TIGARD-TUALATIN SCHOOL DISTRICT NO.23J

GREENHOUSE AT CREEK SIDE COMMUNITY HIGH SCHOOL
PERMIT AND BID SET SPECIFICATIONS

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Project Number: 22116300
SECTION 00 01 02 – PROJECT TEAM

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END OF SECTION
PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Related Requirements
B. Work Covered by Contract Documents.
C. Contract Method.
D. Permits and Fees
E. Work by the District or Others.
F. Contractor’s Use of Site and Premise.

1.02 RELATED REQUIREMENTS
A. General Conditions of the Contract for Construction

1.03 WORK COVERED BY THE CONTRACT DOCUMENTS
A. The Work of Project is defined by the Contract Documents and consists of new greenhouse located at Creekside Community High School.

B. The Work shall include all supplies, tools, equipment, scaffolding, transportation, utilities, service, superintendence, labor, and the furnishing of all materials, items, and accessories needed for the Project.
1. All on site work, including demolition, installation, and final cleaning is required to be completed during the regularly scheduled hours. Contractor is to coordinate work to accommodate the continuous operation of the adjacent streets and utilities, without interruption or hindrance.
2. The Contractor shall provide for all scheduling, coordination, cutting and patching and all other items required by the Contract Documents to complete the Work.
3. Site, Electrical, and Plumbing plans and permit applications have been submitted to and approved by the City of Tigard. Permits are ready to be picked up by the contractor.
4. Building permits will require structural calculations to be provided by the greenhouse vendor at expense of the contractor (estimated at $5,000). Contractor to solicit structural calculations from vendor and submit to City to obtain Building Permits for vertical erection of greenhouse.

C. Work of this Contract, as more completely detailed in the Contract Documents The scope of work includes, but is not limited to, the following elements:
SITE IMPROVEMENTS AND NEW GREENHOUSE
ELECTRICAL IMPROVEMENTS
STRUCTURAL ENGINEERING

1.04 CONTRACT METHOD
A. Construct the work under a Stipulated Sum Contract, furnished by the District.
1.05 PERMIT AND FEES
A. Procuring all permits will be the responsibility of the Contractor. Site, Electrical, and Plumbing plans and permit applications have been submitted to and approved by the City of Tigard. Permits are ready to be picked up by the contractor. TTSD will pay permit fees.

B. Building permits will require structural calculations to be provided by the greenhouse vendor at expense of the contractor (estimated at $5,000). Contractor to solicit structural calculations from vendor and submit to City to obtain Building Permits for vertical erection of greenhouse. TTSD to pay City permit fees.

1.06 WORK BY THE DISTRICT OR OTHERS
A. If District-awarded contracts interfere with each other due to work being performed at the same time or at the same Site, the District will determine the sequence of work under all contracts. “Contractor’s Use of Site and Premises” Articles in this Section outline the District’s policies on use of site.

B. Coordinate Work with utilities of the District and public or private agencies.

C. The Contractor shall afford the District and the District’s separate contractor’s reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work.

1.07 CONTRACTOR’S USE OF SITE AND PREMISE
A. Construction operations are to be limited to areas indicated on contractor’s logistics plan approved by the District

