious material and is non-plastic. Deleterious material includes wood, organic waste, coal, charcoal, or any other extraneous or objectionable material.

C. Material must be graded between the limits specified as follows:

Screen Size	% Passing (by weight)
1 inch	99 to 100
0.5 inch	75 to 100
#4	40 to 70
#40	5 to 30
#200	0 to 10

2.05 GENERAL BACKFILL

A. General Backfill will be used as one of the backfill materials for the low permeability cap, as described in Section 31 20 00 – Earthwork; as a portion of surface material for the PRB trench, as described in Section 02 71 10 –Permeable Reactive Barriers; and as backfill for the landfill perimeter ditches.

B. General Backfill must consist of granular, free-draining soil and/or aggregate that is free of deleterious material. Deleterious material includes wood, organic waste, coal, charcoal, or any other extraneous or objectionable material.

C. Material must be graded to the limits specified under Section 9-03.14(3), Common Borrow, Option 2, in the WSDOT/APWA Standard Specifications.

2.06 COARSE SAND

A. Coarse Sand is a component of PRB Media, which will be used in the PRB trench, as described in Section 02 71 10 – Permeable Reactive Barriers.

B. Material must be graded between the limits specified as follows:

Screen Size	% Passing (by weight)
3/4-inch	100
#4	95 to 98
#10	70 to 80
#40	20 to 50
#80	5 to 10
#200	2 max

2.07 PEA GRAVEL

A. Pea Gravel is a component of PRB Media, which will be used in the PRB trench, as described in Section 02 71 10 – Permeable Reactive Barriers.

B. Pea Gravel must consist of rounded, granular, free-draining aggregate that is free of deleterious material and is non-plastic. Deleterious material includes wood, organic waste, coal, charcoal, or any other extraneous or objectionable material.

C. Material must be graded between the limits specified as follows:

Screen Size	% Passing (by weight)
5/8-inch	85 to 100
1/2-inch	15 to 85
3/8-inch	0 to 15
#4	0 to 5
#200	0 to 3

2.08 GRAVEL SURFACE MATERIAL/CSBM

A. Gravel Surface Material, also referred to as CSBM on the Drawings, will be used as final surface material in SU3, SU4, SU5, SU9, and SU11; for the West Landfill Pump Station access road; for the East Landfill Pump Station gravel pad; for the East Landfill No 2. access road; and in portions of the PRB where the existing surface is a roadway.

B. Gravel Surface Material will be used as base layer below asphalt and concrete paving per Section 32 12 16 – Asphalt Paving and Section 32 13 13 – Concrete Paving and Miscellaneous Concrete.

C. Material must be hard, dense and durable and meet the requirements of Section 9-03.9(3), Crushed Surfacing, in the WSDOT/APWA Standard Specifications.

1. Unless crushed surfacing top course is indicated on the Drawings, gravel surface material must meet the gradation requirements outlined in Section 9-03.9(3) of the WSDOT/APWA Standard Specifications for base course material.

2. Where crushed surfacing top course is indicated on the Drawings, gravel surface material must meet the gradation requirements outlined in Section 9-03.9(3) for top course and keystone material.

2.09 SOIL SUBGRADE AND TEMPORARY COVER MATERIAL

A. Soil Subgrade Material may be used in the West Landfill, East Landfill No. 1, and East Landfill No. 2 if surface of waste does not meet the Technical Specifications, as described in Section 31 05 19.23 – Geosynthetic Clay Liners. If required, Soil Subgrade Material will be placed directly on top of the waste below the Geosynthetic Clay Liner (GCL). Temporary Cover Material will be used as a temporary seasonal cover on both East Landfill No. 1 and East Landfill No. 2.

B. Soil Subgrade or Temporary Cover Material must consist of granular, free-draining soil and/or aggregate that is free of deleterious material. Deleterious material includes wood, organic waste, coal, charcoal, or any other extraneous or objectionable material.

C. Material must meet the requirements specified under Section 9-03.14(3), Common Borrow, Option 2 or 3, in the WSDOT/APWA Standard Specifications with the following modification: all material must pass the 1-inch sieve.

D. Soil Subgrade Material must not contain more than 3% organic matter by weight.

2.10 DRAINAGE LAYER MATERIAL

A. Drainage Layer Material will be used as a component of the low permeability cap in the West Landfill, East Landfill No. 1, and East Landfill No. 2 and will be placed directly on the GCL (or Soil Subgrade Material, if required) as described in Section 31 20 00 – Earthwork, used in the landfill perimeter ditches, and used in the on-slope East Landfill No. 2 ditches.

B. Drainage Layer Material must be a clean, naturally occurring round or sub-angular river gravel, primarily (greater than 80%) igneous or metamorphic rock. Individual stones must be generally free of seams, cracks, and other defects tending to destroy their resistance to weather.

C. Drainage Layer Material must be graded to the limits specified under Section 9-03.12(4), Gravel Backfill for Drains, in the WSDOT/APWA Standard Specifications.

D. Drainage Layer Material must have a minimum hydraulic conductivity of $1x10^{-2}$ centimeter per second or greater after placement per ASTM D2434.

2.11 QUARRY SPALLS

A. Quarry spalls will be used in the Season 1 drainage channel, in the final stormwater conveyance channel for East Landfill No. 1, and for stormwater outlet erosion protection.

B. Material must be hard, dense and durable and meet the requirements of Section 9-13.1(5), Quarry Spalls, in the WSDOT/APWA Standard Specifications.

2.12 TOPSOIL

A. Topsoil will be used prior to hydroseeding in SU2, SU8, SU10, East Landfill No. 1, East Landfill No. 2, West Landfill, and the PRB trench.

B. Topsoil must consist of a nearly equal mixture of sand, silt, and clay, forming a loam or sandy loam soil. It must be free of material considered deleterious by the Company and must meet the following gradational requirements:

Screen Size	% Passing
3/8-inch	100
#4	85 to 100
#40	20 to 70
#200	5 to 20

C. The fines fraction (that portion passing the #200 sieve) must consist of a nearly equal mixture of silt and clay. Clay loam, or other soils with high clay content, is unacceptable. Topsoil must contain an organic content of 5% to 10% by weight. Topsoil must have a pH range of 5.0 to 6.5 with admixtures applied as necessary to attain this range.

2.13 REACTIVE BACKFILL

A. Reactive Backfill must consist of Select Backfill amended by uniformly blending with Company-provided Activated Alumina at quantities specified as follows for use in different SUs:

   1. SU2: 4% Activate Alumina by dry weight

   2. SU3: 1% Activated Alumina by dry weight

   3. SU4 and SU5: 3% Activated Alumina by dry weight

B. Reactive Backfill must be blended prior to placement and must be blended by proportioning Select Backfill and Activated Alumina in the proper amounts.

C. The Seller must conduct a means of verification of the Activated Alumina content in the mixed Reactive Backfill after blending, to be described in the Construction Work Plan and subject to acceptance by the Company. The Company will visually inspect the blended

material and quality assurance testing to confirm that the sufficient homogeneous mixture has been blended.

D. The Company will collect samples of blended material for laboratory verification that appropriate ratios have been included and the blending is homogeneous. Company will supply results within 24 hours of sample collection.

2.14 PERMEABLE REACTIVE BARRIER MEDIA

A. The PRB Media will consist of the following components at the quantities specified:

1. 40% Coarse Sand by dry weight

2. 40% Pea Gravel by dry weight

3. 20% Activated Alumina by dry weight

B. The Activated Alumina, Pea Gravel, and Coarse Sand material must be blended prior to placement and must be blended by proportioning the Activated Alumina, Pea Gravel, and Coarse Sand in proper amounts to get a homogeneous mixture at the percentages listed in this Technical Specification.

C. The Seller must provide mixture verification methods for approval by the Company in the Construction Work Plan as specified in Section 01 33 00 – Submittal Procedures.

D. The Seller must provide the Company with a 5-gallon sample of a Seller-certified pre-mixed blend as a reference for visual inspection of the blended material.

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 31 05 19.13
GEOTEXTILES FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the physical characteristics and installation of the following geotextile fabrics as part of the Work:

1. Geotextile Type 1 will be used as a permanent layer under the waste within East Landfill No. 1. Geotextile Type 1 will also be used in a variety of temporary applications, including but not limited to construction access roads, under stockpiles, and stabilized construction access roads.

2. Geotextile Type 2 will be used as a permanent component of the landfill cover and over the PRBs.

3. Marker product is a contingency item and will be placed over any known waste left behind at the ARP's direction outside of the low permeability cap landfills.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D4491: Standard Test Methods for Water Permeability of Geotextiles by Permittivity

2. ASTM D4632: Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

3. ASTM D4751: Standard Test Methods for Determining Apparent Opening Size of a Geotextile

4. ASTM D5261: Standard Test Method for Measuring Mass per Unit Area of Geotextiles

1.04 SUBMITTALS

A. Geotextile fabric submittals. The Seller must submit the following information for each of the geotextile fabrics to be used for the Work.

1. Samples and complete description of geotextile fabric proposed for use that meet or exceed requirements of this section

2. Written instructions for storage, handling, installation, and seaming of proposed geotextile

3. Written instructions for repair of geotextile

4. Manufacturer's Certificates of Compliance with specified product requirements. This submittal includes Manufacturer's Quality Control testing

5. Written certification documents for geotextiles installed in the landfills and other permanently installed features

B. The Seller must provide Quality Control Certificates for each lot and each shift's production. The Quality Control Certificates must include the following:

1. Roll numbers and identification

2. Sampling procedures

3. Results of Quality Control tests, including a description of test methods used

1.05 QUALITY CONTROL

A. The Seller must engage and pay for the services of a Construction Quality Assurance laboratory for monitoring the quality of geotextile material being installed unless otherwise specified.

B. The Seller must perform Quality Control tests of geotextile, at a minimum of once for every 200,000 square feet, to evaluate the material's conformance to published material properties.

C. The Seller must reject rolls for which Quality Control requirements are not met.

D. The Seller must certify the quality of the rolls of geotextile.

E. The Company will perform independent Quality Assurance testing. The Seller must ensure that the Company has adequate access and time, as needed, to perform Quality Assurance testing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. The Seller must notify the ARP prior to delivery of material to facilitate the Company's testing.

B. Ship geotextile in a closed trailer.

C. Protect geotextile from ultraviolet light exposure, precipitation, inundation, mud, dirt, dust, puncture, cutting, and other damaging or deleterious conditions.

D. Immediately restore damaged protective covering.

PART 2 PRODUCTS

2.01 GENERAL

A. Materials with equivalent or superior performance characteristics may be substituted for those specified by providing written notice to the ARP. The written notice must include a certification by the Seller that the performance of the substitute material will be equivalent or superior to that of the specified material. Any applicable testing must be included with the certification. The Seller will be solely liable for the cost of replacing materials and/or substitute materials that do not have performance characteristics equivalent or superior to those of specified materials. Approval of substitutions by the ARP will not eliminate this liability.

2.02 GEOTEXTILE TYPE 1

A. Product is woven continuous-filament polypropylene or polyester fabric. US Fabrics Inc., product US 270, or equivalent.

B. Product is resistant to soil chemicals.

C. New product is made from virgin materials.

D. The filter fabric used in constructing the East Landfill No. 1 and under permanent roadways must meet the following Minimum Average Roll Values (MARVs) for the following properties:

Property	Designation	Value
Mass per Unit Weight	ASTM D5261	5.6 ounces per yard
Grab Strength	ASTM D4632	270 pounds
Elongation at Break	ASTM D4632	15%
CBR Puncture	ASTM D6241	850 pounds
Apparent Opening Size	ASTM D4751	No. 60 sieve < AOS < No. 40 sieve

2.03 GEOTEXTILE TYPE 2

A. Products must be composed of non-woven, continuous-filament Needle-Punched polypropylene or polyester fabric. US Fabrics Inc., product US 160NW, or equivalent.

B. The product cannot be heat burnished.

C. The product must be resistant to soil chemicals.

D. New product must be made from virgin materials.

E. The geotextile for separation used in constructing landfill covers, PRBs, temporary access roads, and other temporary applications must meet the following MARVs for the following properties:

Property	Designation	Value
Mass per Unit Weight	ASTM D5261	6.0 ounces per yard
Permittivity	ASTM D4491	>1.5 $seconds^{-1}$
Grab Strength	ASTM D4632	150 pounds
Apparent Opening Size	ASTM D4751	Approximate No. 70 sieve

2.04 MARKER PRODUCT

A. The material must be red or orange and non-biodegradable, such as high-density polyethylene (HDPE) construction fence ("snow fence").

B. The material must be a new product made from virgin materials.

C. Marker product will not be subject to laboratory testing. The material chosen for the marker product must be accepted by the ARP before installation.

D. The ARP will provide direction regarding the location of placed marker product prior to installation of marker product.

2.05 SEWING THREAD

A. Polymeric thread with strength properties equal to or greater than the geotextile

B. Chemical resistant

2.06 LABELING

A. The Seller must mark or tag geotextile rolls with the following information:

1. Manufacturer's name
2. Product identification
3. Lot number
4. Roll number
5. Roll dimensions

B. The Seller must mark special handling requirements on rolls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation of geotextile, the Seller must examine underlying construction for conformance with the Technical Specifications. The Seller must verify the following:

1. The underlying construction is complete and constructed as designed, and documentation of completion has been obtained.

2. The underlying soil surface is smooth and free of any debris sticking up in a manner that could damage or otherwise reduce the effectiveness of the geotextile.

3.02 PROTECTION

A. When placing soil materials over geotextile, the Seller must ensure the following:

1. No damage to geotextile occurs.

2. No slippage of geotextile on underlying layers occurs.

3. No excessive tensile stresses in the geotextile occurs.

4. The overlying material is free of any debris that could damage or otherwise reduce the effectiveness of the geotextile.

3.03 DEPLOYMENT

A. The Seller must follow Manufacturer's recommendations, standards, and guidelines.

B. The Seller must anchor geotextile in anchor trenches on slopes greater than 20% (5 horizontal to 1 vertical [5H:1V]). The Seller must roll geotextile down slope in such a manner as to continually keep the geotextile sheet in sufficient tension to preclude folds and wrinkles.

C. The Seller must weight geotextile with sandbags or equivalent as ballast during deployment. The Seller must leave ballast in place until geotextile is covered with the succeeding construction layer, then remove ballast.

D. The Seller must cut geotextile using an approved cutter only. The Seller must take care to protect other in-place geosynthetic materials when cutting geotextile.

E. The Seller must not entrap in geotextile excessive dust, stones, or moisture that could damage or clog drains or filters or hamper subsequent seaming.

F. The Seller must examine geotextile over the entire completed surface to ensure that no potentially harmful foreign objects, such as needles, are present. The Seller must remove any foreign objects.

3.04 SEAMS AND OVERLAPS

A. The Seller must ensure that no soil or material to be placed over geotextiles could be inadvertently inserted beneath the geotextile at the seams.

B. The Seller must continuously sew all geotextiles used for filtration. Overlap must be a minimum of 3 inches. No horizontal seams are allowed on side slopes (i.e., seams must be along, not across, the slope). The horizontal seaming requirement does not include butt seams.

C. The Seller must sew using polymeric thread with chemical resistance and strength properties equal to or exceeding those of geotextile.

D. For sewing, the Seller must use a 401 two-thread chain stitch or equivalent.

3.05 REPAIRS

A. The Seller must repair holes or tears in geotextiles with a patch from the same geotextile material, seamed in place with a minimum seam overlap of 12 inches in all directions.

B. The Seller must remove any soil or other material which may have penetrated the torn geotextile.

3.06 ACCEPTANCE

A. The Seller must retain all ownership and responsibility for geotextile used in the landfills and other permanently installed features until acceptance by ARP and until the full placement of overlying materials has been completed.

B. The Seller must retain all ownership and responsibility for geotextile used in temporary applications for the duration of the Project, subject to approvals by the ARP.

C. The ARP will accept geotextile when the following occurs:

1. Conformance tests verify product requirements.

2. The installation is complete and overlying soil has been placed.

3. Documentation of installation is complete.

4. Verification of the adequacy of all seams and repairs, including associated testing, is complete.

5. Written certification is provided in accordance with Section 01 33 00 – Submittal Procedures.

END OF SECTION

SECTION 31 05 19.23
GEOSYNTHETIC CLAY LINERS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the supply and installation of a Needle-Punched GCL. The material(s) furnished and the installation performed must be in accordance with these requirements and the Drawings.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 31 05 16 – Soils and Aggregates

C. Section 31 20 00 – Earthwork

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D4643: Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating

2. ASTM D4873: Standard Guide for Identification, Storage, of Geosynthetic Rolls and Samples.

3. ASTM D5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

4. ASTM D5261: Standard Test Method for Measuring Mass per Unit Area of Geotextiles

5. ASTM D5887: Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter

6. ASTM D5888: Standard Guide for Storage and Handling of Geosynthetic Clay Liners

7. ASTM D5890: Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners

8. ASTM D5891: Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners

9. ASTM D5993: Standard Test Method for Measuring Mass per Unit of Geosynthetic Clay Liners

10. ASTM D6243: Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method

11. ASTM D6496: Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners

12. ASTM D6768. Standard Test Method for Tensile Strength of Geosynthetic Clay Liners

1.04 SUBMITTALS

A. Information with Bid: The following must be submitted to the ARP with the bid:

1. Statement of experience from the proposed GCL supplier.

2. Statement of experience from the proposed GCL installer.

B. Prior to Installation: The following information must be supplied to the ARP for review within 30 business days prior to importing GCL materials to the Site to ensure that the materials and parties selected for use on the Project meet the requirements of this Technical Specification:

1. Samples of GCL proposed for use on the Project

2. Reference list supplied by GCL Manufacturer indicating the appropriate experience level as required by this Technical Specification

3. Reference list supplied by the GCL installer indicating the appropriate experience level as required by this Technical Specification

4. Reference list supplied by the proposed CQC Supervisor indicating the appropriate experience level as required by this Technical Specification

C. Certifications of subgrade acceptance for each area covered by GCL, signed by the Seller and CQC Supervisor

D. Quality Control Submittals

1. Manufacturer Quality Control Certification: Quality Control certificates must be issued by the GCL Manufacturer to the Company, Seller, and CQC Supervisor for each delivery of material. The certifications must be signed by the Quality Control manager of the GCL Manufacturer or other responsible party and must include the following information:

a) Shipment Packing List: A list indicating the rolls shipped on a particular truckload

b) Bill of Lading: The shipping documents for the truck used for the shipment

c) Letter of Certification: The letter indicating the material is in conformance with the physical properties specified

d) Physical Properties Sheet: The material specification for the GCL supplied in accordance with this Technical Specification

E. Results of GCL physical testing, as described later in this section, will be provided to the ARP before any delivery of GCL occurs for a season. The ARP has the right to refuse GCL materials for use in the Project based on the results of the provided testing results.

1.05 QUALITY ASSURANCE

A. Qualifications

1. The GCL Manufacturer, installer, and CQC Supervisor must all be skilled in accordance with the following experience requirements. Any exceptions must be approved by the ARP prior to the Project bid.

a) GCL Manufacturer: The GCL Manufacturer selected to complete the Work must have successfully produced at least 10,000,000 square feet of Needle-Punched GCL product.

b) GCL Installer: The GCL installer must provide to the ARP sufficient evidence of installation experience and competence with the specified geosynthetic materials.

1) GCL-Only Installation: The GCL installer must demonstrate a minimum of 5,000,000 square feet of GCL installation experience and must provide sufficient evidence of installation experience and competence with other geosynthetics or must demonstrate that an acceptable level of training and supervision will be utilized in order to ensure the quality of the installation.

c) CQC Supervisor: The CQC Supervisor must provide to the ARP sufficient evidence of installation experience and competence with the specified geosynthetic materials, including cutting samples, performing inspections, and monitoring the quality and installation of materials.

B. Manufacturing Quality Control

1. The GCL must be tested for compliance with the requirements of this Technical Specification by the test methods and at the frequencies indicated herein. GCL materials may be tested and pre-approved at the manufacturing location.

PART 2 PRODUCTS

2.01 GEOSYNTHETIC CLAY LINER

A. Materials

1. The GCL product supplied to the Project must be in full accordance with the requirements of this Technical Specification. The GCL must be manufactured by mechanically bonding the geotextiles using a Needle-Punching process to enhance frictional and internal shear strength characteristics.

2. Sodium bentonite used in the GCL must consist of a high swelling clay component that is primarily montmorillonite.

3. In order to maintain these characteristics, glues, adhesives, or other non-mechanical bonding processes must not be used in lieu of the Needle-Punching process. Acceptable GCLs for this Project include Bentofix Thermal Lock SRNWL or BENTOMAT DN, or any other Needle-Punched GCLs that meet the requirements of this Technical Specification. Isolated sewn or stitched rows do not constitute uniform reinforcement for the purposes of this Technical Specification. For the purposes of these Technical Specifications, Needle Punching is considered a manufacturing process whereby boards of barbed needles incorporate the staple fibers from a non-woven geotextile, through the Sodium Bentonite clay layer, and into the matrix of a second geotextile layer.

B. GCL Physical Properties

1. The GCL must be a Needle-Punched reinforced composite composed of a uniform layer of granular Sodium Bentonite encapsulated between two non-woven geotextiles. The GCL material must be in accordance with the test methods, test frequencies, and material physical properties as listed in the following table.

Test	Designation	Frequency	Value
Mass/Area of Top and Bottom, Non-Woven Geotextiles	ASTM D5261	1 per 200,000 sf each	6 oz/sy MARV
Swell Index of Sodium Bentonite	ASTM D5890	1 per 100,000 lb	24 mL/2 g min
Moisture Content of Bentonite	ASTM D4643	1 per 100,000 lb	25% max
Fluid Loss of Bentonite	ASTM D5891	1 per 100,000 lb	18 mL max
Bentonite Mass/Unit Area	ASTM D5993	1 per 200,000 sf	0.75 lb/sf MARV
Tensile Strength of Product	ASTM D6768	1 per 200,000 sf	45 lb/in MARV
Grab Strength of Product	ASTM D4632	1 per 200,000 sf	150 lb MARV
Peel Strength	ASTM D6496	1 per 50,000 sf	3.5 lb/in
Hydraulic Conductivity of Product	ASTM D5084	1 per week	$5x10^{-9}$ cm/s max
Index Flux of Product	ASTM D5887	1 per 200,000 sf	$1x10^{-8}$ $m^3/m^2/s$ max

Test	Designation	Frequency	Value
Internal Shear Strength of Product Under 2 psi Normal Load, Saturated 24 Hours	ASTM D6243	Once per lot	500 psf typical

Notes:
cm: centimeters
g: gram
in: inch
lb: pound
m: meter
MARV: Minimum Average Roll Value
max: maximum
min: minimum
mL: milliliter
oz: ounce
psf: pounds per square foot
psi: pounds per square inch
s: second
sf: square foot
sy: square yard

2. For the purposes of this Technical Specification, the Minimum Average Roll Value (MARV) is the minimum average value of the material in a particular lot calculated as the mean of the tested values minus two standard deviations, providing a 95% confidence level

3. Test frequency must be in accordance with the requirements specified herein. The Seller must ensure that at least one test is performed per construction season. Results of testing must be submitted in accordance with Section 01 33 00 – Submittal Procedures.

C. Dimensions

1. The minimum acceptable dimensions for the GCL panels must be 14 feet wide and 150 feet long. Short rolls (rolls less than 150 feet long) may be supplied but at a rate not to exceed 5% of the total square footage produced for this Project.

D. Overlap Markings

1. A minimum overlap guide-line and a construction match-line delineating the overlap zone must be imprinted with non-toxic ink on both edges of the GCL panel to ensure the accuracy of the seam. These lines must be used during Quality Assurance/Quality Control to ensure the minimum overlap is achieved. The minimum overlap guide-line must indicate where the edge of the panel must be placed in order to achieve a full 6 or 12 inches of overlap for each panel.

E. Packaging

1. All GCL rolls must be packaged in moisture-resistant plastic sleeves. The cardboard cores must be sufficiently strong to resist collapse during transit and handling.

F. Roll Identification and Labeling

1. Prior to shipment, the Manufacturer must label each roll, both on the GCL roll and on the surface of the plastic protective sleeve. Labels must be resistant to fading and moisture degradation to ensure legibility at the time of the installation. At a minimum, the roll labels must identify the following:

a) Length and width of roll

b) Total weight of roll

c) Type of GCL material

d) Production lot number and individual roll number

2.02 ACCESSORY BENTONITE

A. Accessory bentonite used for sealing seams, penetrations, or repairs must be the same granular bentonite used in the production of the GCL itself. This bentonite must also be used for gaps and other areas requiring sealing around catch basins, as shown on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. The following installation procedures are as specific as possible while recognizing that the specific requirements of the Project may necessitate minor modifications. Deviations from these procedures must be pre-approved by the ARP.

3.02 SHIPPING AND HANDLING EQUIPMENT

A. The Seller must contact the Manufacturer prior to shipment to determine the correct unloading methods and equipment if different from the pre-approved and specified methods.

B. The GCL must be supported during handling to ensure worker safety and prevent damage to the liner. Only under approved circumstances will the rolls be dragged, lifted from one end, lifted with only the forks of a lift truck, or pushed to the ground from the delivery vehicle.

C. Suitable handling equipment is described as follows:

1. Spreader Bar Assembly

a) A spreader bar assembly must include both a core pipe or bar and a spreader bar beam. The core pipe must be used to uniformly support the roll when inserted through the GCL core, and the spreader bar beam will prevent chains or straps from chafing the roll edges.

2. Stinger

    a) A stinger is a rigid pipe or rod with one end directly connected to a forklift or other handling equipment. If a stinger is used, it must be fully inserted to its full length into the roll to prevent excessive bending of the roll when lifted.

3. Roller Cradles

    a) Roller cradles consist of two large-diameter rollers spaced approximately 3 inches apart, which both support the GCL roll and allow it to freely unroll. The use of roller cradles will be permitted if the rollers support the entire width of the GCL roll.

4. Straps

    a) Straps may be used to support the ends of spreader bars but are not recommended as the primary support mechanism. Because straps may damage the GCL where wrapped around the roll and generally do not provide sufficient uniform support to prevent roll bending or deformation, great care must be exercised when this option is used, and it may be used only in accordance with the Manufacturer's approval.

3.03 GCL INSPECTION UPON DELIVERY

A. Delivery, storage, and handling of the GCL must conform to ASTM D4873.

B. Each roll must be visually inspected when unloaded to determine if any packaging or material has been damaged during transit. Repairs to damaged GCL must be performed in accordance with this Technical Specification.

    1. Rolls exhibiting damage must be marked and set aside for closer examination during deployment.

    2. Minor rips or tears in the plastic packaging must be repaired with moisture-resistant tape prior to placing the package in storage to prevent moisture damage.

    3. GCL rolls delivered to the Site will be only those indicated on GCL manufacturing Quality Control certificates.

3.04 STORAGE/STOCKPILING/STAGING

A. The Company will provide a storage location for the GCL and handle and store the GCL per ASTM D5888; however, storage of the GCL rolls will be the responsibility of the Seller. All GCL rolls must be stockpiled and maintained dry in a flat location area away from high-traffic areas but sufficiently close to the active Work area to minimize handling. GCL must be protected from dirt, water, ultraviolet light exposure, vandalism, and other sources of damage.

B. Dry storage for the GCLs is available on site at the former cast houses. Other areas may be available for outside storage, as needed. The Seller must coordinate with the ARP and acquire

approval regarding storage areas during construction. When outside storage is used, the Seller must implement appropriate temporary erosion and sediment control measures.

C. For Needle-Punched GCLs, the presence of free-flowing water within the packaging will require that roll be set aside for further examination to ascertain the extent of damage, if any. Free-flowing water within the packaging of unreinforced GCLs will be cause for rejection of that roll.

D. GCLs should be stored no higher than three to four rolls high or limited to the height at which the handling apparatus may be safely handled by installation personnel. Stacks or tiers of rolls should be situated in a manner that prevents sliding or rolling by "choking" the bottom layer of rolls.

E. Storage area must be on high ground with drainage away in all directions. Ground must have no protrusions greater than 3/8 inch and no sharp grade breaks or ruts.

F. Rolls must not be stacked on uneven or discontinuous surfaces in order to prevent bending, deformation, or damage to the GCL or to cause difficulty inserting the core pipe. Do not stack on pallets.

G. An additional tarpaulin or plastic sheet must be used over the stacked rolls to provide extra protection for GCL material stored outdoors. The tarp must be secured against displacement by wind. Unprotected GCL rolls may be rejected.

H. Bagged bentonite material must be stored and tarped next to GCL rolls unless other, more protective measures are available. Bags must be stored on pallets or another suitably dry surface that will prevent undue pre-hydration.

3.05 MANUFACTURING QUALITY ASSURANCE DOCUMENTATION

A. Sampling and testing for compliance with the requirements of this section must be coordinated by the CQC Supervisor as necessary to support the Manufacturer's Quality Control data.

3.06 SUBGRADE PREPARATION

A. The surfaces upon which the GCL will be placed must be suitable for the placement of GCL material, in accordance with this section.

B. Preparation and Examination of GCL Subgrade Surface: The subgrade surface upon which the GCL material will be installed must be continuously inspected, approved, and certified by the CQC Supervisor as it is prepared. Prior to GCL installation, the prepared surface must undergo a full inspection by the Company and CQC Supervisor, and no GCL installation may proceed until the surface has been approved by both. Furthermore, the subgrade surface must be certified by the earthwork Seller to be in accordance with the requirements of this section, as follows:

1. Site-specific compaction requirements must be followed in accordance with the Drawings and Technical Specifications.

2. The surface must be smooth and free of any debris, vegetation, roots, sticks, sharp rocks, or other deleterious materials that protrude greater than 1/2 inch from the surface; free of any voids, large cracks, ruts, ridges, or standing water or ice; and free of any other features that could be reasonably expected to puncture or damage the GCL.

3. Directly prior to deployment of the GCL, the surface must be final-graded to fill remaining voids or desiccation cracks and proof-rolled to eliminate sharp irregularities or abrupt elevation changes. The surface must be maintained in this smooth condition until the GCL is placed.

4. Subsequent to the CQC Supervisor's approval, it will be the installer's responsibility to indicate to the ARP any change in the subgrade surface condition that could cause it to be out of compliance with any of the requirements the Technical Specifications.

3.07 GCL PLACEMENT

A. GCL material must be placed in general accordance with the procedures specified as follows or as modified to account for site-specific conditions.

B. GCL Panel Position

1. Where possible, all slope panels should be installed parallel to the maximum slope, whereas panels installed in flat areas require no particular orientation. Shingle panels must be oriented to allow for downslope liquid flow.

C. Panel Deployment

1. GCL materials must be installed in general accordance with the Manufacturer's guidance and the procedures set forth in this section, subject to site-specific conditions that would necessitate modifications.

2. Deployment should proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation.

3. The GCL may be deployed on slopes by pulling the material from a suspended roll.

4. Deployment on flat areas must be conducted in the same manner as that for the slopes; however, care should be taken to minimize dragging the GCL. A slip-sheet may be used to facilitate positioning of the liner while ensuring the GCL is not damaged from underlying sources.

5. Overlaps on slopes flatter than 10% must be a minimum of 6 inches and be free of wrinkles, folds, or "fish mouths." On slopes steeper than 10%, overlap of GCLs with a bentonite

moisture content of 15% or less must be a minimum of 6 inches. If the GCL moisture content is greater than 15%, overlap must be 12 inches on slopes steeper than 10%.

6. The Seller must install only as much GCL as can be covered by a temporary tarpaulin or other such water-resistant sheeting at the end of the day. No GCL will be left exposed overnight. The exposed edge of the GCL must also be covered by a temporary tarpaulin or other such water-resistant sheeting until the next working day.

D. Seaming

1. To assist in Quality Control of installation overlap, 6-inch and 12-inch lap lines and a 9-inch match-line must be imprinted on both edges of the upper geotextile component of the GCL. Lines must be printed as continuous dashes in easily observable non-toxic ink.

2. Loose granular bentonite should be placed between panels at a rate of 1/4 pound (lb) per lineal foot of seam.

E. Detailing

1. Detail work, defined as the sealing of the liner to pipe penetrations, foundation walls, drainage structures, spillways, and other appurtenances, must be performed as recommended by the GCL Manufacturer.

F. Damage Repair

1. Prior to cover material placement, damage to the GCL must be identified and repaired by the installer. Damage is defined as any rips or tears in the geotextiles, delamination of geotextiles, or a displaced panel.

2. Rip and Tear Repair: Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and then placing a patch cut from unused GCL over the damage (damaged material may be left in place), with a minimum overlap of 12 inches on all edges.

3. Accessory bentonite should be placed between the patch edges and the repaired material at a rate of 1/4 lb per lineal foot of edge.

4. Displaced Panels: Displaced panels must be adjusted to the correct position and orientation. The adjusted panel must then be inspected for any geotextile damage or Sodium Bentonite loss. Damage must be repaired by the above procedure.

5. Premature Hydration: If the GCL is prematurely hydrated, the installer must notify the ARP for a site-specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design, dependent upon the degree of damage.

3.08 COVER MATERIAL

A. The uncovered edge of GCL panels must be protected at the end of the working day with a waterproof sheet that is secured adequately with ballast.

B. GCL Cover

1. Precautions must be taken to prevent damage to the GCL by restricting the use of heavy equipment over the liner system.

2. Equipment: Installation of the overlying components can be accomplished by utilizing equipment and methods that protect the integrity of the underlying materials, such as using lightweight, rubber-tired equipment and avoiding sudden stops, starts, or turns. No larger equipment will be allowed directly on the GCL. The overlying drainage layer must be placed to full thickness as shown on the Drawings before the Seller is allowed to travel over the GCL with larger equipment. For additional requirements regarding equipment over the GCL see Section 31 20 00 – Earthwork.

C. Placement of Drainage Layer Material, General Backfill, and Topsoil Layers

1. Placement of the Drainage Layer Material, General Backfill, and Topsoil Layer overlying the GCL must be as specified in Section 31 20 00 – Earthwork.

3.09 ACCEPTANCE

A. The Seller must retain all ownership and responsibility for GCL until acceptance by the ARP.

B. The ARP will accept GCL when:

1. Conformance tests verify product requirements.

2. Documentation of installation is complete.

3. Verification of the adequacy of all seams and repairs, including associated testing, is complete.

4. The installation is complete and overlying soil has been placed.

5. Written certification documents have been received by the ARP.

3.10 WARRANTY

A. GCL material and installation warranties provided by the Manufacturer and installer must be made a part of the final submittal documents.

B. Installation

1. The installer of the GCL material must provide a 2-year installation workmanship warranty, repairing and/or replacing any material not installed in full compliance with the requirements of this Technical Specification.

END OF SECTION

SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes requirements for removing surficial brush, trees, and vegetation from U-Ditch area, access road areas, and other excavation and construction areas and for reusing and/or disposing of the cleared materials.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

C. Section 01 74 19 – Waste Management and Disposal

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Construction Work Plan

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Different portions of the Limits of Work will require clearing and grubbing of existing vegetation. Vegetation in these areas consists primarily of grasses and low brush, with some small to moderate-sized trees. The Seller must inspect the tree sizes prior to bidding, including the region of increased tree density surrounding the U-Ditch.

B. It is desirable to minimize the amount of vegetative matter that is placed within the West Landfill, East Landfill No. 1, and East Landfill No. 2. Therefore, clearing and grubbing are required before excavation of the SUs to allow the Seller to remove vegetative matter and sod from the Site separately from the Waste Material. The ARP will provide a location for temporary storage of cleared wood, vegetative matter, and grubbed topsoils within the Site.

3.02 CLEARING REQUIREMENTS

A. Mark clearing limits and identify items within the clearing limits to remain prior to commencing clearing. Clearing limits must be marked as specified in Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control.

B. Preserve and provide protection for the following items within the clearing limits:

1. Adjacent facilities: Exercise extreme care to prevent damage to adjacent facilities that are to remain.

2. Monuments: Carefully maintain benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed by the ARP. Note the position of all monuments on the As-Built Drawings.

C. Work at the SUs must begin with the clearing of the area designated as the limits of excavation. Construction stakes establishing the limits of clearing and excavation must be located by the Seller based on the Drawings. Clearing must include removal of brush, trees, grasses, and organic materials.

D. Staked areas must be approved by the ARP prior to start of clearing.

E. The Seller must clear all trees and woody vegetation from the areas identified by cutting, breaking, uprooting, and other means. The method of clearing must be identified in the Construction Work Plan.

F. Cleared trees and woody vegetation must be temporarily stockpiled on site as directed by the ARP. Cleared material, consisting of stumps, brush, roots, rotten wood, and any other vegetation from the limits of clearing, must be sorted and stockpiled for disposal as described in this Technical Specification.

G. During clearing operations, the Seller must remove any and all surficial debris (including rubbish, debris, concrete rubble, scrap metal, and any other objectionable materials) from the limits of clearing as indicated on the Drawings using the Seller's method of choice. The surficial debris must be considered Waste Material and must be segregated from the cleared trees and woody vegetation. Waste Material will be managed in accordance with Section 01 74 19 – Waste Management and Disposal.

3.03 GRUBBING REQUIREMENTS

A. Following clearing, the Seller must grub the cleared areas by removing all ground vegetation, grasses, and sod. However, care must be taken not to remove any underlying Waste Material. The method of grubbing must be identified in the Construction Work Plan. Grubbed vegetation and sod must be stockpiled for disposal, as described in this Technical Specification.

3.04 DISPOSAL OF MATERIALS

A. Cleared and grubbed material must be disposed of in accordance with Section 01 74 19 – Waste Management and Disposal.

B. Cleared or grubbed material must not be disposed in the West Landfill, East Landfill No. 1, or East Landfill No. 2, unless written authorization is provided by the ARP.

C. Burning will not be allowed unless accepted by and directed by the ARP.

END OF SECTION

SECTION 31 20 00
EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. This section describes general requirements for earthwork, including preparation, excavation, on-site consolidation, placement and compaction of backfill material, ground preparation for foundations, and installation of low permeability cap materials.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 50 00 – Temporary Facilities and Controls

C. Section 01 56 15 – Protection of Existing Utilities

D. Section 01 57 13 – Erosion, Sediment, and Pollution Control

E. Section 01 74 19 – Waste Management and Disposal

F. Section 31 05 16 – Soils and Aggregates

G. Section 31 05 19.13 – Geotextiles for Earthwork

H. Section 31 05 19.23 – Geosynthetic Clay Liners

I. Section 31 11 00 – Clearing and Grubbing

J. Section 31 23 33 – Trenching and Backfilling

K. Section 31 32 13 – Soil Mixing Stabilization

L. Section 32 90 00 – Hydroseeding

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

2. ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

B. OSHA Part 1926 (Safety and Health Regulations for Construction), Subpart P (Excavations)

C. OSHA Pamphlet 2226, Trenching and Excavation Safety

D. WAC 296-155, Safety Standards for Construction Work

1.04 SUBMITTALS

A. Submittals must be submitted in accordance with timelines and requirements in Section 01 33 00 – Submittal Procedures.

1.05 QUALITY CONTROL

A. The Company will accept earthwork when:

1. The material installation and compaction are complete and accepted.

2. Quality Assurance conformance test results meet the requirements of the Contract Documents.

3. Required documentation from field laboratory testing has been received and accepted.

4. All repairs have been completed to the ARP's satisfaction.

5. All required documentation from the material supplier and Seller has been received and accepted.

B. In-place density and moisture content will be determined by ASTM D6938.

1.06 NOTICE FOR REVIEW, SURVEYING, AND TESTING

A. Notify the ARP for review of surface preparation prior to commencement of proof-rolling.

B. Give advance notice of at least 1 working day to the ARP when ready for compaction or subgrade testing and inspection prior to placement of overlying backfill layer, overlying GCL, or geosynthetic deployment in each SU and landfill and in the PRB or Work Areas associated with stormwater elements. This requirement applies to each material type and location where material is being imported and placed or regraded from either borrow or on-site sources, including berm and drainage ditch construction.

C. The Seller must provide a minimum of 2 working days' notice to the ARP prior to surveying areas for measurement and payment so that the Company can perform an independent survey, if elected. The Seller must sequence the Work to allow enough time for the Company's surveyor to complete the Quality Assurance survey.