B. Use of the Site:
1. Do not unreasonably encumber Site or facility with materials and equipment.
2. Do not load structure with weight that will endanger structure.
3. Confine operations at the site to the areas permitted. Portions of the site beyond areas in which work is indicated are not to be disturbed.
4. Keep existing driveways and entrances serving the premises clear and available at all times. Do not use parking for storage of materials.
5. Move stored products which interfere with the District operations and other contractors.
6. Assume full responsibility for the protection and safekeeping of stored products.
7. Obtain and pay for use of additional storage land work areas needed for Contractor operations if necessary.
8. Provide resources for trash removal. Facility dumpsters and trash cans cannot be used for Contractor’s trash disposal. Contractor shall not interfere with District waste facilities and scheduled trash pickup.
9. Lock automotive type vehicles and other mechanized or motorized construction equipment when parked and unattended. Do not leave vehicles or equipment unattended with the motor running or ignition key in place.
10. Areas of the site which will be occupied by the Contractor or impacted by construction shall be restored to existing conditions. Contractor is responsible for damage caused by construction activities to playgrounds and surfaces not rated for heavy traffic.
11. It is understood that the Contractor has the most knowledge about staging construction and the extent of restoration required. The Contract Documents therefore do not indicate new construction to replace existing.
12. Landscaping damaged by the Contractor or associated activities shall be repaired to original conditions. All newly seeded or planted areas will be maintained through a period of establishment as determined as reasonable but not less than one growing season. Contractor shall follow requirements as indicated below:
a. The Contractor shall be responsible for protecting seeded areas from damage and maintaining seeded areas as necessary to establish a complete coverage of the specified vegetation in a healthy and growing condition for 365 days from the date of substantial completion of the project.
b. Mowing: Mow all seeded areas as required to maintain in a healthy growing condition, and to control the germination and spread of noxious weeds. Mow a minimum of once per maintenance period. Line trimmers may be used where appropriate.
c. Re-Seeding: Upon detection of damaged or failing areas and areas showing unsatisfactory growth and coverage, the Contractor shall restore the area as necessary to establish a complete cover crop. Reseed using the seed mixes specified.
d. Provide necessary watering of seeded areas via temporary irrigation system or hand watering. Any irrigation system is subject to requirements for system use, such as approved backflow devices. Perform necessary site visits and observations to maintain the proper amounts of moisture in soils to promote healthy and vigorous plant growth. Correct conditions of over or under-watering as may be determined by weekly observations during the irrigation.

13. Contractor is to protect existing trees in the vicinity of construction operations. No Work, staging, or vehicle traffic is to extend into the drip line of a tree. Contractor will be responsible for any and all penalties, fines, arborist reports, inspections, and required remediation steps for causing damage to a tree or its root system.

C. Contractor’s Site Conduct:
1. Identifying name tags shall be worn at all times.
2. No loitering in the school buildings.
3. The site is a tobacco-free site. This means no smoking or chewing on the property.
4. Keep the project free of pop cans, lunch wrappers, etc.
5. The supervisor will review the scheduling of any work that is excessively noisy with District Representative.
6. Profanity is not acceptable.
7. The wearing of clothing with logos displaying alcohol, tobacco, illegal substances, or suggestive is not acceptable attire.
8. The Contractor, the Contractor’s employees and all subcontractor’s and subcontractor’s employees who perform Work will be required to comply with the District’s policies and procedures.
   a. All contractors working on site are to be fully vaccinated according to Oregon Health Authority Public Health Division chapter OAR 333-019-1030. (OAR 333-019-1030 continues to be in effect, and applies to anyone who is employed by, or volunteers in, a public school, private school, parochial school, or charter school, alternative educational program or school-based program or who is not employed but otherwise engaged to provide goods or services to a school or school-based program through any formal or informal agreement, whether compensated or uncompensated, and includes but is not limited to teachers, administrative staff, coaches, drivers, and volunteers. This rule applies to before/afterschool programs located at schools. Short-term visitors or individuals making deliveries are not subject to this rule. Individuals whose job or volunteer work never includes direct or indirect contact with students or children at the school are not covered by this rule.)
9. Beyond courtesy, there should be no interaction between Contractor and the District’s staff.
10. Employee Screening: Comply with District’s requirements for drug and background screening of Contractor personnel working on Project site.

D. Emergency Building Exits During Construction:
1. Maintain required access to existing emergency exits as required by governing jurisdiction. Any changes made to the egress plan by the Contractor shall be the Contractor’s responsibility to get it professionally designed and approved by the governing jurisdiction.
2. Protect the public and the District’s staff from construction hazards in the emergency egress pathways.