1.07 PROTECTION

A. Existing Utilities must be protected in accordance with Section 01 56 15 – Protection of Existing Utilities.

B. Protection of Placed Soil Layers

1. The Seller is responsible for protection of Work during construction. The Seller must include additional cover or erosion control measures (e.g., protection from wetting, drying, or freezing by providing temporary drainage, features, and blankets or protective cover layers as necessary) to protect soils placed throughout the Project as necessitated by the Seller's construction sequencing.

2. Exposed soils must be stabilized in accordance with Section 01 57 13 – Erosion, Sediment, and Pollution Control.

3. Equipment and methods must be utilized to protect the integrity of cover materials scheduled to remain in place. The Company may examine areas for damage at any time. The Seller must repair damage as required by the Company and must modify construction methods to prevent further damage.

4. Protection must be maintained until constructed soil layers or prepared subgrade have been permanently covered.

5. No additional payment will be made for repair of eroded or damaged slopes.

C. Protect all excavations from surface water inflow.

1.08 ANTICIPATED GROUNDWATER ELEVATIONS

A. The following are descriptions of anticipated groundwater elevations during excavation. The Seller must sequence Work to maximize material removal based on the following categories:

1. The final excavation elevation is at or below the Seasonal Low Groundwater Elevation (i.e., groundwater is anticipated to be encountered year-round). The Seller must plan to perform excavation in these SUs during the period when the groundwater table is expected to be the lowest to maximize material removal. This generally applies to the following SUs: SU3, SU5, and SU8. Excavation in these areas must occur between August 1 and September 30.

2. The excavation elevation is between the Seasonal Low and Seasonal High Groundwater Elevations (i.e., groundwater is anticipated to be encountered during the wet months but is not likely to be encountered during the dry months). The Seller must plan to perform excavation Work in these areas during the dry months. This generally applies to SU2.

3. The excavation elevation is above the Seasonal High Groundwater Elevation (i.e., groundwater is not anticipated to be encountered). This generally applies to SU10.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials must meet requirements specified in Section 31 05 16 – Soils and Aggregates.

PART 3 EXECUTION

3.01 GENERAL

A. The Company reserves the right to make minor adjustments or revisions in lines or grades, if found necessary as the Work progresses.

B. Seller must not start clearing or grading until the proposed Work has been staked out. The Company must verify the staked extents prior to starting any soil disturbance activities.

C. The Seller must suspend earthwork when satisfactory results cannot be obtained because of rain, extreme weather, or other unsatisfactory conditions.

D. The Seller must drag, blade, or slope the grade to provide proper surface drainage as required by the temporary water control Drawings.

E. Hauling equipment must be routed around and away from areas of soft or yielding subgrade.

F. Soil or other foreign materials that fall on pavements must be promptly removed.

G. Equipment

1. The Seller must select equipment suitable for Site conditions, including considerations of operating on compressible material or in wet conditions.

2. The Seller must provide compaction equipment appropriate for the material types to obtain the densities specified.

    a) Hand-operated compaction equipment must be used in areas closer than 2 feet to structures to obtain the compaction densities specified.

    b) Operate compaction equipment in accordance with the manufacturer's instructions and recommendations. If inadequate densities are obtained, provide larger and/or different type equipment at no additional cost to the Company.

3. The Seller must furnish and maintain earth-moving equipment in satisfactory condition and operate such equipment as necessary to uniform density, section, and smoothness of grade.

3.02 PREPARATION

A. Install erosion and sediment control measures as described in Section 01 57 13 – Erosion, Sediment, and Pollution Control.

B. Prepare Staging Areas as described in Section 01 50 00 – Temporary Facilities and Controls.

C. Perform tree removal prior to cleaning and grubbing between the two branches of the U-Ditch.

D. Perform clearing and grubbing prior to excavation and on-site consolidation activities, as described in Section 31 11 00 – Clearing and Grubbing.

E. Perform grading and filling of the U-Ditch and construct perimeter ditch along northern edge of West Landfill in accordance with the lines, limits, and grades on the Drawings and as summarized as follows:

   1. U-Ditch: Excavate U-Ditch soils and regrade as shown on the Drawings. Excavated material can be used as fill within the U-Ditch, except as shown on the Drawings.

   2. West Landfill: Construct perimeter ditch and berm along north edge of West Landfill using imported Select Backfill material. Perform compaction as specified in Paragraph 3.06B.

F. Install temporary cofferdam or berm to isolate water from Pump Station 004.

G. Perform regrading of roadside ditch adjacent to East Landfill No. 1 to drain toward temporary wet well as described in Section 33 05 61 – Concrete Manholes.

H. Perform ground improvement and install settlement monitoring equipment prior to berm construction and on-site consolidation activities associated with East Landfill No. 1, as described in Section 31 32 13 – Soil Mixing Stabilization.

I. Perform grading and construct ditches and berms along perimeter of landfills in accordance with the lines, limits, and grades on the Drawings and as summarized as follows:

   1. West Landfill: Following U-Ditch reconfiguration, construct perimeter ditch and grading using existing overburden material from the West Landfill and imported Select Backfill material. Perform compaction as specified in Part 3 Paragraph 3.06B of this Technical Specification and coordinate with the Company if required compaction is unable to be achieved using existing overburden materials. The Seller may be required to import additional material if suitable compaction is not achieved with material from on-site sources.

   2. East Landfill No. 1: Following ground improvement, construct perimeter berms and grading using Select Backfill. Landfill berm material must be placed and compacted in lifts of 12 inches or less. Each lift must be compacted to 90% of maximum dry density as determined by ASTM D1557.

3. East Landfill No. 2: Regrade perimeter berms using existing berm material.

3.03 EXCAVATION

A. All excavations, trenching, and shoring must comply with the rules and regulations as established by WAC 296-155 and OSHA Construction Safety and Health Regulations 29 CFR, Part 1926, Subpart P, Excavation, Trenching and Shoring. OSHA Pamphlet 2226, Trenching and Excavation Safety, can be used as an additional aid. Trenching must be in accordance with Section 31 23 33 – Trenching and Backfilling.

B. The Seller must supply all materials, shoring, and bracing needed to protect the Work, adjacent structures, and facilities and to confirm safe working conditions in the excavations.

C. Proceed with excavation, on-site consolidation, and/or stockpiling in an orderly manner that prevents the different materials from being mixed together during or after excavation.

D. Excavation Limits

1. Lines, grades, and dimensions shown on the Drawings are approximate, and the Seller must excavate to the visual horizontal and vertical limits of waste.

2. The Seller must notify the ARP when any of the following occur within an SU so that they can either verify that Work is complete or provide direction on additional material removal:

a) The visual horizontal and vertical limits of waste have been reached.

b) The visual horizontal and vertical limits of waste extend beyond the Excavation Limits and Design Excavation Grade.

c) Groundwater is encountered prior to reaching Excavation Limits and Design Excavation Grade.

1) In locations where the groundwater is encountered before the bottom of waste is identified, the Seller will be required to extend the excavation at the ARP's direction up to 2 feet below the observed groundwater level.

3. Do not excavate beyond the horizontal Excavation Limits shown on the Drawings prior to consulting with the Company.

4. Grade the surface of over-excavated areas to create a smooth transition to adjoining areas and slope to drain.

E. Water Management

1. The Seller must provide ample means and devices to prevent surface water from entering excavations.

2. Contaminated groundwater is anticipated to be encountered in multiple SUs. The Seller should manage the groundwater within the SU. If it becomes necessary to remove any groundwater, approval must first be obtained from the Company. The groundwater must be managed as remediation water as directed by the Company and as described in Section 02 71 00 – Water Management and Treatment.

3.04 ON-SITE CONSOLIDATION

A. Hauling Requirements

1. Trucks hauling waste to the on-site landfills must use designated roads or constructed access roads, as shown on the Drawings and as approved by the Company, between the subject excavation area, the Staging Area (if temporary stockpiling is necessary), and the on-site landfills.

2. The Seller must determine the number of trucks required based on excavation loading time, truck round-trip times, and the standby time the Seller wishes to accrue.

B. Material Handling and Stockpiling

1. The Seller may temporarily stockpile excavation material prior to final placement in the on-site landfills for the purposes of managing water content of material or segregating unsuitable debris from the material prior to placement in the landfills.

   a) Wet material that is unsuitable for placement in the on-site landfills may be blended with dry material that is designated to be disposed of within the same landfill unit.

2. Temporary stockpiles may be located within the on-site landfill that the material will be disposed in or within the SU that the material originates from. All other locations must be approved by the Company.

C. Placement and Compaction of Waste in On-Site Landfills

1. Regrading in SU2 must be sequenced such that regraded material from SU1 material is underlying SU2 material in the final landfill configuration.

2. Prior to placing waste in East Landfill No. 1, the Seller must place Geotextile Type 1 as specified in Section 31 05 19.13 – Geotextiles for Earthwork.

3. Waste must be placed directly into the on-site landfills or placed in a temporary stockpile within the recipient landfill and spread out in lifts that are no thicker than 1 foot. Each sequential lift must be compacted by at least two full passes of a compactor over the entire lift surface. This compaction is intended to provide a uniform density to

prevent differential settlement. Each layer of waste must be compacted to 80% of maximum dry density as determined by ASTM D1557.

4. The final constructed surface of the consolidated waste in all landfills must be uniform, with no undulations measuring larger than 4 inches over a distance of 1 foot, and subject to inspection by the Company.

5. The Seller must maintain a crowned or lightly sloping surface to the placed waste in order to maintain positive drainage of the ground surface to prevent ponding. Ultimately, waste placed within the on-site landfills must be graded to the final extents shown on the Drawings. The final grades may vary based on the amount of waste excavated and will be coordinated with the Company.

6. The Seller must manage material for appropriate moisture content to achieve compaction requirements. This may require adding water or blending material to reduce moisture content.

3.05 PLACEMENT OF TEMPORARY SEASONAL COVER

A. Place Temporary Seasonal Cover on East Landfill No. 1 and East Landfill No. 2 prior to the end of Season 1, as shown on the Drawings.

B. Material must be placed in a single lift and compacted by at least two full passes of a compactor over the entire lift surface to produce an unyielding surface. The final layer thickness must be 6 inches after compaction.

C. Construct on-slope landfill ditches to convey water to existing ditches between construction seasons.

D. Hydroseed the Temporary Cover Material with Hydroseed Mix No. 3 after the surface has been inspected by the Company.

3.06 PLACEMENT AND COMPACTION OF BACKFILL MATERIAL

A. Backfill Placement

1. Do not place backfill materials in an SU until the excavation activities in that SU have been accepted as complete by the Company. Acceptance will include an inspection of the excavation and completed required surveys.

2. Acceptance in SU9, SU11, and the Diesel AST Area is contingent on the Company's testing of the excavated surface. The Seller shall plan for a 7-day turnaround time for the reporting of test results from the Company. The Seller may be required to perform additional excavation based on the test results.

3. For larger excavations (e.g., SU3), the Seller may request partial acceptance of the excavation so that progressive excavation and backfill activities may occur. This request must be submitted 3 days prior to planned backfill activities and include the required survey.

4. The Seller must place Select Backfill, Reactive Backfill, and Gravel Surface Material to the limits and grades shown on the Drawings.

5. Fill materials must not be placed over frozen or unstable subgrade surfaces.

6. Stop fill placement temporarily during unsuitable weather conditions.

7. Uniformly grade areas to provide a finish surface that is smooth, compacted, and free of irregularities. Comply with compaction requirements and grades to cross sections, lines, and elevations indicated.

8. Protect newly graded surfaces from erosion in accordance with Section 01 57 13 – Erosion, Sediment, and Pollution Control.

B. Compaction Methods

1. Compaction efforts will be verified in the field by the Company using the nuclear gage compaction testing method, as defined in ASTM D6938, provided by the Seller.

2. Each layer of Select Backfill and Reactive Backfill must be compacted as follows:

   a) Below the observed groundwater table, if encountered, place material in lifts as practicable and compact entire lift surface by at least two full passes of a compactor.

   b) Above the observed groundwater table and deeper than 2 feet from below final grade, compact lifts to 80% of maximum dry density as determined by ASTM D1557. No layer may exceed 12 inches in depth before compaction.

   c) Within 2 feet from the final ground surface shown on the Drawings, compact lifts to 90% of maximum dry density as determined by ASTM D1557. No layer may exceed 12 inches in depth before compaction.

3. Each layer of Gravel Surface Material must be compacted to 95% of maximum dry density as determined by ASTM D1557. No layer may exceed 6 inches in depth before compaction.

4. The Seller must manage material for appropriate moisture content to achieve compaction requirements. This may require adding water or blending material to reduce moisture content.

5. If the Seller cannot attain the specified densities with the maximum lift thicknesses specified, the lift thickness must be reduced and/or heavier compaction equipment must be provided.

C. Final Restoration

1. Gravel Surface material must be placed on the Select Backfill as noted on the Drawings and in accordance with Section 31 05 16 – Soils and Aggregates.

2. Hydroseed must be placed on the Topsoil as noted on the Drawings and in accordance with Section 32 90 00 – Hydroseeding.

3.07 INSTALLATION OF LOW PERMEABILITY CAP

A. Placement and Compaction of Soil Subgrade Material

1. Soil Subgrade Material must have a 6-inch minimum cover thickness over the waste. It must be placed and compacted in lifts of 8 inches or less. Each lift must be compacted to 90% of maximum dry density as determined by ASTM D1557.

2. The final constructed surface of the Soil Subgrade Material must be uniform, with no undulations measuring larger than 1 inch over a distance of 1 foot; must be compacted with a smooth-drum roller to form a firm stable base; and is subject to the treatment and inspection requirements of Section 31 05 19.23 – Geosynthetic Clay Liners.

3. The following activities must be followed to verify that the GCL is not damaged from the underlying surface during installation:

   a) Seller must rake or remove by hand, as necessary, any rocks or debris that protrude from the surface greater than 1/2 inch.

   b) Any survey stakes, if used, must be pulled out of the soil surface. Breaking off of the survey stakes at the ground surface is not allowed.

   c) The GCL installer and Company must examine and accept the surface prior to the placement of the GCL.

B. Placement of the GCL

1. Placement of the GCL must be as specified in Section 31 05 19.23 – Geosynthetic Clay Liners.

C. Placement of Drainage Layer Material

1. The Drainage Layer Material must be placed in a manner that does not puncture, cut, tear, or otherwise damage the GCL and is consistent with Section 31 05 19.23 – Geosynthetic Clay Liners. No additional compaction effort is necessary.

2. The underlying GCL products must be inspected and approved by the Company before placement of Drainage Layer Material. Remove all weighting materials prior to placement.

3. Perimeter anchor trenches and adjacent stormwater trenches that incorporate the GCL must be completely backfilled and compacted before placement of overlying material.

4. When placing material, care must be used to avoid damage to the underlying GCL. Any damage to the GCL during placement of Drainage Layer Material must be repaired at the Seller's sole expense.

5. In no case will tracked or other equipment be allowed to operate on less than 12 inches of cover over the GCL.

6. Track-mounted equipment with low ground pressure tracks, having a ground pressure of 5 pounds per square inch (psi) or less, must be used for spreading materials over the GCL.

7. While operating equipment, avoid sharp turns, starts, or stops that could damage the underlying geosynthetic material.

8. Materials placed over GCL installed on a slope must be pushed from the bottom of the slope or perpendicular to the slope. No material, regardless of material depth, may be pushed downslope over the GCL.

D. Placement of Geotextile

1. Placement of Geotextile Type 2 must be installed as specified in Section 31 05 19.13 – Geotextiles for Earthwork.

E. Placement of General Backfill

1. Material must be placed in a single lift.

2. Materials placed over Geotextile Type 2 installed on a slope must be pushed from the bottom of the slope or perpendicular to the slope. No material, regardless of material depth, may be pushed downslope.

3. While operating equipment, avoid sharp turns, starts, or stops that could damage the underlying geosynthetic material.

4. Track-mounted equipment with low ground pressure tracks, having a ground pressure of 5 psi or less, must be used.

5. No additional compaction effort is necessary.

F. Placement of Topsoil Layer

1. Topsoil must be placed in a single uniform lift and raked smooth.

2. Track-mounted equipment with low ground pressure tracks, having a ground pressure of 5 psi or less, must be used.

3. No additional compaction effort is necessary.

G. Hydroseed must be placed on the Topsoil as noted on the Drawings and in accordance with Section 32 90 00 – Hydroseeding.

3.08 CONSTRUCTION OF ACCESS ROAD

A. The Seller must place Gravel Surface Material to the limits and grades shown on the Drawings and in accordance with Section 31 05 16 – Soils and Aggregates.

The Seller must overexcavate and compact the native surface prior to placement of Gravel Surface Material. Each layer of Gravel Surface Material must be compacted to 95% of maximum dry density as determined by ASTM D1557. No layer may exceed 6 inches in depth before compaction.

END OF SECTION

SECTION 31 23 19
DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the performance requirements for the dewatering of excavations associated with the installation of gravity storm drains, manholes, stormwater pump station facilities, and force mains as part of execution of the Work.

B. Active dewatering during excavation of SU2, SU3, SU5, SU8, and SU10 is not required.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

C. Section 02 71 00 – Water Management and Treatment

D. Section 31 23 34 – Trenching and Backfilling

E. Section 33 05 61 – Concrete Manholes

F. Section 33 11 17 – HDPE Gravity Stormwater Pipe

G. Section 33 42 16 – HDPE Stormwater Force Main Piping

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Water Management Plan, as part of the EPP

2. TESC Plan, as part of the EPP

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. The Seller's attention is called to shallow groundwater conditions at the Site.

B. Excavations for stormwater facilities, including gravity storm drains, manholes, stormwater pump station facilities, and force mains are likely to encounter groundwater. Dewatering of groundwater from excavations must be as required by these Technical Specifications.

C. The Seller must submit the means and methods of dewatering as part of the Water Management Plan (part of the EPP)

D. Identify, select, furnish, install, maintain, and operate temporary pumps, pipe, and other equipment necessary for removal of water from the various parts of the Work, and for maintaining the foundations and other parts of the Work free from water as required for constructing each part of the Work. All water control must conform to the requirements contained in Section 02 71 00 – Water Management and Treatment.

E. The Seller must review available data provided as part of the Final Revised EDR Appendix A to satisfy themselves regarding geologic and groundwater conditions. Additional information not included in the Contract Documents or the Final Revised EDR can be provided by the Company.

3.02 DEWATERING

A. Provide, maintain, and operate necessary pumps and other equipment for removal of water from excavations and trenches for structures and pipe that are to be constructed.

B. Accomplish dewatering, as needed, by use of motor or engine-driven pumps with adequate lift capacity, discharge piping, hoses and piping, valves, and intakes.

C. If a generator is to be used to operate pumping equipment, the generator must be placed above the high-water line within an approved spill protection area.

D. Provide dewatering facilities capable of operating in freezing temperatures if freezing weather conditions occur or are expected to occur.

E. The Seller must provide the pumps, piping, and equipment to transfer dewatering effluent to the storage tanks at Facility 77, as shown on the Drawings and in accordance with the requirements outlined in Section 02 71 00 – Water Management and Treatment. The Seller may use permanent force main piping if it is installed and fully operational and has been accepted for use by the Company prior to dewatering activities. The Seller may also use existing inactive stormwater piping located near the west groundwater area. Otherwise, the Seller must provide all equipment and piping to convey the dewatering effluent to the storage tanks at Facility 77 for monitoring and management by the Company.

F. Dewatering Below Groundwater Level

1. Where infrastructure excavation and trenching extends below the groundwater level, dewater the portion below the groundwater level in advance of excavation.

2. Dewater to prevent loss of fines from the foundation, maintain the stability of the excavation, and allow construction work to be performed in the dry.

3. All dewatering water must be captured and conveyed to Facility 77.

G. Seepage Control

1. Before excavating to final grade for pipe and structures, bring the water level to an elevation at least 3 feet below the required subgrade elevation.

2. Maintain this water level until pipe has been placed, structures have been completed, and backfill has been placed.

3. After backfill has been placed, with approval of the Company, allow groundwater to rise to natural levels.

4. Control pumping and dewatering operations so that the groundwater level rises slowly and uniformly along the entire length of pipe and around each structure.

3.03 TREATMENT BY COMPANY

A. Characterization of dewatering effluent at the Facility 77 storage tanks or the Facility 77 extension will be performed by the Company. The Seller must coordinate with the ARP before conveying dewatering effluent to Facility 77.