3. Protection barriers from falling material hazards shall be professionally designed and submitted to the District for approval.

END OF SECTION
SECTION 01 14 00 – WORK RESTRICTIONS

1.01 SECTION INCLUDES

A. Related Requirements
B. Access to Site
C. Coordination with Occupants
D. Use of Site
E. Standard Working Hours/Days
F. Deviation from Standard Hours/Days

1.02 RELATED REQUIREMENTS

A. General Conditions of the Contract for Construction

1.03 ACCESS TO SITE

A. Contractor shall limit use of premises for Work and for construction operations.
B. Access to and from site shall be from location approved in advance by District.
C. There shall be no access through or from adjacent parks or residences.
D. Coordinate use of premises under direction of the District.

1.04 COORDINATION WITH OCCUPANTS

A. The District will occupy the buildings throughout construction.
   1. Contractor shall only enter the premises when it is occupied with permission from the District.
   2. Contractor shall only allow workers on site who have passed a background check and obtained a badge. Badges will be carried by workers in a visible location at all times.
   3. Contractor shall work with the District Representative to accommodate all reasonable requests as needed to provide a safe environment for other occupants while construction is taking place and the schools are occupied by other users.
   4. Contractor shall not delay the reopening of the area to the public beyond the time specified.

1.05 USE OF SITE

A. Contractor shall have use of the site but shall coordinate access and useable locations in advance with District.
B. Contractor shall direct all construction vehicle and delivery traffic along an access route as approved by the District.
C. Contractor shall professionally prepare a site logistics plan defining Contractor area for work, access, staging and storage utilizing CAD, Bluebeam, Adobe Acrobat, or other similar software.
D. Provide staging and logistics plan delineated on Project Site Plan. Include crane operations, material lay-down area, job office location, fence locations, gate locations, fence locking plan, pedestrian
walkways and contractor parking. Project Site Plan shall be on 11x17 paper and shall be professionally prepared.

E. Contractor shall submit staging and logistics plan to District and governing authorities (if required) for review and approval prior to commencement of Work.

F. Contractor shall limit his use of the premises for Work and for storage to allow for:
   1. District occupancy and operations.
   2. Coordinated use of premises under direction of District.
   3. Full responsibility for protection and safekeeping of products under this Contract stored at Site.
   4. Moving stored products, under Contractor's control, which interfere with operations of District or a separate Contractor.
   5. Obtaining and paying for use of additional storage or work areas needed for operations.
   6. Conformance to fire / life safety requirements and fire equipment access.
   7. Worker vehicle parking on-site.

G. The existing fire alarm system and fire sprinkler system shall remain operational twenty-four (24) hours per day, seven (7) days per week. If at any time during the Project the existing system is not fully operational the Contractor, at its own expense, shall provide a “Fire Watch” acceptable to the District until the existing system is made fully operational.

H. Work on weekends, evenings or holidays may be required to meet the project phasing schedules. Provide 72 hours notification to the District to ensure necessary inspections, monitoring, testing, etc. are provided during these work hours.

I. Temporary hard barriers as necessary shall be constructed prior to the start of work in accordance.
   1. The Contractor shall submit diagrams one week prior to start of construction indicating the construction zone, barricades and access for School Personnel, for approval by the District.

J. The Contractor shall diligently maintain all construction zone barricades and fencing.
   1. Fence panels shall be secured with two fence clamps per joint.
   2. The Contractor shall secure end panels in a manner acceptable to the District.
   3. The use of tie wire will not be an acceptable method for securing fence panels.
   4. Construction zone gates shall be secured with chains and District provided padlocks.

1.06 STANDARD WORKING HOURS/DAYS

A. Facilities will be available 7-days a week for contractor work

B. Contractor is required to work on weekends at their own expense any week that they are behind schedule (according to the approved Project Construction Schedule).