B. The Seller must deliver water to the Facility 77 storage tanks.

C. See Section 02 71 00 – Water Management and Treatment for additional requirements.

3.04 MAINTENANCE

A. The Seller must maintain the dewatering system in good working order, subject to the ARP's observations and approval.

B. If replacement of infrastructure is needed due to breaks, tears, or other damages to the dewatering system, the Seller must replace damaged materials or equipment in an expeditious manner. Equipment and materials are also subject to replacement due to poor functionality.

END OF SECTION

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for trenching, backfilling, and compaction for gravity stormwater and pressurized stormwater force main piping, stormwater manholes, pump stations, related appurtenances, and other miscellaneous excavations and compaction.

1.02 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures

B. Section 01 74 19 – Waste Management and Disposal

C. Section 31 20 00 – Earthwork

D. Section 31 05 16 – Soils and Aggregates

E. Section 31 23 19 – Dewatering

F. Section 33 05 61 – Concrete Manholes

G. Section 33 42 11 – Corrugated HDPE Gravity Stormwater Pipe

H. Section 33 42 16 – HDPE Stormwater Force Main Piping

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils

2. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3)

B. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

C. OSHA:

1. Construction Industry Standards

2. Occupational Safety and Health Standards

3. OSHA Pamphlet 2226, Trenching and Excavation Safety

4. Construction Safety and Health Regulations 29 CFR, Part 1926, Subpart P

D. WISHA:

1. Chapter 296-155, Part N, WAC – Washington Safety Standards for Construction Work; Excavation, Trenching, and Shoring

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Imported Aggregate Materials

a) The Seller must submit source information and particle size analysis (gradation) test results, in accordance with ASTM D422, for approval of imported aggregate and soil materials prior to hauling materials to the Site.

1.05 REQUIREMENTS

A. The Company reserves the right to reject materials that, in the opinion of the Company, are determined to be substandard for any reason. In the event material is hauled to the Site without prior approval and is determined by the Company to be unacceptable, all materials must be removed from the Site at no additional cost to the Company.

B. The Seller must be responsible for planning, designing, installing, maintaining, and removing support and protection for excavations and trenches greater than 4 feet in depth in accordance with Chapter 296-155, Part N, WAC and applicable OSHA and WISHA requirements.

C. Excavation support systems must be designed and installed to protect surrounding property and structures. Excavation support systems must also be designed so that installation and removal of the support systems does not disturb soil adjacent to or below the required excavation or trench section.

D. Excavation support systems must be designed to meet water control requirements, as specified in Section 31 23 19 – Dewatering.

E. Work at the East Landfill Pump Station may not impact the adjacent on-site wetland or wetland buffer. Shoring is required for Work in this area.

PART 2 PRODUCTS

2.01 GENERAL

A. Construct the excavation to the lines shown on the Drawings. Install and remove support systems in such a manner as not to disturb soil adjacent to the trench or below the trench or excavation. Installation of horizontal strutting below the barrel of a pipe and use of the pipe as a support are not permitted.

B. Unless otherwise indicated or approved by the Company, remove all sheeting, shoring, and bracing after placement and compaction of backfill.

2.02 EXCAVATED MATERIALS

A. The Seller's operations in excavations must be such that excavations will yield as much suitable material for use in permanent construction required under these Technical Specifications as practicable.

B. Stockpile material for reuse so that characterization can be conducted as described in Section 01 74 19 – Waste Management and Disposal.

C. Place excavated materials that are too wet for immediate compaction temporarily in stockpiles until moisture content is reduced sufficiently to permit them to be placed and properly compacted to meet the requirements of these Technical Specifications.

2.03 BACKFILL MATERIALS

A. Use backfill material from material excavated in required excavations, where possible. If sufficient suitable material is not available from on-site excavations, obtain additional material from commercial borrow sources as approved by the Company.

1. The Company makes no guarantee that the specified backfill materials are available from materials obtained from excavations for pipe trenches and structures.

2. Process on-site materials as needed to produce materials meeting the requirements of these Technical Specifications.

B. Pipe Bedding

1. Pipe bedding must be furnished, placed, and compacted in accordance with the standard trench details shown on the Drawings. Pipe bedding must be imported material or suitable native material meeting the requirements of Section 9-03.12(3) of the WSDOT/APWA Standard Specifications.

C. Select Backfill

1. Select backfill used as backfill in the pipe zone must be imported material or suitable native material meeting the requirements of Section 9-03.12(3) of the WSDOT/APWA Standard Specifications.

D. Final Backfill

1. Final backfill in trenches and other excavations must be suitable native material or imported material free of organic material, frozen lumps, wood, concrete, other debris, or rock larger than 3 inches in maximum dimension. Final backfill must be approved by the Company prior to placement.

PART 3 EXECUTION

3.01 TRENCHING

A. All excavations, trenching, and shoring must comply with the rules and regulations as established by WAC 296-155 and OSHA Construction Safety and Health Regulations 29 CFR, Part 1926, Subpart P, Excavation, Trenching and Shoring. OSHA Pamphlet 2226, Trenching and Excavation Safety, can be used as an additional aid.

B. Excavate trenches for pipe and appurtenances to the lines, grades, and dimensions shown on the Drawings.

C. Finish the bottom of the trench to the lines and grades shown on the Drawings.

D. Perform trench excavation in the dry. Dewater area to be excavated in accordance with Section 31 23 19 – Dewatering.

E. Asphalt pavement cutting, removal, and replacement must be in accordance with Section 32 12 16 – Asphalt Paving.

F. Concrete pavement cutting, removal, and replacement must be in accordance with Section 32 13 13 – Concrete Paving and Miscellaneous Concrete.

G. Aggregate surfacing must be in accordance with Section 31 05 16 – Soils and Aggregates.

3.02 OVER-EXCAVATION

A. If foundation material is excavated beyond lines required to receive the pipelines and structures, fill overexcavation with suitable materials and compact in accordance with Article 3.06.

B. If foundation material is disturbed or loosened during excavation or otherwise, compact foundation in place or remove and replace it with suitable material and compact in accordance with Article 3.05.

3.03 STOCKPILE

A. Stockpile excavated materials meeting the material requirements for pipe bedding or backfill until processed or placed as backfill material.

B. Do not compact stockpiled material.

3.04 DISPOSAL

A. Excess material from excavations must be stockpiled. Prior to disposal, the Seller must coordinate with the ARP to determine whether stockpiled material is suitable for use and needed as backfill. If stockpiled excess material is not suitable for reuse as backfill on other portions of the overall Project, the material must be disposed of at a suitable location off site, as required by the Company.

B. Dispose of excavated materials that are unsuitable for, or are in excess of, embankment, backfill, or other earthwork requirements, as directed by the Company.

3.05 PLACEMENT OF BACKFILL

A. General Backfill

1. Place backfill to the lines and grades specified, or as directed by the Company.

2. Place backfill in the dry for structures and pipelines above the high water line. Dewater excavations for structures and pipelines below the high water line as outlined in Section 31 23 19 – Dewatering.

3. Place structural fill below and around reinforced concrete and wet well structures as shown on the Drawings or as specified or directed by the Company. Place structural fill in 6-inch lifts and compact to 95% of maximum dry density as determined by ASTM D1557.

4. Outside paved areas and roadways, place additional backfill in excavations to the depth and lines specified. Place backfill in 6-inch lifts and compact to 90% of maximum dry density as determined by ASTM D1557.

5. In or adjacent to (within 10 feet of) paved areas and roadways, place additional backfill in excavations to the depth and lines specified. Place backfill in 6-inch lifts and compact to 95% of maximum dry density as determined by ASTM D1557.

6. Where backfill is to be placed behind or against concrete structures, compaction of backfill against structures must not be allowed until the concrete has reached its 7-day strength.

7. Topsoil must be replaced to match the grades and lines of the existing ground on either side of the excavation. Topsoil backfill should remain loose.

8. The type and amount of material used for backfill, and the manner of placing material, must be subject to approval by the Company.

9. Do not place backfill material when either the material or the surfaces on which it is to be placed are frozen.

10. Do not use material removed in stripping or high in organic matter for backfill material. Stockpile instead for use as topsoil.

B. Trench Bedding and Backfill

1. Place pipe bedding in trench to the lines and grades shown on the Drawings. Place pipe bedding in 6-inch lifts and compact to 95% of maximum dry density as determined by ASTM D1557.

2. Place select backfill carefully around the pipe to the lines and grades specified. Select backfill must be brought up simultaneously on both sides of the pipe to the top of the pipe. After the pipe is covered, place select backfill over the pipe to the depth indicated on the Drawings. Place select backfill in 6-inch lifts and compact to 95% of maximum dry density as determined by ASTM D1557.

3. Place final backfill to the top of the trench. Place final backfill in 6-inch lifts and compact to 90% of maximum dry density as determined by ASTM D1557 for backfill outside paved areas or roadways. For backfill within paved areas or roadways, place final backfill in 6-inch lifts and compact to 95% of maximum dry density as determined by ASTM D1557.

4. Do not place backfill in pipe trenches when either the material or the surfaces on which the backfill will be placed are frozen.

3.06 COMPACTION OF BACKFILL

A. The Seller must compact backfill by means of an appropriately sized static, vibratory, or impact-type compactor suited to the soil and physical restrictions of the area to be compacted. Although the Seller is responsible for the selection of the method of compaction, selection of an inappropriate method will not relieve the Seller of the responsibility to achieve the specified result. Jetting, sluicing, or water settling will not be permitted.

B. Topsoil must not be compacted.

C. The Seller must perform compaction testing to demonstrate compliance with these Technical Specifications, as outlined in Section 31 20 00 – Earthwork.

D. The Company may perform compaction testing, as needed, to ensure compliance with the compaction requirements of these Technical Specifications, as follows:

1. The Company must, at his discretion, obtain and pay for the services of an independent soils testing laboratory to conduct on-site density tests during material placement.

2. The frequency of compaction testing must be as determined by the Company.

3. Compaction testing performed by the Company must not relieve the Seller of his obligation to place and compact trench backfill materials as required in these Contract Documents.

3.07 PROTECTION

A. To provide adequate protection for compacted backfill in and around pipe, the Company reserves the right to direct the Seller to place a sufficient amount of backfill or embankment material over compacted backfill within 72 hours after completion of compacting backfill.

END OF SECTION

SECTION 31 32 13
SOIL MIXING STABILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements of the shallow soil mixing stabilization necessary prior to constructing perimeter berms for East Landfill No. 1, as shown on the Drawings. The work consists of furnishing all plant, labor, equipment, and materials, and performing all operations as required to increase the strength of soils within the area defined on the Drawings using a grout injection soil mixing method.

B. This section provides the performance specifications for settlement instrumentation to be installed above the geotextile and below the consolidated waste at East Landfill No. 1.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Requirements

B. Section 01 32 00 – Construction Progress Documentation

C. Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control

D. Section 31 11 00 – Clearing and Grubbing

1.03 REFERENCES

A. American Petroleum Institute (API) Spec 13A –Drilling Fluids Materials

B. ASTM Standards:

1. ASTM C150 – Standard Specification for Portland Cement

2. ASTM D1633 – Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

3. ASTM D2166 – Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

4. ASTM D4380 – Standard Test Method for Determining Density of Construction Slurries

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Requirements:

1. Soil Stabilization Plan, including settlement monitoring, as part of the Construction Work Plan

B. Submit the following in accordance with Section 01 32 00 – Construction Progress Documentation:

1. Daily Activity Report: The Seller must submit Daily Activity Reports to the ARP in the morning following completion of Work that day. The Daily Activity Report must document the progress of the soil mixing stabilization construction, present the results of the Quality Control parameter monitoring, and present the results of the strength and permeability testing on cured samples.

a) The Daily Activity Report must include (at a minimum) the results of the following Quality Control parameters:

1) Identification of Work Area

2) Rig number

3) Date and time (start and finish) of column and/or panel installation

4) Map indicating details of completed Work including: column and/or panel number(s), column and/or panel top and bottom depths or elevations, and column and/or panel widths

5) Grout injection volume

6) Grout injection rate versus depth

7) Slurry specific gravity measurements

8) Mixing time, mixing speed, and amounts of reagents and water added to each batch

9) Location of test samples, test methods, and results

10) Description of obstructions, interruptions, and/or other difficulties encountered during installation and how they were resolved

2. If approved for use by the ARP, the Seller must provide a written statement from the manufacturer as to the use of any admixtures or softening agents, dispersions, retarders, or plugging or bridging agents to the water or the grout, its effect on the stabilized soil material, its long-term performance and stability, and its effect on the environment.

1.05 QUALITY ASSURANCE

A. The ARP may perform Quality Assurance testing on the soil mixing stabilization material and the grout mix, including the cement and water mix. The ARP's testing in no way

relieves the Seller of the responsibility for performing tests necessary to meet the construction requirements. All of the Seller's routine testing procedures must be available for the ARP to inspect at any time.

B. The Seller will allow access for the ARP to conduct Quality Assurance testing. The Seller must provide testing as required in this Technical Specification. Sampling and testing to assure compliance to the Contract provisions must be in accordance with this Technical Specification. The ARP reserves the right to require additional testing as deemed necessary.

1.06 CHARACTER OF MATERIAL TO BE STABILIZED

A. Details of the characteristics of soil to be stabilized are located in Appendices A and B of the Final Revised Engineering Design Report.

1.07 PERFORMANCE REQUIREMENTS

A. The stabilized material must meet the performance requirements presented in this section over the lateral extent of the area shown on the Drawings and to a minimum depth of 15 feet below the existing surface.

B. The Unconfined Compression Test, as specified in ASTM D1633, must be performed on representative samples of treated material. The tests listed in the following table must be performed on samples that have been cured for a minimum of 3, 7, and 28 days. The preliminary 3- and 7-day test durations will be used by the Seller for adaptive management purposes. Verification will be measured against the final 28-day cure duration, as per the ASTM method.

Test	Method	Required Minimum Value After 28 Days of Curing
Unconfined Compressive Strength	ASTM D 1633	5,000 psf (35 psi)

Note:
psf: pounds per square foot
psi: pounds per square inch

C. No more than 10% of tests may be less than the required strength at 28 days.

PART 2 PRODUCTS

2.01 CEMENT

A. Conforms to ASTM C150 Type II. Do not use reclaimed cement or cement containing lumps or deleterious material.

B. Protect the cement from moisture and contamination while in transit to and in storage at the Site.

2.02 WATER

A. Use fresh water free of excessive amounts of deleterious substances that could adversely affect the properties of the grout. The Seller must assure that the grout resulting from the water mixture always meets the standard of this Technical Specification. The water must meet the following requirements:

1. Be free from salt contamination

2. Have a pH of no less than 6.0 and no more than 8.0

3. Have a total dissolved solids not greater than 500 parts per million (ppm)

4. Have oils, acids, organics, alkali, or other deleterious material not greater than 50 ppm

5. Have a hardness not greater than 50 ppm

2.03 GROUT

A. Grout must consist of a stable colloidal suspension of cement or other additives in water. Premix in a grout plant that combines dry materials and water in predetermined proportions. The grout must be pumpable and workable with the injection equipment, assist in loosening the soils for penetration and optimum mixing, and upon setting, strengthen the in situ soils. The Seller must assure that the grout, when mixed with the in situ soil, meets the necessary properties.

B. The Company is conducting bench scale tests to determine the appropriate grout mix to achieve the in situ strength specified herein. The Company has preliminarily determined that a mixture of 50% cement and 40% water should be sufficient to achieve the average in situ strength specified herein, at the specified in situ doses. The Seller must demonstrate through required start-up and Quality Control testing specified herein that this mix will be sufficient to achieve the average in situ strength. Based on the results of start-up testing, the Seller may be required to adjust the mix ratios based on this Quality Control testing.

2.04 ADDITIVES

A. Add admixtures of softening agents, dispersions, retarders, or plugging or bridging agents to the water or the grout as needed to permit efficient use of material and proper workability of the grout. Do not use additive except as approved in advance by the ARP. Do not use fly ash or other solids containing heavy metals.

PART 3 EXECUTION

3.01 GENERAL

A. The Seller must clear and grub the area where soil stabilization will occur and the area within ELF1 where spoils generated from stabilization will be placed in accordance with

Section 31 11 00 – Clearing and Grubbing. Clearing and grubbing must be accepted by the ARP before start of soil stabilization work.

B. The Seller must construct the treated area using soil mixing stabilization columns and/or panels to the lines, grades, and cross sections indicated in the Construction Work Plan design. The Geotechnical Report (Appendix B of the Final Revised Engineering Design Report) provides a generalized description of the soil profile through which the soil mixing stabilization columns and/or panels are to be constructed.

C. The Drawings define the grout injection rate along the perimeter of East Landfill No. 1. The injection rate is based on the in situ volume of the soil to be treated.

D. Soil mixing stabilization columns and/or panels must have minimum dimensions as specified on the Drawings. The Seller must sequence the Work to maintain integrity of adjacent columns or panels.

E. Panels must have a minimum of 3 inches of overlap with the adjacent previously installed panels, if panels are used. If the Seller elects to construct columns, the Seller must meet the spacing and overlap requirements shown on the Drawings. The Seller must ensure that the final product is continuous ground improvement with no gaps or deficiencies along the entire length of the soil mixing stabilization at the minimum required widths and depths. A minimum 24-hour wait period must be observed to allow initial curing of the grout before constructing adjacent panels or columns.

F. The Seller may be required to construct temporary access roads to complete the soil stabilization program. Proposed temporary access roads must be described in the Construction Work Plan for approval by the ARP prior to construction. All temporary access roads must be removed at the end of the Work and their area returned to pre-existing conditions, to the satisfaction of the ARP.

3.02 TOLERANCES

A. The Seller must apply the following tolerances to the soil mixing stabilization dimensions and construction:

1. Horizontal and vertical positioning must be achieved so as not to deviate 1 foot horizontal for every 100 feet vertical from the soil mixing stabilization design.

2. Survey and stake the soil mixing stabilization pattern to assure that the columns and/or panels are constructed as designed.

3. Survey or measure the depth of the soil mixing stabilization columns and or/panels to within 6 inches of the plan elevation. Measure the depth from the surface to the bottom of the mixing auger/tool.

4. Construct each soil mixing stabilization column or panel within 3 inches of the dimensions shown on the Drawings unless otherwise directed by the ARP.

5. Discontinue Site activity when severe weather or flooding conditions may compromise the quality of the Work.

6. Calculate and check the injection ratio for each soil stabilization column or panel. The Seller may correct the injection ratio for previous overlaps in the same column or panel. In all cases, the Seller must observe the minimum injection ratio. There is no maximum injection ratio.

3.03 EQUIPMENT

A. Temporary support may be required under the equipment (e.g., marsh mats) to allow access to all areas of the proposed soil mixing stabilization. The Seller must determine where this additional support may be required and include proposed support methods in the Construction Work Plan for acceptance by the Company prior to the start of construction.

B. Mixing Equipment

1. The mixing equipment must have a minimum capacity adequate to meet performance and schedule requirements and must be equipped with positive means for controlling the mix proportions, maintaining the time of mixing constant, and maintaining the appropriate speed of rotation of the mixer.

C. Reagent Feed Units

1. Satisfactory means, incorporating weighing, metering, or volumetric measurement, must be provided to separately batch the required amount of each reagent. Silos and feeders must be equipped and operated so that no caking of material or variation in feed occurs. Provision must be made so that each reagent can be easily sampled.

D. Accuracy of Equipment

1. Scales, meters, and volumetric measuring devices used for measuring reagents and water must be accurate to plus or minus 0.1% of the quantity being measured. A check of calibration of measuring equipment must be performed once every 5 working days. The Seller must monitor and report instrumentation calibration as specified.

3.04 EXECUTION OF THE WORK

A. Start-up:

1. The Seller must schedule and plan for a start-up phase in which 100 linear feet of soil stabilization is constructed and allowed to cure for 7 days so that verification samples can be collected by the ARP and tested. The start-up phase must be conducted between Stations 5+00 and 6+00 as shown on the Drawings.

2. The Seller must allow 7 days after the initial curing period for the ARP to schedule and conduct field sampling and laboratory testing.

3. Based on the results of these tests, the Seller will be approved to continue with the Work at full production. The ARP may adjust the grout dosage based on the results of the startup testing.

B. Positioning:

1. The Seller must maintain horizontal and vertical control during the Work. The ARP must be allowed to confirm the as-built location of the columns and/or panels during construction. The Seller method for confirming vertical alignment of the columns and/or panels must be detailed in the Construction Work Plan.

C. Depth of Treatment:

1. The minimum depth of treatment must be equal to the depth identified on the Drawings.

2. The Seller method for confirming depth of treatment must be detailed in the Construction Work Plan.

3. The Contractor must adequately mark equipment to confirm the penetration depth during construction.

D. Grout Preparation:

1. Dry materials must be stored properly prior to mixing. Automatic batch scales must be used in the mixing plant to accurately control the mixing ratio of dry materials and water.

2. The minimum mixing time for grout is 3 minutes, and the maximum holding time is 3 hours. The Contractor must determine the specific gravity of the grout during the design mix program for confirmation of grout proportions.

3. The Contractor must check the specific gravity of the slurry at least twice per shift per rig using the methods outlined in ASTM D4380. Specific gravity measurements must be recorded on the Daily Activity Report.

E. Soil-Grout Mixing:

1. The Seller must mix soil and grout material together in place by mechanical mixing to achieve a homogeneous, macro-uniform mixture of grout and in situ soils. Jetting must not be used to facilitate mixing.

2. The Seller must assure continuous installation of each column and/or panel without interruption. If an interruption of more than 2 hours occurs, the Seller must remix the full height of the element using the correct dosage of fresh grout at no additional cost or adverse schedule impact to the Company.

F. Grout Shaft Rotation Speed and Penetration/Withdrawal Rate:

1. The Seller must adjust the mixing shaft rotational speed and penetration/withdrawal rates as needed to achieve adequate mixing.

2. The Seller must monitor, optimize, and record the number of mixing passes for each column and/or panel to assure adequate mixing.

3. The Seller must adjust the mixing rotation speed to accommodate drilling conditions based on the degree of drilling difficulty.

G. Grout Injection Rate:

1. The required grout injection rates (specified as a percentage by volume of in situ soil) are shown on the Drawings. The grout injection rates range from 20% to 30% by volume.

2. The total quantity of injected grout must be in accordance with the mix design established by the Company and verified during the start-up phase of construction. The start-up phase must be conducted between Stations 5+00 and 6+00.

3. The Seller must constantly monitor, calculate, and control the grout injection rate.

4. For production Quality Control, the Seller must perform real-time monitoring of the slurry injection rate.

5. The Seller must process the recorded data after construction of each column and/or panel and present average injection rates for every 3-foot vertical interval of soil-cement column.

6. The Seller may request that the established mix design and injection ratio be modified. Modifications must be approved by the ARP prior to implementation, and the ARP may request additional Quality Control testing to confirm acceptable results at no additional cost or adverse schedule impact to the Company.

H. Control of Spoils:

1. The Seller must control all spoils created during the soil mixing stabilization installation. The Seller must contain spoils near the Work Area.

2. The Seller must dispose of spoils within the central portion of the ELF1. After placement of the spoils, the Seller must cover the spoils, as per stockpiling requirements in accordance with Section 01 57 13 – Temporary Erosion, Sediment, and Pollution Control. These spoils must be maintained until additional fill is incorporated into ELF1, at which time, these spoils will become part of the landfill material and will be treated as such.

I. Obstructions:

1. If obstructions are encountered, the Seller must stop drilling until the nature of the obstruction is known. The Seller must excavate and remove permissible obstructions located within 15 feet of the ground surface. Obstructions deeper than 15 feet of the ground surface that reduce the drilling rate to less than 1 foot of penetration per minute for 5 minutes may be acceptable as refusal upon the Owner's approval.

J. Swell Management

1. The Seller must place, regrade, and otherwise manage excess materials (swell) resulting from the soil mixing stabilization treatment. The Seller must coordinate with the Owner regarding disposition of excess materials.

3.05 CLEANUP AND TREATMENT FOR TOP OF SOIL MIXING STABILIZATION CONSTRUCTION

A. Upon completion of the soil mixing stabilization, the Seller must level all remaining grout and soil mixing stabilization swell and clean the surface to the approval of the Owner.

3.06 FIELD QUALITY CONTROL

A. The Seller must maintain its own Quality Control for the soil mixing stabilization, following testing requirements in this section:

1. Soil Mixing Stabilization Column or Panel Depth

a) The Seller must demonstrate, to the approval of the Owner, that the Work is continuous and soil mixing stabilization is installed to a minimum depth of 15 feet and a minimum width of 10 feet.

2. Grout

a) During construction, the Seller must conduct specific gravity tests on fresh grout at the mixer or holding tank where the grout is ready for injection into the soil. The Seller must check the specific gravity of the slurry at least twice per shift per rig using the methods outlined in ASTM D4380.

3. Soil Mixed Material

a) Sampling of stabilized soils – The Seller must retrieve and cast wet samples on a daily basis during soil mixing stabilization installation.

1) The Seller must immediately sample columns or panels upon completion. The Seller must screen off particles >10% in diameter of the mold opening and store the samples in a moist room in accordance with ASTM C192 until the test date.

2) The Seller must collect a set of samples at a rate of 1 per 500 cy of stabilized area and demonstrate that the Table 31 32 13-1 criteria have been met in all of the samples.

3) Samples shall be taken at two depth intervals, representing approximately 20% and 80% of the depth interval treated for the column/cell.

4) The Seller must conduct unconfined compressive strength testing in accordance with ASTM D2166 on wet samples at ages of 3, 7, and 28 days.

5) The Seller must retain an approved, independent testing laboratory to conduct strength and unit weight testing.

6) The Seller must report the in-place wet unit weight on the test report per ASTM D2166.

B. Seller Experience

1. The Seller must have successfully completed at least three projects of comparable size and scope in accordance with local, state, and federal requirements using the proposed system or a similar system.

2. Descriptions and reference must be included with Seller's bid.

C. Key Personnel

1. Key personnel must have a minimum of 3 years of stabilization field experience. Key personnel includes system operators, Quality Control personnel, and supervisory engineering and technical staff involved with the stabilization system design and operation.

D. Batch Proportions

1. Mixing time, mixing speed, and batch proportions must be maintained and documented within the limits specified in the approved Soil Stabilization Plan.

3.07 SETTLEMENT MONITORING

A. The Seller must procure and install settlement monitoring equipment at East Landfill No. 1 prior to construction of the perimeter berm and the placement of waste material from SU8 and SU10. The minimum expectation for monitoring equipment is settlement plates; however, Seller may propose an alternative method for monitoring settlement (e.g., shape arrays).

B. A minimum of 7 settlement plates must be installed. Each settlement plate must be installed within an excavation slightly larger than the dimensions of the plate and a minimum depth of 12 inches with a level bottom.

C. The horizontal position and elevation of the settlement plate riser pipe must be surveyed to the 0.01-foot accuracy prior to placement of the fill material to establish a baseline reading. Plates must be monitored regularly through the fill placement process, including when additional riser pipes are installed.

D. The settlement plate stem must remain in a vertical position at all times. The Seller must operate equipment in a manner to ensure that settlement plate assemblies are not damaged or displaced laterally. Each assembly shall be clearly marked and flagged.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the furnishing, placing, compacting, and sealing of one or more layers of plant-mixed hot-mix asphalt (HMA) on a prepared foundation or base to the lines, grades, and thicknesses shown on the Drawings for repair of roadways and other areas.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 31 05 16 – Soils and Aggregates

C. Section 31 23 33 – Trenching and Backfilling

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils

2. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)

B. WSDOT/APWA:

1. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

2. WSDOT Test – Method of Test for Determination of Method 705 Degradation Value

3. WSDOT Test – Maximum Specific Gravity of Bituminous Paving Mixtures Method 113

1.04 SUBMITTALS

A. Prior to installation of materials specified in this section, the Seller must submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. HMA Design

a) Submit HMA mix design documentation, data, and batch plant certification.

2. Aggregate for HMA

    a) Submit particle sieve analysis (gradation) test results, in accordance with ASTM D422, and origin of material for aggregate to be used for HMA.

1.05 QUALITY CONTROL

A. The Seller must be experienced in work of the highest professional quality and have facilities and personnel adequate for the Work specified. The Seller must be acquainted with all Work related to Site improvements and other Work.

B. Unless otherwise referenced or modified herein, Quality Control and quality standards for this section must be as specified in the WSDOT/APWA Standard Specifications.

C. Testing must comply with WSDOT/APWA Standard Specifications Sections 9-03.8(2) and 9-03.20. Aggregates for the HMA class specified must meet the requirements for pavements having less than 3 million equivalent single axel loads (ESALs) in accordance with Section 9-03.8(2) of the WSDOT/APWA Standard Specifications. Tests must be performed by a certified testing agency or licensed laboratory. Two copies of the results of each test must be submitted to the Company for approval prior to continuation of the Work to be tested, unless otherwise directed.

D. Other tests as may be referenced elsewhere in this section.

PART 2 PRODUCTS

2.01 ASPHALT MATERIALS

A. Bituminous Materials

1. Medium curing liquid asphalt binder, grade PG 64-22, in accordance with Section 9-02 of the WSDOT/APWA Standard Specifications.

2. Asphalt must not have been distilled at a temperature high enough to injure by burning or to produce flecks of carbonaceous matter, and upon arrival at the Work, must show no signs of separation into lighter and heavier components.

B. Aggregate

1. Aggregate for class 1/2-inch HMA mix, in accordance with Section 9-03.8 of the WSDOT/APWA Standard Specifications

C. Asphalt Emulsion (Tack Coat)

1. Emulsified asphalt grade CSS-1, in accordance with Section 9-02 of the WSDOT/APWA Standard Specifications

D. Asphalt Joint and Crack Sealant

1. Poured Rubber Joint Sealer, in accordance with Section 9-04.2(2) of the WSDOT/APWA Standard Specifications

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Crushed Surface Material must be used as the base course beneath new asphalt paving.

B. Crushed Surface Material must be dumped and smoothed by moving rocks into position in such a manner as to ensure the material when in place is stable and without tendency to slide.

C. The Seller must place and spread Crushed Surface Material in accordance with the requirements for the "Road Mix Method" outlined in Section 4-04.3(4) of the WSDOT/APWA Standard Specifications.

D. The Seller must place Crushed Surface Material in 6-inch maximum lifts to the depths and thicknesses shown on the Drawings and compact to 95% of maximum dry density, as determined by ASTM D1557.

3.02 NEW ASPHALT PAVING (INCLUDING PATCHING)

A. In areas of new paving, or where existing paving has been removed for installation of stormwater pipe and appurtenances, the Seller must place new asphaltic concrete paving over compacted base aggregate meeting the requirements of Article 3.01.

B. The Seller must install asphalt per Article 3.05. Minimum asphalt thickness must be as shown on the Drawings.

1. New asphalt patching must meet the grade of adjacent existing asphaltic concrete paving (to remain). Edges of new and existing pavement must be flush without ridges or gaps.

3.03 REPAIR OF EXISTING ASPHALT

A. All trench and pavement cuts must be made uniformly by wheel or saw cutting. If edge of trench line degrades, ravels, or is non-uniform, additional saw cutting will be required prior to final patch or paving.

B. The Seller must apply a tack coat, as specified in Paragraph 2.01-C, to the existing pavement and edge of cut, as specified in Section 5-04 of the WSDOT/APWA Standard Specifications. Asphalt concrete equal to or more than 4 inches thick will be placed in equal lifts with a minimum thickness of at least 2 inches.

C. Connection to existing asphalt at centerline, lane edges, and overlay ends must be made by grinding. Feathering of asphalt is not acceptable without written approval from the Company. Grind can be a few inches off centerline to avoid existing striping, if any.

D. Surface smoothness will be pursuant to Section 5-04 of the WSDOT/APWA Standard Specifications. Paving will be corrected by removal and repaving of the trench only.

E. Asphalt concrete must not be placed on any wet surface, or when the average surface temperatures are below freezing, or when weather conditions otherwise prevent the proper handling or finishing of the bituminous mixtures.

F. All joints on trenching or overlays must be sealed using crack sealant as specified in Paragraph 2.01-D.

G. When trenching within the roadway shoulder(s), the shoulder must be restored to its original or better condition.

H. The final patch must be completed as soon as possible after first opening the trench. The final patch must be completed within 5 days of opening the trench, unless otherwise approved by the Company. This time frame may be adjusted if delays are due to inclement paving weather or other adverse conditions that may exist, with approval from the Company.

3.04 TACK COAT

A. The allowable temperature range for tack coat material is 290°F to 325°F.

B. Where the new asphaltic concrete abuts a curb or gutter, cold pavement joint, trimmed meet line, or any metal surface, the Seller must apply a thin tack coat of asphalt on the vertical face of the abutting surface by hand painting prior to paving. The application on the contact surfaces must be thin and uniform to avoid an accumulation of excess asphalt in puddles. The Seller must not apply the tack coat on vertical contact surfaces above the finished height of the asphalt concrete being placed.

3.05 ASPHALT

A. Placement: The Seller must install a course of asphaltic concrete to the lines and grades as indicated on the Drawings. The hot plant mix must have an installation temperature of 275°F to 300° F.

B. Compaction: Compaction of the asphalt concrete pavement must conform to the requirements of WSDOT/APWA Standard Specifications Section 5-04.3(10)A. Density of the pavement in place must be a minimum of 91% of the reference maximum density as determined by WSDOT Test Method 705. The reference maximum density must be determined as the moving average of the most recent five determinations for the lot of asphalt concrete being placed. Compacted thickness must be as shown on the Drawings, but in no case shall the compacted thickness be less than 3 inches. Asphalt concrete must be compacted in maximum 3-inch lifts.

C. Curing and Cleaning: New asphalt pavement must be completely cured (minimum of 7 days of warm, dry weather, longer if cold or damp) prior to application of any materials. Pavement needs to be clean and free of all foreign matter. A high-pressure washer, air

broom, or hand sweeper must be used; removal of grease and oil requires the use of a strong detergent. After using detergents, the surface must be thoroughly flushed with water.

3.06 DISPOSAL

A. The Seller must remove and dispose of asphalt waste produced from saw cutting and trenching in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING AND MISCELLANEOUS CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for forming, placing, reinforcing, finishing, and curing cast-in-place concrete for the following:

1. Placement of a reinforced concrete slab at each stormwater pump station for support of discharge pipe, valves, fittings, and electrical and controls panels

2. Concrete paving repair that will be needed where concrete will be sawcut and removed to accommodate trenching for stormwater force main pipe installation

3. Placement of reinforced concrete for light pole bases

4. Placement of miscellaneous concrete where needed to complete the Work

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 74 19 – Waste Management and Disposal

C. Section 31 05 16 – Soils and Aggregates

D. Section 31 23 19 – Dewatering

E. Section 31 23 33 – Trenching and Backfilling

1.03 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 214R-11 – Guide to Evaluation of Strength Test Results of Concrete

2. ACI 301-16 – Specifications for Structural Concrete

3. ACI 304R-00 – Guide for Measuring, Mixing, Transporting, and Placing Concrete

4. ACI 305 – Guide to Hot Weather Concreting

5. ACI 306R-88 – Cold Weather Concreting

6. ACI 308R-01 – Guide to Curing Concrete

7. ACI 309R-05 – Guide to the Consolidation of Concrete

B. ASTM Standards:

1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

2. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

3. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

4. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field

5. ASTM C33 – Standard Specification for Concrete Aggregates

6. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

7. ASTM C94 – Standard Specification for Ready-Mixed Concrete

8. ASTM C138 – Standard Test Method for Density (Unity Weight), Yield, and Air Content (Gravimetric) of Concrete

9. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete

10. ASTM C150 – Standard Specification for Portland Cement

11. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete

12. ASTM C187 – Standard Test Method for Amount of Water Required for Normal Consistency of Hydraulic Cement Paste

13. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

14. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete

15. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

16. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete

17. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

18. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

19. ASTM C920 – Standard Specification for Elastomeric Joint Sealants

20. ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete

21. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

22. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete

23. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

24. ASTM D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

C. International Building Code (IBC), 2018 Edition

D. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

1.04 QUALITY ASSURANCE

A. Concrete Work: All concrete work must conform to the requirements of ACI 301-16, unless otherwise noted on the Drawings or in the Technical Specifications.

B. Inspection and Testing: The Seller will be responsible for testing concrete to ensure that it meets the requirements of these Technical Specifications. The Seller must obtain and pay for the services of an independent testing laboratory to perform the concrete inspections and testing. The Seller must provide all necessary assistance in carrying out such inspections and tests.

C. The Company may also perform tests at the Company's discretion to ensure that concrete meets the requirements of these Technical Specifications. The cost of inspection and testing done by the Company will be paid by the Company. If the Company's testing indicates that concrete does not meet the requirements of these Technical Specifications, the Company will require the Seller to perform additional testing, such as core drilling or collection of additional concrete cylinders. Additional testing of substandard concrete, as indicated by concrete test results, must be paid for by the Seller at no additional cost to the Company. The Seller may obtain results of tests performed by the Company from the Company's Representative.

D. During placement of concrete, the Seller's independent testing laboratory must sample and test concrete in accordance with ASTM C31, ASTM C138, ASTM C143, and ASTM C231. At a minimum, concrete testing and analysis must occur at the following frequencies:

1. Sample each truck load after 1/2 cubic yard has been discharged from the truck.

2. Concrete from each truck load must not be placed until slump, temperature, and entrained air tests indicate that the concrete is within the limits required in these Technical Specifications.

3. After successive truck loads meet the acceptance test requirements, the frequency of concrete testing may be reduced, as directed by the Company's Representative. A minimum of one sample must be collected for each type of concrete per every 50 cubic yards of concrete placed.

4. Cured cylinders must be tested in accordance with ASTM C39.

5. Notify the Company at least 48 hours before inspection. Inspection will be required immediately prior to any intended pours or placement of concrete.

E. Qualifications of Supplier: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment. Ready-mixed concrete plants must be approved and certified by the National Ready Mix Concrete Association (NRMCA) or qualified by WSDOT.

F. Installer Qualifications: A firm with minimum 5 years' experience with concrete placing and finishing.

G. Concrete Work: Concrete work, where indicated, must be exposed, as finished. Special care must be taken to provide specified, finished surfaces without gravel pockets or other defacements.

1.05 SUBMITTALS

A. The Seller must submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Concrete Mix Design: For each concrete mixture, indicating all material contents per cubic yard of concrete.

2. Certificates: Provide certificates of compliance with specified mix design and certificates for compressive strength, yield, air content, and slump for each proposed concrete mix. Provide written evidence that the concrete ready-mix plant is approved and certified by the NRMCA and other organizations.

3. Concrete Delivery Tickets: For each truck delivered to the Site. Submit tickets to the Company before unloading at the Site in accordance with ASTM C94.

4. Records: Maintain records of all concrete placements; indicate exact mix proportions, list time, date, location in the Project, weather conditions at the time of placement, and the source of the concrete supply. Make records available to the Company at any time

during the course of construction and submit at end of concrete placement phase of the Project for the purposes of preparing Record Documents.

5. Non-Shrink Grout: Provide Manufacturer name, product name, catalog information, certification of ASTM compliance, indication of recommended usage, and installation guidelines.

6. Membrane: Provide Manufacturer name, product name, catalog information, indication of recommended usage, and installation guidelines.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Structural Slabs

1. Concrete materials must be as indicated on the Drawings for the structural slabs.

B. Concrete Paving and Miscellaneous Concrete, Including for Light Pole Bases

1. Aggregates: Standard: ASTM C33-86

2. Cements:

a) Provide cements obtained from same source or of same brand for concrete in same element or portion of the Work.

b) Standard Portland Cement: Columbia, Ideal, Kaiser, Lone Star, Ash Grove, or approved equal. Standard gray Portland cement, ASTM C150/C150M; Type I or Type II.

3. Cementitious Materials: Fly ash, ASTM C618 type F, except that the maximum allowable loss on ignition must be 0.75%. Use for all concrete.

4. Admixtures:

a) Use only one brand of admixtures.

b) Water-Reducing Admixture: Master Builders Pozzolith 300-N, or approved. Chemical admixture conforming to requirements of ASTM C494-86, Type A.

c) Retarder-Densifying Admixture: Master Builders Retarding Pozzolith, or approved; ASTM C494-86, Type B.

d) Accelerator: Chemical admixture designed to accelerate set on concrete but not corrode reinforcing steel; ASTM C494-86, Type C.

e) Air Entraining Agent: Conform to requirements of ASTM C260-86.

5. Other Ingredients: Provide other ingredients as indicated or as required by Code or Reference Standards.

6. Water: ASTM C94/C94M and potable.

2.02 CONCRETE MIXES

A. Structural Slabs

1. Concrete mix must be as indicated on the Drawings for the structural slabs.

B. Concrete Paving and Miscellaneous Site Concrete, Including Light Pole Bases

1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

2. Class 4000 general-purpose concrete mixture, for concrete pavements and other miscellaneous concrete, in accordance with Section 6-02.3 of the WSDOT/APWA Standard Specifications:

   a) Minimum Compressive Strength: 4,000 psi at 28 days, unless indicated otherwise on Structural Drawings

   b) Maximum Water-Cementitious Materials Ratio: 0.45

   c) Slump Limit: 4 inches, plus or minus 1 inch

   d) Air Content: 5%, plus or minus 1.5% by volume

3. Quality of Concrete: Assumed compressive strengths and locations of same are noted on Drawings.

4. Concrete must meet the following requirements:

   a) Minimum Cementitious Material

      1) Cement with fly ash: 6 sacks/cy and 100 lbs fly ash/cy

5. Admixtures:

   a) Add in accordance with manufacturer's directions.

   b) If approved, water-reducing retardant may be used when the temperature of the concrete, as placed, exceeds 65°F.

   c) If approved, accelerator may be used when temperature of concrete is less than 40°F.

d) No calcium chloride or other water-soluble chloride ion admixtures will be permitted, unless otherwise approved by the Company.

e) Use retarder/densifier when placing other concrete in warm weather conditions or when ambient temperature exceeds 65°F.

f) Use air-entraining agent in concrete subjected to freezing temperatures after curing. Total air content must be in accordance with Table 26-B of the IBC.

6. If the Seller elects not to use the approved design mix, the Seller must pay for special batch plant inspection costs.

2.03 CEMENTITIOUS MATERIALS

A. Structural Slabs

1. Cementitious materials must be as indicated on the Drawings for structural slabs.

B. Concrete Paving and Miscellaneous Concrete, Including Light Pole Bases

1. Provide cementitious materials that conform to the appropriate specifications listed:

a) Portland Cement

1) ASTM C150/C150M, Type I or Type II, in accordance with Section 9-03.1 of the WSDOT/APWA Standard Specifications

b) Pozzolan (Fly Ash)

1) Provide pozzolan that conforms to ASTM C618, Class C or F, including requirements of Tables 1A and 2A, in accordance with Section 9-23.9 of the WSDOT/APWA Standard Specifications.

2.04 AGGREGATES

A. Normal-Weight Aggregates: ASTM C33, graded, (38-millimeter [mm]) (25-mm) 3/4-inch (19- nominal maximum coarse-aggregate size.

B. Fine Aggregates:

1. Fine aggregates must be free of materials with deleterious reactivity to alkali in cement.

2. Fine aggregates must consist of sand or other inert material or combination thereof having hard, strong, durable particles free from an adherent coating.

3. Fine aggregate must be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious matter.

4. Fine aggregate must meet the particle gradation requirements of the WSDOT/APWA Standard Specifications, Section 9-03.1(2)B, for Class 1 fine aggregate.

C. Coarse Aggregates

1. Coarse aggregates must consist of gravel or other inert material or combination thereof having hard, strong, and durable pieces free from adherent coatings.

2. Coarse aggregate must be washed to thoroughly remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious material.

3. Coarse aggregate must meet the particle gradation requirements of the WSDOT/APWA Standard Specifications, Section 9-03.1(4)C, for AASHTO Grading No. 57.

2.05 BONDING AGENTS AND ADHESIVES

A. Bonding Agents as required

B. Primers and Sealers: As recommended by the adhesive and Bonding Agent manufacturers

2.06 EXPANSION/ISOLATION JOINTS IN SLABS

A. Joint Filler: Pre-formed, non-extruding asphalt impregnated resilient material; ASTM D1752, Type I, 3/8-inch wide by depth required to bring top surface within 1/2 inch of slab surface

B. Joint Sealer: Self-leveling polyurethane; ASTM C920, Type M, Grade SL, Class 25, Color: gray

C. Expansion/Isolation Joint Cap: Removable high-impact extruded polystyrene; place on joint filler during concrete placement; joint cap by Burke Company or equal.

2.07 MIXING CONCRETE

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94 and ASTM C1116, and furnish batch ticket information.

1. When air temperature is between 85°F and 90 F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 F, reduce mixing and delivery time to 60 minutes.

2.08 CURING MATERIALS

A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A. Non-yellowing, VOC compliant, semi-gloss sheen.

1. Provide as method of curing and sealing for exposed-to-view interior concrete floors.

2. Sheen: Medium (semi-gloss)

3. Acceptable Products:

   a) Euclid Chemical Company (The); Super Diamond Clear VOX

   b) L&M Construction Chemicals, Inc.; Lumiseal WB Plus

   c) Meadows, W. R., Inc.; Vocomp-30

   d) Tamms Industries, Inc.; LusterSeal WB 300

   e) US Mix Products Company; US Spec Radiance UV-25

   f) Vexcon Chemicals, Inc.; Vexcon Starseal 1315 Beading Flat

4. Curing compounds for colored concrete: Curing compound must comply with ASTM C309 and be approved by color additive manufacturer for use with colored concrete. Provide color cure and seal products to match colored concrete.

2.09 NON-SHRINK GROUT

A. Use premixed and packaged non-metallic grout conforming to ASTM C1107. The use of powdered aluminum will not be permitted without written permission of the ARP.

B. Grout must be tested to comply with ASTM C827 for volume change, ASTM C187 and ASTM C143 for workability, and ASTM C39 for compressive strength.

2.10 MOISTURE RETAINING MEMBRANES

A. All curing membrane must conform to ASTM C171 and may be white polyethylene film, a combination sheet polyethylene and paper, Or Approved Equal, approved in advance by the ARP.

B. All cement or tape used for sealing membrane joints must be only as recommended by the Manufacturer of the membrane being joined.

2.11 REINFORCEMENT

A. Structural Slabs

   1. Steel reinforcement must be as indicated the Drawings for structural slabs.

B. Concrete Paving and Miscellaneous Concrete

   1. Reinforcing Steel: ASTM A615/A615M Grade 60

   2. Weldable Reinforcing Steel: ASTM A706/A706M, Grade 60

3. Reinforcement Accessories:

    a) Tie Wire: Annealed, minimum 16 gage

    b) Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement

    c) Wire for reinforcement must comply with the requirements of ASTM A82.

PART 3 EXECUTION

3.01 STRUCTURAL SLABS

A. Forming and placement of concrete and reinforcement for structural slabs must be in accordance with the specifications provided on the Drawings for the reinforced concrete slabs to be installed at each stormwater pump station.

B. Where requirements for forming a placement of concrete and reinforcement for structural slabs are not specified on the Drawings, the Seller must follow the general requirements for forming and placement of concrete and reinforcement outlined in this Technical Specification.

3.02 CONCRETE PLACEMENT (INCLUDING PATCHING)

A. Inspection: Before placing concrete, inspect and complete any unfinished formwork, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304 and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

E. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.

F. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and

complete embedment of reinforcement and other embedded items without causing mix to segregate.

G. Cold Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.

H. When air temperature has fallen to, or is expected to fall below, 40°F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F and not more than 80°F at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

I. Hot Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90°F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is the Seller's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot so that the steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Company.

3.03 REPAIR OF EXISTING CONCRETE PAVING

A. In areas of new paving, or where existing paving has been removed for installation of stormwater pipe and appurtenances, new concrete paving must be placed over compacted base aggregate meeting the requirements of Section 31 05 16 – Soils and Aggregates.

B. New concrete patching must meet the grade of adjacent existing concrete paving (to remain). Edges of new and existing concrete paving must be flush without ridges or gaps.

C. All trench and pavement cuts will be made uniformly by wheel or saw cutting. If edge of trench line degrades, ravels, or is non-uniform, additional saw cutting will be required prior to final patch or paving.

D. Concrete will not be placed on any wet surface, or when the average surface temperatures are below freezing, or when weather conditions otherwise prevent the proper handling or finishing of the concrete mixtures.

E. The final patch will be completed as soon as possible after first opening the trench. The final patch must be completed within 5 days of opening the trench, unless otherwise approved by the Company. This time frame may be adjusted if delays are due to inclement paving weather or other adverse conditions that may exist, with approval from the Company.

3.04 CURING

A. Maintain concrete between 65°F and 85°F (18°C to 29°C) during curing.

3.05 CONCRETE FINISHING

A. Broom Finish:

1. The surface must be rodded across the screeds and smoothed with a “bull float” light steel trowel and broom-finished. The general surface must have no irregularities greater than 3/16 inch in depth or variations in grade of more than 3/8 inch in 10 feet. The broom stria must be approximately 1/8 inch depth. The slab must be edged or patterned with a 2-inch-wide edging tool having a 3/4-inch corner radius.

3.06 CONSTRUCTION JOINTS

A. Form all joints perpendicular to main reinforcement. Continue reinforcing across joints, unless otherwise indicated; provide longitudinal keys at least 1-1/2 inches deep at all joints in walls between walls and slabs or footings. Remove key forming wood inserts and thoroughly clean surface of concrete at all joints before placing next lift.

B. Roughen surface of concrete at joints and remove laitance to obtain bond before placing next lift; if use of keys is impractical due to congestion or inaccessibility or if it is inadvisable to disturb surface before it has hardened, use only wet sandblast method for preparing surface.

C. Dampen hardened concrete of joints between footings and walls, joints in unexposed walls, and all others not specifically mentioned here in after and roughen by air water cutting.

D. Dampen hardened concrete joints in exposed work and roughens by air/water cutting. Thoroughly cover joint surfaces with neat cement mortar of similar proportions to mortar in concrete; apply mortar as thick as practicable on vertical surfaces and a minimum of 1/2-inch thick on horizontal surfaces; place next lift before mortar has reached its initial set.

E. For bonding new concrete to existing concrete, use bonding agent. For grouting dowels and reinforcing bars, use specified adhesives in accordance with manufacturer's instructions.

F. Provide key forming wood inserts strips in walls; pour concrete to 1/2 inch above lower edge or strip.

3.07 CONTROL JOINTS/SAWCUTTING

A. Layout of proposed jointing plan must be established as soon as the concrete can take foot traffic.

B. Concrete joint pattern must be saw-cut with an early entry concrete saw when the concrete has cured enough to provide a clean saw-cut edge.

C. In slabs on grade, saw-cut control joints to true, straight lines, maximum variance from true line of 1/4 inch in 10 feet, and no irregularities across joint in excess of 1/8 inch; extend reinforcing steel through and lap beyond joints.

3.08 EXPANSION JOINTS

A. Layout of proposed jointing plan must be established as soon as the concrete can take foot traffic.

B. Provide pre-molded 3/8-inch joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.

C. Locate expansion joints as noted on the Drawings.

D. Extend joint fillers full width and depth of joint and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after concrete has been placed on both sides of joint before sealant is applied.

E. Fillers and Sealants: install polyurethane sealant in a continuous, smooth joint, wiping excess sealant from adjacent concrete.

F. Provide expansion joints not more than 30 feet apart in footings. Run no reinforcement or other metal trim continuous through joints, unless otherwise indicated.

3.09 NON-SHRINK GROUT

A. Apply in accordance with manufacturer's direction; protect adjacent finished surfaces from defacement.

3.10 CLEANING

A. The Seller must leave premises clean and free of residue from Work in this section.

3.11 DISPOSAL

A. The Seller must remove and dispose of concrete waste produced from saw cutting and trenching in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

SECTION 32 90 00
HYDROSEEDING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for furnishing all materials, equipment, and labor necessary for preparation, seeding, fertilizing, and protection of hydroseeded areas.

B. Locations of Placement

1. Hydroseed Mix No. 1: SU8 and SU10, the surface of the PRB, and other locations as shown on the Drawings, for long-term restoration of the final surfaces

2. Hydroseed Mix No. 2: Over the consolidation landfills (West Landfill, East Landfill No. 1, and East Landfill No. 2), and SU2, as shown on the Drawings, as long-term cover and establishment of a pollinator mix

3. Hydroseed Mix No. 3: Over East Landfill No. 1 and East Landfill No. 2, as shown on the Drawings; this mix is intended to serve as a Temporary Seasonal Cover, consists of a Bonded Fiber Matrix, and does not contain live seed

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

1.03 REFERENCES

A. Ecology, *Stormwater Management Manual for Western Washington*, 2019.

B. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

1.04 SUBMITTALS

A. Prior to ordering, submit product data for fertilizer, hydromulch, and soil binding agent components.

B. Submit seed vendor's certification for required seed mixture, indicating percentage by weight and percentages of purity, rumination, and weed seed for each species.

C. Upon request, the Seller must furnish to the ARP duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory.

D. Seed Supplier: Name and address of seed supplier. Should the Seller require the source of seed supply to change during the construction, a written request must be provided to the ARP 48 hours in advance. The request is to be followed up by submission of proposed seed supplier and substitution seed analyses for ARP's review prior to the start of supply to the Site.

1.05 QUALITY ASSURANCE

A. Seed must be furnished in containers that show the following information: seed name, lot number, net weight, percentage of purity, germination, weed seed, and inert material. Seed that has become wet, moldy, or otherwise damaged will not be accepted. Seed must conform to the requirements of the Washington State Seed Law and, when applicable, the Federal Seed Act and must be "certified" grade or better.

B. All seed must be delivered and stored in original containers in an enclosed storage facility protected from damage, weather, insects, and rodents.

1.06 FIELD QUALITY CONTROL

A. Grading Inspection

1. Finish grading must be inspected and approved by the Company prior to seed application.

B. Hydroseeding Inspections

1. The Seller must request a provisional inspection upon completion of the Work to verify seed has been placed evenly and appropriately. For the temporary seasonal cover, an inspection will also occur to verify that the bonded fiber matrix has been placed evenly and appropriately. Upon completion of the punch list, the Company will make provisional acceptance in writing.

2. Nine months after hydroseed has been placed, a secondary inspection will occur to determine if grass has grown in sufficiently. If any areas are unsatisfactory, the Seller must make amendments per this Technical Specification.

3. Final acceptance will be at the end of the 1-year guarantee period and after all required repairs have been made, at which time the Company will assume maintenance duties of hydroseeded areas.

1.07 GUARANTEE AND REPLACEMENTS

A. Hydroseeding is guaranteed as specified in the Contract. Hydroseed Mix No. 1 and No. 2 seeded areas must have a uniform stand of grass defined as uniform, vigorous growth with no bare spots over 3 feet by 3 feet (9 square feet) at the time of the 9-month secondary inspection. The Seller must reseed at the original rate and fertilize at the rate of 1 pound (lb) of nitrogen per 1,000 square feet. All areas failing to vigorously establish for any reason

whatsoever within 90 days after germination or a growing season, whichever is longest, must be reseeded.

PART 2 PRODUCTS

2.01 GENERAL

A. The materials used in performing this Work must conform to the material specifications listed in this section and in the Construction Work Plan to be submitted by the Seller.

2.02 FERTILIZER

A. As part of the Hydroseed Mix No. 1, fertilizer will consist of finely ground dolomitic lime, which must be retained by Taylor Standard Sieves as follows:

1. Number 20 sieve – retains 0.0%

2. Number 100 sieve – retains 25%

B. Hydroseed Mix No. 1 fertilizer must be as manufactured by Lilly Miller (or approved equivalent as approved by Company).

C. Guaranteed Fertilizer Analysis:

Component[1]	Percent
Total Nitrogen (N)	15
Ammoniacal Nitrogen	4.6
Urea Nitrogen	3.2
Coated Slow Release Urea Nitrogen	3.3
Slowly Available Water Soluble Nitrogen[2]	2.3
Water Insoluble Nitrogen	1.6
Available Phosphoric Acid (P_20_5)	22
Soluble Potash (K_20)	15
Sulfur (S)	4
Boron (B)	0.06
Copper (Cu)	0.06
Iron (Fe)	1
Manganese (Mn)	0.15
Zinc (Zn)	0.14

Notes:
1. Derived from Urea, Sulfur-Coated Urea, Methylene Ureas, Ammonium Phosphate, Sulfate of Potash, Muriate of Potash, Iron Sulfate, Calcium and Sodium Borate, Copper Oxide and Sulfate, Iron Oxide Sulfate and Frit, Manganese Oxide and Sulfate, and Zinc Oxide and Sulfate.
2. Slowly Available Water Soluble Nitrogen from Methylene Ureas

2.03 HYDROMULCH FOR HYDROSEED MIXES NO. 1 AND NO. 2

A. Mulch must be wood cellulose fiber from alder, containing no growth- or germination-inhibiting substances. A soil-binding agent (tackifier) is required. Mulch must be dyed a suitable color to facilitate placement coverage observation. Wood cellulose fiber carrier must consist of pure wood fiber products with tackifier and must be one of the following:

1. Conwed Fibers Hydro Mulch 2000

2. Or equal, as approved by the Company

2.04 SOIL BINDING AGENT (TACKIFIER) FOR HYDROSEED MIXES NO. 1 AND NO. 2

A. Soil-binding agent must consist of non-toxic, biodegradable materials that are environmentally safe, such as Hydrostraw Guar Plus ESI – TAK or an Company-approved equivalent. Tackifier must be guar-based and must be applied, at a minimum, in quantities sufficient to equal the retention properties of guar gum when applied at a rate of 60 gallons per ton (250 liters per ton) of mulch.

2.05 SEED MIXES

A. Hydroseed Mix No. 1

1. Seed to be used in hydraulic application (hydroseeding) must meet the requirements of Section 9-14.3 of the WSDOT/APWA Standard Specifications.

2. Seed must be composed of the following species, and applied at the rate of 80 to 100 lbs per acre:

   a) 45% Dwarf tall fescue (several varieties) – *Festuca arundinacea* var

   b) 30% Dwarf perennial rye (Barclay) – *Lolium perenne* var *barclay*

   c) 20% Red fescue – *Festuca rubra*

   d) 5% Colonial bentgrass – *Agrostis tenuis*

3. The seed mix must also meet or exceed the following:

   1) Minimum pure seed percent – 98%

   2) Minimum germination percent – 90%

   3) Maximum weed seed percent – 0.5%

B. Hydroseed Mix No. 2

1. Seed to be used in hydraulic application (hydroseeding) must meet the requirements of Section 9-14.3 of the WSDOT/APWA Standard Specifications.

2. Seed must consist of PT 702 "Let it Bee" available from Pro Time Lawn Seed (or a Company-approved equal)
   Toll free: 800.345.3295
   Phone: 503.239.7518
   Fax: 503.296.5528
   Email: info@ptlawnseed.com
   Website: https://ptlawnseed.com/pages/support

3. Seed must be composed of the following species (based on Pro Time Lawn Seed "Let it Bee" Seed Mix), and applied at the rate of 120 lbs per acre:

   a) 19% Quatro Sheep Fescue – *Festuca ovina* "Quatro"

   b) 19% Longfellow 3 Chewings Fescue – *Festuca rubra* var *commutata*

   c) 19% Chantilly Creeping Red Fescue – *Festuca rubra* "Chantilly"

   d) 19% Eureka II Hard Fescue – *Festuca trachyphylla* "Eureka II"

   e) 19% Shoreline Slender Creeping Red Fescue – *Festuca rubra* "Shoreline"

   f) 5% White Clover – *Trifolium repens*

C. Hydroseed Mix No. 3: Bonded Fiber Matrix as Temporary Seasonal Cover

1. Bonded Fiber Matrix

   a) The Mechanically Bonded Fiber Matrix (MBFM) must be Conwed Fibers 3000 MBFM, as manufactured by PROFILE Products (or an approved equivalent). The MBFM will require no cure time and be comprised of wood fiber, cross-linking hydrocolloid tackifier, co-polymer gel, and crimped interlocking fibers. The MBFM must be manufactured using thermal-mechanical defibration to create wood fibers that, when combined with tackifier and synthetic fibers, must have a minimum water holding capacity of 1,500%.

PART 3 EXECUTION

3.01 GENERAL

A. Application of seeding must be applied to the extents shown on the Drawings and in accordance with BMP C120 Temporary and Permanent Seeding of the Stormwater Management Manual for Western Washington, except as specified in this Technical Specification.

3.02 SITE PREPARATION

A. The Seller must notify the ARP no less than 48 hours in advance of any seeding operation and must not begin the Work until areas prepared for seeding have been approved by the ARP. Following the ARP's approval, seeding of the approved areas must begin immediately. All soil preparation operations, compaction, and cleanup of debris as specified in the Technical Specifications must be done prior to seeding and must be approved by the ARP.

3.03 SEEDING SCHEDULE

A. The time period for seeding will be March 15 to October 1. No seeding will be done before or after these dates without the ARP's written approval.

3.04 HYDROSEEDING

A. Hydroseed Mixes No. 1 and No. 2: Fertilizer, seed, and mulch must be applied in one operation with approved hydraulic equipment. The Seller must apply materials at the following rates:

1. Hydromulch – 50 lbs per 1,000 square feet

2. Fertilizer (for Hydroseed Mix No. 1 only) – 10 lbs per 1,000 square feet

3. Soil-Binding Agent – 1 lb per 1,000 square feet

4. Seeding – Application rate (lbs per acre) as specified in Section 2 of this Technical Specification

B. Hydroseed Mix No. 3

1. Bonded Fiber Matrix (Hydroseed Mix No. 3) must be applied at a minimum rate of 3,000 lbs per acre of mulch with approximately 10% tackifier.

2. After application of the Bonded Fiber Matrix, there must be no exposed soil from any view direction or slumping of material off of the soil face.

3. Bonded Fiber Matrix must not be placed 24 to 36 hours before rainfall and cannot be installed on wet or saturated soils.

C. Seeding must not be done during windy weather or when the ground is frozen.

D. Equipment must utilize water as carrying agent, utilizing continuous built-in agitation system.

E. Equipment with a gear pump is not acceptable.

F. The Seller must pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of material over designated areas.

3.05 MAINTENANCE

A. Maintenance of the hydroseeded surfaces must be performed as follows:

1. The Seller must maintain seeded areas until hydroseed has fully germinated, is well established, and exhibits a vigorous growing condition.

2. Maintenance must include protection of hydroseeded areas.

3. If hydroseed is applied during the months of June, July, or August, supplemental watering is required for seed germination and establishment through September 1. If hydroseed is applied in September, watering is not required as part of maintenance.

3.06 CLEANING

A. The Seller must perform cleaning during the seeding and upon completion of the seeding. The Seller must remove all excess materials, soil, debris, and equipment from the Site and must repair the damage resulting from seeding operations.

END OF SECTION

SECTION 33 05 23
TRENCHLESS UTILITY INSTALLATION

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for trenchless utility installation under on-site rail lines and utilities, including the following:

1. Call for field locations and field verification of the type, location, depth, and size of existing utilities at the proposed stormwater pipe crossings under existing on-site rail lines

2. Preparation of a Utilities and Rail Crossings Plan detailing the Seller's proposed methods, equipment, and installation of pipe sleeves for proposed stormwater pipe crossings under on-site rail lines

3. Excavations of jacking or drilling and receiving pits or trenches, protection of excavations, protection of existing utilities, dewatering, backfill, and other Work required to complete installation of pipe sleeves at the proposed stormwater pipe crossings under existing on-site rail lines

4. Trenchless installation of steel pipe sleeves for stormwater pipes crossing under existing on-site rail lines within the Project Site

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 56 15 – Protection of Existing Utilities

C. Section 01 64 00 – Company-Furnished Products

D. Section 31 12 16 – Asphalt Paving

E. Section 31 23 33 – Trenching and Backfilling

F. Section 32 23 19 – Dewatering

1.03 REFERENCES

A. WSDOT/APWA

1. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction*, 2022 Edition (WSDOT/APWA Standard Specifications)

1.04 REQUIREMENTS

A. The Seller will be responsible for selecting a method for installing sleeves for stormwater pipe crossing on-site rail lines at locations within the Project site. Pipe sleeves must be installed by a trenchless construction method, such as:

1. Horizontal boring or jacking

2. Directional drilling

B. The specified thickness for sleeve piping was based upon the superimposed loads and not upon the loads that may be placed on the pipe as a result of boring or jacking operations. Seller must provide replacement pipe if increased strength is necessary to withstand boring or jacking loads.

C. Rail line crossings must be in installed in a way that will minimize displacement of the rail lines. The Seller must monitor the elevation and horizontal location of the rail lines throughout the installation of pipe sleeve under the rail lines to ensure that displacement is within the tolerances indicated on the Drawings. If the tolerances indicated on the Drawings are exceeded, the Seller must immediately notify the ARP.

D. The Seller must prepare and submit a crossings plan for review and approval by the Company in accordance with Paragraph 1.05.

1.05 SUBMITTALS

A. Submit a Utilities and Rail Crossings Plan, as part of the Construction Work Plan, in accordance with Section 01 33 00 – Submittal Procedures.

1. The Seller must submit a plan detailing proposed methods, equipment, and installation of pipe sleeves for proposed stormwater pipe crossings. The plan must include the following:

a) Results of utility locating at rail crossings

b) Results of work completed to verify subsurface soil conditions at rail crossings

c) Detailed drawings (plan view and section view) showing the proposed method and installation requirements for installing pipe sleeves at each crossing under on-site rail lines

d) A short written summary of the proposed method to be used

e) Qualifications of the personnel or Subcontractor that will be performing the horizontal jacking, boring, or direction drilling work

PART 2 PRODUCTS

2.01 BACKFILL MATERIALS

A. Backfill materials for drill pit excavations, receiving pit excavations, or open trench cuts required to complete the crossings must be in accordance with Section 31 23 33 – Trenching and Backfilling and the typical trench sections shown on the Drawings.

2.02 PIPE SLEEVE

A. Pipe sleeves installed at the crossings must be epoxy-coated Schedule 40 welded steel pipe.

B. Pipe sleeves for force main pipe crossing under on-site rail lines have been pre-purchased by the Company. Manufacturer information for the steel pipe to be furnished by the Company is included in Appendix C and described in Section 01 64 00 – Company-Furnished Products.

C. Additional pipe will be required for a rail crossing for gravity stormwater pipe to be constructed near the East Landfills. The Seller must furnish all pipe sleeves and related materials not furnished by the Company. Pipe and other materials furnished by the Seller for pipe sleeves must be equal to the pipe sleeves furnished by the Company.

2.03 EQUIPMENT

A. Drilling, boring, jacking, or trenching equipment must be as specified by the Seller in the approved Utilities and Rail Crossings Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to submitting a proposed Utilities and Rail Crossings Plan, the Seller must verify existing field conditions, as follows:

1. Utilities

    a) The Seller must contact the Utility Locating Request Center (One-Call Center) at 811 or 1-800-424-5555, in accordance with Section 01 56 15 – Protection of Existing Utilities at least 2 business days prior to field verification of utility locations.

    b) The Seller must hire services of a private utility locate Seller to locate utilities prior to the start of field verification of utility locations.

    c) The Seller must pothole or perform other excavations necessary to verify the location, depth, size, and type of utilities at the proposed crossings.

2. Subsurface soil conditions

a) No subsurface soil exploration has been done to verify soil conditions at the proposed crossing locations.

b) The Seller must collect and review available soil mapping, nearby well logs, or other information.

c) The Seller must, at their discretion, complete potholing or subsurface soil investigations to verify anticipated subsurface soil conditions at the crossing locations.

3.02 GENERAL

A. Pipe sleeves must be installed at rail crossings in accordance with the approved Seller-supplied Utilities and Rail Crossings Plan.

B. Provide dewatering in accordance with Section 31 23 19 – Dewatering.

C. Grade and line tolerances:

1. Provide all necessary equipment during pipe sleeve installation to allow control of alignment and grade as work progresses.

2. The final position of the pipe sleeve must be straight and true in alignment and grade as shown on the Drawings.

3. The final position of the pipe sleeve crown must not rotate more than 1 degree about the pipe centerline from the initial position.

4. Invert elevations of carrier pipe must not depart from design grade by more than 0.1 foot.

5. Installed pipe sleeves that are not in compliance with the tolerances specified must be replaced at the Seller's sole expense.

D. Remove earth displaced by the pipe sleeve installation through the interior by hand, or auger, or other acceptable means.

E. Provide adequate equipment to ensure a smooth, continuous, and uniform pipe sleeve with no exterior voids.

F. Immediately stop installation work if any movement or settlement occurs that exceeds the tolerances indicated on the Drawings, which may cause damage to existing structures or railroad prism along or adjacent to the Work:

1. Resume installation only after all necessary precautions have been taken to prevent further movement.

2. Repair all damage at Seller's expense.

G. Weld each section of pipe sleeve with a full penetration butt weld around the entire circumference of the joint to form a continuous conduit capable of resisting all stresses, including jacking stresses.

    1. Grind or otherwise smooth all interior welds to allow ease of carrier pipe skid installation.

3.03 DRILLING AND RECEIVING PITS

A. Comply with all OSHA trench regulations.

B. The Seller must show proposed locations of all drilling and receiving pits in the approved Crossing Plan.

C. Drilling and receiving pits for horizontal boring or directional drilling must be excavated, backfilled, and protected in accordance with Section 31 23 33 – Trenching and Backfilling.

3.04 PIPE INSTALLATION INSIDE PIPE SLEEVE

A. Install pipe through completed pipe sleeves in accordance with the applicable pipe specification sections and to the tolerances specified under this section.

B. Individually attach spacers to the pipe at locations shown on the Drawings.

C. Install spacers a maximum of 2 feet from each side of joint.

D. Maximum distance between spacers: 5 feet

E. Maximum distance between end of sleeve and first spacer: 12 inches

F. Pipe sleeve end closure:

    1. Seal both ends of the sleeve annulus around the carrier pipe with flexible couplings as shown on the Drawings.

END OF SECTION

SECTION 33 05 61
CONCRETE MANHOLES

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the furnishing and installing pre-cast concrete manholes to collect stormwater, provide access to stormwater piping, create transitions where stormwater piping changes directions, and house stormwater appurtenances.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 05 50 00 – Metal Fabrications

C. Section 31 23 19 – Dewatering

D. Section 31 23 33 – Trenching and Backfilling

E. Section 33 42 11 – Corrugated HDPE Gravity Stormwater Pipe

F. Section 33 42 16 – HDPE Stormwater Force Main Piping

1.03 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. AASHTO M 199 – Standard Specification for Precast Reinforced Concrete Manhole Sections

2. WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

1.04 SUBMITTALS

A. The Seller must submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Pre-Cast Concrete Manholes

a) Catalog data and dimensional drawings from Manufacturer of pre-cast concrete manhole sections.

PART 2 PRODUCTS

2.01 PRE-CAST CONCRETE MANHOLES

A. Pre-cast concrete manhole sections must meet the requirements of AASHTO M 199 and Section 9-05.50 of the WSDOT/APWA Standard Specifications.

B. Pre-cast concrete manholes must be a 48-inch Type 3 concrete manhole as shown on the Drawings and in WSDOT Standard Plan B-15.60.

C. Pre-cast concrete manholes must meet the dimension requirements shown on the Drawings.

D. Where indicated on the Drawings, a circular grate must be placed over pre-cast concrete manholes. The grate must conform to Section 9-05.15 of the WSDOT/APWA Standard Specifications and WSDOT Standard Plans B-30.80-01.

E. Where indicated on the Drawings, a galvanized steel debris rack must be placed over pre-cast concrete manholes. Debris racks must be fabricated in accordance with Section 05 50 00 – Metal Fabrications.

2.02 FLEXIBLE MANHOLE CONNECTORS

A. Unless otherwise noted on the Drawings, the Seller must install a flexible manhole connector at all manhole penetrations.

   1. Model: Kor-N-Seal II 306 series, or approved equal

PART 3 EXECUTION

3.01 INSTALLATION OF PRE-CAST CONCRETE MANHOLES

A. The Seller must install pre-cast concrete manholes in accordance with Section 7-05.3 of the WSDOT/APWA Standard Specifications.

3.02 TESTING

A. All gravity storm drains, manholes, and related equipment must be tested to ensure that the storm drain collection system is watertight prior to final grading and surfacing in accordance with Section 7-04.3 of the WSDOT/APWA Standard Specifications.

B. Testing of the gravity storm drain collection systems will include television inspection of the main by the Company, at the Seller's expense. Immediately prior to television inspecting, enough water will be run down the line so that it discharges into the lowest manhole or wet well and the line is flushed clean. Acceptance of the line will be made after the television inspection tape has been reviewed and approved by the ARP. Testing will take place after all underground utilities are installed and compaction of subgrade is completed.

3.03 FINAL INSPECTION AND CLEANING

A. The Seller will be responsible for ensuring that all drainage structures and pipe are free from debris prior to project closeout.

B. Drainage structures that are installed with inlets must be covered to prevent debris and sediment from entering the storm drain system prior to the final closeout inspection, or inlet protection must be installed in each structure to prevent sedimentation of new drainage structures and downstream pipe.

C. Inlet protection and temporary inlet covers must be removed prior to final inspection, and any debris and sediment that has collected in the storm drain structures or adjacent pipe must be removed prior to the final closeout inspection.

D. Drainage structures and adjacent pipe where debris or sediment is observed during the final closeout inspection must be cleaned prior to final project closeout.

END OF SECTION

SECTION 33 42 11
CORRUGATED HDPE GRAVITY STORMWATER PIPE

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the installation of corrugated polyethylene drainage pipe and fittings for the gravity stormwater conveyance piping.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 31 23 19 – Dewatering

1.03 REFERENCES

A. AASHTO M252 – Standard Specification for Corrugated Polyethylene Drainage Pipe

B. AASHTO M294 – Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in) Diameter

C. ASTM Standards:

1. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

2. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

3. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

4. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

5. ASTM F2487 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene and Polypropylene Pipelines

D. Plastic Pipe Institute (PPI)

1. PE 4710 – PPI High-Density Polyethylene (HDPE) Material Designation

E. WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

1.04 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittals:

1. Product data and specifications for corrugated polyethylene stormwater pipe

2. Catalog data for gaskets and other jointing materials

3. The Manufacturer's installation instructions

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not drop pipe or fittings or subject the pipe to unnecessary jarring, impact, or other treatment that could damage the pipe. Follow the Manufacturer's recommendations when hauling, unloading, handling, and storing the pipe. Do not push or pull pipe and fittings over sharp objects or drop anything onto the pipe and fittings.

B. Inspect pipe, fittings, and related equipment for defects before installation. If any length of pipe shows kinks, buckles, cuts, gouges, or any other damage that, in the opinion of the Company, will affect the performance of the pipe, the Seller must remove the pipe from the Work Area and replace it by a length of undamaged pipe of equal or greater design strength at the expense of the Seller.

C. Do not store pipe in the yard or at the Work Area in direct sun or under any other conditions that would cause degradation of the pipe.

1. At a minimum, wrap pipe in an adequately fastened opaque covering.

a) In warm climates, allow air circulation through and around the pipe by puncturing or cutting the covering in the area of the pipe ends.

D. Support and store pipe above ground surface.

PART 2 PRODUCTS

2.01 TYPE S CORRUGATED HDPE PIPE

A. Corrugated HDPE pipe must meet the requirements of AASHTO M252 and AASHTO M294 Type S, with a smooth interior wall, annular corrugations, and a gasketed bell. Pipe must meet the following specifications:

1. HDPE must be per PPE PE 4710.

2. Nominal inside diameter must be the size indicated on the Drawings.

3. Joints must be bell and spigot type with gaskets conforming to ASTM F477.

4. Joints must be watertight according to the requirements of ASTM D3212.

5. Corrugated exterior must meet the material specifications of ASTM D3350.

6. Carbon black must not exceed 5%.

7. Material must be homogeneous and uniform in color, opacity, density, and other properties.

8. Pipe must be continuously marked with the name of the Manufacturer, the nominal pipe size, the Manufacturer's standard reference, and the production code.

2.02 UNDERDRAINS

A. Underdrain pipe must be perforated or slotted pipe meeting one of the following:

1. Perforated Corrugated HDPE Underdrain Pipe

   a) Pipe must meet the requirements of AASHTO M252 and AASHTO M294 Type SP, with a smooth interior wall, annular corrugations, and perforations.

   b) Pipe must meet the applicable requirements of Article 2.01; and

   c) Pipe must also meet the requirements of Section 9-05.2(8) of the WSDOT/APWA Standard Specifications.

   d) Pipe must be perforated by the manufacturer, with Class 1 perforations.

2. Slotted Polyvinyl Chloride (PVC) Underdrain Pipe

   a) Slotted PVC pipe must conform to ASTM D3034 SDR 35, ASTM F794, or ASTM F679 Type 1, with joints and gaskets conforming to ASTM D3212 and ASTM F477.

   b) Pipe must meet the requirements of WSDOT/APWA Standard Specification Section 9-05.12(1).

   c) Pipe must be slotted by the manufacturer, with slots cut on each side of the bottom of the pipe at 45° from the vertical access. Slot width must be 0.04 inch to 0.069 inch, 1 inch long, and spaced 0.25 inch apart.

PART 3 EXECUTION

3.01 GENERAL

A. The location and configuration of pipe and drainage structures shown on the Drawings is based on the Company's understanding of space requirements for these materials. It is the Seller's responsibility to verify the layout and dimensions of equipment prior to installation.

B. All stormwater piping must be staked for grades and alignment by an engineering or surveying firm capable of performing such work.

3.02 LAYING PIPE

A. Install pipe in accordance with the Manufacturer's recommendations and ASTM D2321.

B. Lay pipe to lines and grades shown on the Drawings within the following tolerances:

   1. Vertical departure: 1/4 inch

C. Keep the pipe trench free of water during pipe installation in accordance with Section 31 23 19 – Dewatering.

D. Carefully grade the pipe trench to provide uniform support along the bottom of the pipe and place a uniform lift of bedding.

E. Carefully lower pipe and accessories into the trench by means of derrick, rope, belt slings, or other equipment that will not cause damage to the pipe.

F. Rest the full length of each section of pipe solidly upon the compacted pipe bedding.

G. Bring HDPE pipe to within 5°F of earth temperature prior to cutting to length for placement of tees, elbows, or other fittings.

H. Carefully inspect the bell of the pipe and remove any foreign matter. Lubricate the bell of the pipe with a clean rag or brush. Clean the spigot end of the pipe and remove the protection covering from the gasket. Lubricate the gasket with a clean rag or brush. Do not allow dirt or foreign matter to contact the lubricated bell and spigot sections. Push the spigot into the bell and align per manufacturer's recommendations without damaging pipe ends.

I. Lay the pipe so that the bell end of each piece of pipe is upstream of the spigot end.

J. Take the necessary precautions to avoid floating or otherwise displacing the pipe.

K. During pipe installation, keep the ends of the pipeline closed.

L. Keep the pipe firmly in position so that the installed pipe forms a continuous, watertight conduit with a smooth and uniform interior surface.

3.03 TESTING

A. All gravity storm drains, manholes, and related equipment must be tested to ensure that the storm drain collection system is watertight prior to final grading and surfacing in accordance with Section 7-04.3 of the WSDOT/APWA Standard Specifications.

B. Testing of the gravity storm drain collection systems will include television inspection of the main by the Company at the Seller's expense. Immediately prior to television inspecting, enough water will be run down the line so that it discharges into the lowest manhole or wet well and the line is flushed clean. Acceptance of the line will be made after the television inspection tape has been reviewed and approved by the ARP. Testing will take place after all underground utilities are installed and compaction of subgrade is completed.

3.04 FINAL INSPECTION AND CLEANING

A. The Seller will be responsible for ensuring that all drainage structures and pipe are free from debris prior to project closeout.

B. Drainage structures and adjacent pipe where debris or sediment is observed during the final closeout inspection must be cleaned prior to final project closeout.

END OF SECTION

SECTION 33 42 16
HDPE STORMWATER FORCE MAIN PIPING

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the installation of Company-furnished pressurized HDPE force main pipe and fittings.

B. This section also describes the requirements for furnishing and installing additional pipe, fittings, and related equipment that have not been furnished by the Company. The Seller is responsible for reviewing the types and quantities of pipe, fittings, and related materials being furnished by the Company for the Work, per the information included in the purchase agreement for those materials included in Appendix C. The Seller must review the quantities of these materials needed to complete the Work and must furnish additional quantities of pipe and other materials, as needed to complete the Work.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

A. Section 31 23 33 – Trenching and Backfilling

B. Section 31 23 19 – Dewatering

C. Section 33 42 11 – Corrugated HDPE Gravity Stormwater Pipe

D. Section 33 44 14 – Valves for Stormwater Control

1.03 REFERENCES

A. ASTM Standards:

1. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

2. ASTM F412 – Standard Terminology Relating to Plastic Piping Systems

3. ASTM F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

4. ASTM F2206 – Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)

5. ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

B. American Water Works Association (AWWA):

1. AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. (19 mm) Through 3 in. (76 mm), for Water Service

2. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), for Waterworks

C. ASME/ANSI:

1. ASME/ANSI B16.1 – Cast Iron Pipe Flanges and Flanged Fittings

2. ASME/ANSI B16.5 – Pipe Flanges and Flanged Fittings

D. Plastic Pipe Institute (PPI): PE4710 – PPI High-Density Polyethylene (HDPE) Material Designation

E. WSDOT/APWA *Standard Specifications for Road, Bridge, and Municipal Construction* (2022 Edition) (WSDOT/APWA Standard Specifications)

1.04 SUBMITTALS

A. The Seller must submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. HDPE Pipe

a) Submit data from the Manufacturer showing pipe dimensions and material specifications for any Seller-furnished HDPE force main pipe.

b) Submit certification that pipe material meets specification requirements for any Seller-furnished HDPE force main pipe.

2. HDPE Pipe Installation

a) Pipe deflection and minimum bending radius recommendations

b) Fusion recommendations

1) Fusion temperature

2) Interface pressure

3) Cooling time

c) Fusion Welder Certification and Statement of Qualifications

3. Filling and Testing Plan

    a) Proposed rate, time, and procedure for filling and pressure testing the distribution pipe and appurtenances

    b) Proposed method of disposing of water drained from pipeline to enable repair of leaks

1.05 QUALIFICATIONS

A. Use personnel adequately trained, qualified, and certified to perform fusion joining of HDPE pipe with at least 2 years of experience performing fusion joining of HDPE pipe.

B. Use personnel skilled and experienced in laying HDPE pipe with butt fusion joints.

1.06 DELIVERY, STORAGE, AND HANDLING

A. The Seller must receive, unload, and stockpile company-furnished pipe, fittings, and related materials furnished by the Company in accordance with Section 01 64 00 – Company-Furnished Products.

B. The Manufacturer must package HDPE pipe and fittings in a manner designed to deliver the product to the project neatly, intact, and without physical damage. During transportation, each pipe must rest on suitable pads, strips skids, or blocks securely wedged or tied in place.

C. Do not drop pipe or fittings or subject the pipe to unnecessary jarring, impact, or other treatment that could damage the pipe. Follow the Manufacturer's recommendations when hauling, unloading, handling, and storing the pipe. Do not push or pull pipe and fittings over sharp objects or drop anything onto the pipe and fittings.

D. If any length of pipe shows kinks, buckles, cuts, gouges, or any other damage extending greater than 10% of the pipe wall thickness, or that in the opinion of the ARP will affect the performance of the pipe, the Seller must remove the pipe from the work area and replace it by a length of undamaged pipe of equal or greater design strength at the sole expense of the Seller.

E. Pipe must not be stored in direct sun or under any other conditions that would cause degradation of the pipe.

    1. At a minimum, wrap pipe in an adequately fastened opaque covering.

        a) In warm climates, allow air circulation through and around the pipe by puncturing or cutting the covering in the area of the pipe ends.

F. Support and store pipe above ground surface.

G. Transport coated fittings with padded bolsters between the pipes. Use heavy padding under ties.

1.07 COMPANY-FURNISHED PIPE AND SELLER RESPONSIBILITIES

A. The Company will furnish HDPE pipe and fittings that meet the requirements of this Technical Specification in the sizes and lengths indicated in the purchase agreement for those materials (see Appendix C).

B. The Seller is responsible for reviewing the types and quantities of pipe, fittings, and related materials being furnished by the Company for the Work. The Seller must also review the quantities of these materials needed to complete the Work and must furnish additional quantities of pipe and other materials, as needed to complete the Work.

C. The Seller is also responsible for receiving, unloading, and stockpiling pipe, fittings, and related materials and the approved on-site Staging Areas and transporting Company-furnished pipe from the on-site stockpile locations to the place of installation.

D. The Seller is also responsible for installing for both Company-furnished and Seller-furnished HDPE force main pipe, fittings, and related equipment in accordance with Part 3 – Execution.

PART 2 PRODUCTS

2.01 HDPE FORCE MAIN PIPE AND FITTINGS

A. HDPE force main pipe must meet the following requirements:

1. Pipe and fittings furnished by the Seller must be equal in dimension, wall thickness, and material specifications to the pipe and fittings furnished by the Company for force main construction.

2. Pipe must be manufactured from a PE 4710 resin, as defined by the PPI.

3. The resin material must meet the specifications of ASTM D3350 with a cell classification of 445574C.

4. Pipe must have a manufacturing standard of ASTM F714, and must meet the requirements of AWWA C906, for pipe 4 inches and larger, and AWWA C901, for polyethylene pipe 3 inches and smaller.

5. Pipe must be provided in the sizes and dimension ratios shown on the Drawings.

6. Material must be homogeneous and uniform in color, opacity, density, and other properties.

7. Pipe must be continuously marked with the name of the Manufacturer, the nominal pipe size, the Manufacturer's standard reference, and the production code.

8. The pipe must contain no recycled compounds except that generated in the Manufacturer's own plant from resin of the same specification from the same raw material.

9. Detectable marking tape and locating wire placed above the pipe must be marked green or labeled with the words "Storm Drain."

10. All HDPE pipe must be from a single Manufacturer experienced and qualified in the manufacture of the HDPE pipe to be furnished.

11. Refer to ASTM F412 for standard terminology related to HDPE force main pipe.

B. Fittings for HDPE force main must meet the following requirements:

1. HDPE fittings must meet the requirements of AWWA C906 and ASTM F2206 and must be made of the same material as the adjoining pipe.

2. HDPE fittings must have the same pressure rating as the adjoining pipe or must be counter-bored or tapered to reduce the wall thickness to allow for butt-fusion to the adjacent pipe.

3. Connections from HDPE to other types of pipe must be made using a flanged fittings or solid, bolted sleeve type couplings designed for joining HDPE to other types of pipe. A stainless steel stiffener must be used wherever plain end HDPE pipe is coupled to another pipe.

4. Connections from HDPE to flanged fittings or valves must be made using a molded HDPE flanged adapter with a ductile iron or stainless steel backing ring.

5. Where flanged fittings are required, flanges must have bolt holes consistent with ASME/ANSI B16.1 Class 125 or ASME/ANSI B16.5 Class 150. Flanges and bolt holes must be compatible with adjoining pipe, valve, or fitting.

6. All HDPE fittings must be from a single Manufacturer experienced and qualified in the manufacture of the HDPE fittings to be furnished.

2.02 RELATED ITEMS

A. Detectable Marking Tape and Locating Wire

1. Install detectable marking tape and locating wire over all buried, pressurized plastic pipe.

2. Marking tape must be green or labeled with the words "Storm Drain."

3. Tape must be placed at least 6 inches above the pipe and must extend along the full length of pressurized pipe.

4. The locating wire must be minimum 12-gauge copper multi-strand RHW-type wire placed at least 3 inches above the pipe and must extend along the full length of the pressurized pipe. Install wire as a single continuous wire. Splicing of the wire, if necessary, must be done in such a way as to produce an electrically and mechanically sound connection.

5. Detectable Marking Tape must meet the requirements of Section 9-15.18 of the WSDOT/APWA Standard Specifications.

B. Concrete Thrust Blocking

1. The Seller is responsible for restraining pressurized pipe against unresolved hydrostatic forces. Concrete thrust blocking must be used as shown on the Drawings to restrain pipe and fittings. Blocking must be placed at bends, tees, caps, blind flanges, wyes, valves, and other fittings.

2. Concrete for thrust blocking must be commercial concrete per Section 6-02.3(2) of the WSDOT/APWA Standard Specifications.

3. Concrete thrust blocking must bear against undisturbed native soil at the sides and bottom of the trench excavation and must be shaped as not to obstruct access to the joints of the pipe or fittings. Where bearing area against undisturbed native soil is not available, the Seller may omit thrust blocking, with approval from the Company. The Seller must demonstrate to the Company's satisfaction that that all pipe joints and connections to fittings and appurtenances will be restrained against hydrostatic forces before eliminating thrust blocking.

PART 3 EXECUTION

3.01 LAYING PIPE

A. The Seller must install HDPE pipe in accordance with the Manufacturer's recommendations.

B. Lay pipe to lines and grades shown on the Drawings within the following tolerance:

1. Vertical departure: 1/4 inch

C. Keep the pipe trench free of water during pipe installation in accordance with Section 31 23 19 – Dewatering.

D. Carefully grade the pipe trench to provide uniform support along the bottom of the pipe and place a uniform lift of bedding.

E. Bring HDPE pipe to within 5°F of earth temperature prior to cutting to length for placement.

F. Complete joints prior to placing the pipe in the trench, per Article 3.02.

G. Carefully lower pipe and accessories into the trench by means of derrick, nylon rope, belt slings, or other equipment that will not cause damage to the pipe.

H. Rest the full length of each section of pipe solidly upon the compacted pipe bedding, and place a lift of select backfill up to the pipe spring line.

I. Make changes to alignment and grade by installing fabricated HDPE bends or by bending the pipe, as allowed by the Manufacturer, to match the proposed alignment and grade. Minimum cold (field) bending radii must be as shown on the Drawings or as recommended by the pipe manufacturer.

J. After pipe laying and fusion joining operations are complete, clean the inside of the pipe and remove debris. When pipe laying is in progress, keep ends of pipelines closed.

3.02 FUSION

A. Clean pipe of all shavings and other debris prior to joining pipe.

B. Join HDPE pipe by the method of thermal butt or side wall fusion, outlined in ASTM F2620. Perform fusion joining in accordance with the procedures established by the Manufacturer.

C. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe Manufacturer.

D. The butt fusion joining must produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.

E. Do not perform pipe fusion in water or when trench conditions are unsuitable for the Work. Prevent water from coming in contact with the fusion heater plate.

F. Socket fusion, hot gas fusion, threading, solvents, and epoxies are not allowed.

3.03 INSPECTION AND TESTING

A. HDPE pipe, fittings, and appurtenances must be tested under a hydrostatic pressure of at least two times the maximum working pressure of the pipe. Test pressures must be as shown on the Drawings.

B. Hydrostatic pressure test procedures must be in accordance with those outlined in Section 7-09.3(23) of the WSDOT/APWA Standard Specifications, except as modified herein.

C. Test sections must not exceed 1,500 feet in length.

D. The Seller must provide pumps, hoses, fittings, and other equipment needed to perform the pressure tests. The Seller must also arrange for water to be made available for pressure testing.

E. Disinfection is not required.

F. Pressure testing must be coordinated through the Company and witnessed by the ARP. Notify the ARP at least 24 hours before applying pressure to the pipeline.

END OF SECTION

SECTION 33 44 13
PACKAGED STORMWATER PUMP STATIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for installation of Company-furnished package stormwater pump stations. The requirements for Company-furnished packaged stormwater pump stations and related equipment and services are outlined in Section 01 64 00 – Company-Furnished Products.

B. The Seller must review the shop drawings, data for materials to be furnished, and installation instructions provided by the Company's selected Pump Station Package Supplier (PSP Supplier), PumpTech, LLC, to understand the types and quantities of materials to be furnished as part of the Company-furnished packaged pump stations and to verify the installation requirements.

C. The Seller must also review the drawings and information related to the equipment and materials being furnished by the Electrical Engineer and the Electrical Package Supplier (EP Supplier), Powers of Automation, to understand the types and quantities of materials to be furnished as part of the Company-furnished electrical and controls systems for each pump station and to verify the installation requirements.

D. The Seller must identify and furnish any additional materials needed to complete the Work that are not indicated in Appendix C.

1.02 RELATED SECTIONS

A. Section 02 71 00 – Water Management and Treatment

B. Section 31 20 00 – Earthwork

C. Section 31 23 19 – Dewatering

D. Section 31 23 33 – Trenching and Backfilling

1.03 QUALIFICATIONS

A. Use personnel adequately trained, qualified, and certified to perform the Work needed to complete installation, startup, and testing of each pump station.

B. Provide the appropriate equipment needed to unload and install all pump station components.

1.04 DELIVERY, STORAGE, AND HANDLING

A. The Seller will coordinate with the Company and PSP Supplier for delivery of packaged pump stations to the Site.

B. The Seller will unload and store all pump station components until they can be installed.

C. Each pump station package will be shipped with loose components, as shown on the fabrication drawings and information provided by the PSP Supplier. Components will include the following:

1. Wet well pipe stub outs, covers, and internal components assembled
2. Pumps
3. Rails
4. Stairs
5. Discharge pipe
6. Discharge fittings
7. Valves
8. Gaskets
9. Instrumentation

D. Do not drop packaged pump station components or subject components to unnecessary jarring, impact, or other treatment that could damage the components. Follow the PSP Supplier's recommendations when hauling, unloading, handling, and storing package pump station components.

E. Report any damage observed to the ARP immediately.

1.05 COMPANY-FURNISHED EQUIPMENT AND SELLER RESPONSIBILITIES

A. The Company will purchase packaged stormwater pump stations for the West Landfill and East Landfill pump stations. The pump station packages will include pumps, pipe, fittings, valves, wet well structures, and other equipment as defined in the Company's procurement documents for the pump stations, included in Appendix C.1.

B. The Company will purchase control panels, instrumentation, and electrical systems needed to control and operate the pump stations from the EP Supplier. The electrical and controls systems will include the equipment and materials indicated in Appendix C.

C. The Seller will be responsible for the following:

1. Unload and store the packaged pump station components upon delivery to the Site.

2. Unload and store the electrical and controls equipment upon delivery to the Site.

3. Transport packaged pump station components and electrical and controls equipment from the storage/staging location to the pump station location for installation.

4. Complete excavations in accordance with Section 31 20 00 – Earthwork and Section 31 23 33 – Trenching and Backfilling.

5. Dewater excavations in accordance with Section 31 23 19 – Dewatering.

6. Complete other Site preparation, place and compact structural fill and backfill, and complete all other earthwork needed for installation of each packaged pump station.

7. Install pump wet well structures, as recommended by the PSP Supplier and as shown on the Drawings.

8. Construct the reinforced concrete slab and stair base at each pump station designed to support the discharge pipe, fittings, valves, and electrical and control panels.

9. Install all prepackaged pump station components as recommended by the PSP Supplier. This will include, but is not limited to, the following Work:

    a) Install pumps through openings provided in the top of each wet well.

    b) Install and securely attach rails and stairs on each wet well structure.

    c) Connect discharge pipe and fittings to pumps at flanged connections and with dismantling fittings.

    d) Install valves to discharge pipe and fittings at flanged connections.

    e) Install pipe supports.

    f) Install other appurtenances.

10. Furnish and install any additional equipment or materials needed to complete pump station construction so that the pump stations are fully operational.

11. Connect inlet piping and force main discharge piping to each pump station.

12. Complete all finished grading and site work related to the pump stations.

13. Coordinate the Work with the Company, the PSP Supplier, and the EP Supplier.

14. Coordinate with the Company, the EP Supplier, and the PSP Supplier to complete installation of instrumentation and controls.

15. Coordinate with the Company, the EP Supplier, and the PSP Supplier to complete testing and startup of each pump station.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Perform excavations and earthwork needed to prepare each site for pump station installation in accordance with Section 31 20 00 – Earthwork and Section 31 23 23 – Trenching and Backfilling.

B. Provide shoring, sheeting, or other protection for all excavations in accordance with Section 31 20 00 – Earthwork.

C. Provide all temporary dewatering systems to dewater excavations in accordance with Section 31 23 19 – Dewatering and convey all dewatering effluent through temporary piping or the newly installed force main to storage tanks at Facility 77, in accordance with Section 02 71 00 – Water Management and Treatment.

3.02 INSTALLATION

A. Install the pump station and all pump station components in accordance with the PSP Supplier's recommendations and instructions and as outlined in these Technical Specifications.

B. Coordinate with the Company, the PSP Supplier, and the EP Supplier throughout installation.

C. Following installation, complete all backfilling and site work, as shown on the Drawings.

3.03 SCHEDULE AND CONSTRAINTS

A. The East Landfill Pump Station and related force main are intended to be installed and fully operational prior to any Work within the East Landfill area so that these facilities can be used to manage Remediation Water during landfill construction, in accordance with the requirements outlined in Section 02 71 00 – Water Management and Treatment.

B. The West Landfill Pump Station and related force main are intended to be installed and fully operational by the time the West Landfill Work is complete and the landfill is stabilized, at the end of Construction Season 1. The West Landfill Pump Station will not be used to manage Remediation Water during landfill construction but will be needed to manage stormwater runoff from the capped landfill once landfill construction is complete and the landfill cover has been stabilized.

C. Installation of electrical and controls equipment will need to completed on a timeline that allows for the pump stations to be operational according to these needs.

END OF SECTION

SECTION 33 44 14
VALVES FOR STORMWATER CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the requirements for the installation of Company-furnished valves for control of the flow of stormwater through force main piping.

B. This section also describes the requirements for furnishing and installing additional equipment related to Company-furnished valves that will be needed to complete the Work. The Seller is responsible for reviewing the types and quantities of valves being furnished by the Company for the Work, per the information included in the purchase agreement for those materials included in Appendix C. The Seller must also review the additional materials needed, such as fittings, additional valves, and utility boxes, needed to complete installation of these valves as indicated on the Drawings. The Seller must furnish and install the additional materials and equipment needed to complete installation of Company-furnished valves, as indicated on the Drawings.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 31 23 19 – Dewatering

C. Section 31 23 33 – Trenching and Backfilling

D. Section 33 42 16 – HDPE Stormwater Force Main Piping

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures

1. Combination Air Release Valve Assemblies

a) Submit a schedule and catalog data for pipe, fittings, valves, utility boxes, and other equipment needed to complete air release valve assemblies.

1.04 COMPANY-FURNISHED VALVES AND SELLER RESPONSIBILITIES

A. The Company will purchase gate valves, valve boxes, and air release valves that will meet the requirements of this Technical Specification in the quantities and sizes shown on the Drawings.

B. The Seller will be responsible for reviewing the types and quantities of valves and related materials being furnished by the Company for the Work. The Seller must also review the

quantities of materials needed to complete the Work and must furnish additional quantities of fittings, valves, and utility boxes, as needed to complete installation of the valves, as shown on the Drawings.

C. The Seller will also be responsible for receiving, unloading, and stockpiling valves and related materials at the approved on-site Staging Areas and transporting Company-furnished valves and related materials from the on-site stockpile locations to the place of installation.

D. The Seller will also be responsible for installing for both Company-furnished and Seller-furnished valves and related equipment in accordance with Part 3 – Execution.

PART 2 PRODUCTS

A. If additional gate valves, valve boxes, or air release valves are required beyond those furnished by the Company, the additional valves and equipment must be equal to those furnished by the Company, as indicated in Appendix C, and approved by the Company prior to installation.

B. Combination Air Release Valve Assemblies

1. Combination air release valves will be as furnished by the Company.

2. Service saddle, corporation stop, service pipe, couplings, valves, nipples, fittings, air vent, and utility box must be as indicated on the Drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect valves upon delivery at the Site to ensure proper working order. Verify that valves operate from the fully opened to fully closed position without sticking or binding. If valves stick or bind, repair or replace the valves before installation.

B. Clean flanges or threads, bolts, and nuts with a wire brush.

C. Lubricate bolts with oil and graphite before installation.

D. Lubricate valve operators in accordance with Manufacturer's recommendations.

3.02 INSTALLATION

A. The Seller will be responsible for installing air release valves and isolation valves on HDPE force main pipelines and at the connections between force main pipelines and existing pipe and fittings at Facility 77, in accordance with Section 31 23 19 – Dewatering, Section 31 23 33 – Trenching and Backfilling, and Section 33 42 16 – HDPE Stormwater Force Main Piping.

B. Valves must be installed in the locations shown on the Drawings and in accordance with the Manufacturer's recommendations.

C. Install valves so that bolt holes straddle the horizontal and vertical centerlines of the pipe run to which the valves are connected.

D. Valves and valve boxes must be set plumb. Valve boxes must be set flush with the finish ground surface.

END OF SECTION