C. If work continues after school is back in session, work may be performed during school hours in District approved areas only.

1.07 DEVIATION FROM STANDARD HOURS/DAYS

A. For any deviation from the above stated working days/times, Contractor shall submit a request in writing to the District Representative at least 48 hours prior to the date in question. While the District cannot assure approval in every instance, efforts shall be made to accommodate such requests.
PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.00 CONTRACT TIME / MILESTONE SCHEDULE

A. All Phase times indicated are from start of Contractor’s access to work area to Substantial Completion for each Phase.
1. Contract Time and Milestone Schedule:
   2. Notice to Proceed (NTP): October 28th, 2022
   3. Substantial Completion: January 24th, 2022
   4. Final Completion: February 14th, 2022

B. Description of General Phasing Requirements:
   1. The start dates represented in the milestone schedule are preliminary and the District reserves the right to modify these dates based on when the Notice to Proceed is issued.
   2. The Contractor is responsible for providing the manpower and scheduling the shifts necessary to complete the work in accordance with the Contract Time and Milestone Schedule.
   3. The School will remain open during work. The Work of this project must take into account that most sites will have occupancy by students and staff.
   4. Non-School hours are defined as hours before 7:00 AM, and after 3:45 PM on days when school is in session.
   5. Follow City of Tualatin Noise Ordinance.
   6. Work that is hazardous, noisy, or that causes vibration may not be performed in the buildings or on the site when the school is occupied, without approval from the District’s Representative. Contractor must submit all request in writing to the District’s Representative. This includes but is not limited to the following work activities:
      a. Hazardous materials abatement.
      b. Concrete bushing, chipping, grinding, jack hammering.
      c. The use of Powder-Actuated (PAT’s) fasteners.
      d. Floor grinding to remove adhesive.
      e. Chemicals used in quantities that cause excessive odor, such as hot tar, and cannot be effectively ventilated. As determined by the District’s Representative.
      f. Wall tile removal. Hand scraping or chipping may be acceptable as approved by the District’s Representative.
      g. Electric Tile Cutter may be used if isolated in a temporary sound deadening room constructed by the Contractor as approved by the District’s Representative.
      h. Large impact drills for use in concrete.
      i. Smaller Bulldog type impact drills for */" holes or less.
      j. Operation of cranes in occupied areas, including drilling rigs, and concrete pump trucks unless the occupants can be sufficiently isolated from the swing zone.
      k. Chop Saws for metal studs or other metal cutting. These may be used if isolated in a temporary sound deadening room constructed by the Contractor as approved by the District’s representative.
      l. The use of abrasive or “hot” saws to cut steel decking.
      m. Earthwork compaction, including the operation of vibratory compaction equipment.

3.01 ACTUAL DAMAGES

A. Substantial Completion: The delayed Substantial Completion of any phase of the Work will result in the assessment and withholding of Actual Damages for each day of delayed Substantial Completion. See Section 01 77 00 “Closeout Procedures” for requirements by phase of the project.
B. **Final Completion:** The delayed Final Completion of the Work will result in the assessment and withholding of Actual Damages for each day beyond the Contract Time until all punch list items are completed. Actual damages include but are not limited to: The District’s project team labor (including the CM), additional time spent re-inspecting work that was completed incorrectly, and attorney’s fees related to the delay in completing the work.

END OF SECTION
PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Related Sections
B. Access and Start-Up/Termination
C. Shut-Off Procedures
D. System Survey
E. Emergency Shut-Off Survey
F. Payment Provisions

1.02 RELATED REQUIREMENTS
A. General Conditions of the Contract for Construction.

1.03 RELATED SECTIONS
A. Section 01 73 00 — Execution and Closeout Procedures.

1.04 ACCESS AND START-UP/TERMINATION
A. Contractor shall coordinate with the District for temporary power and water, and other utilities as needed to conduct the work. Contractor shall not disconnect any existing breakers to use for temporary power without approval from the District and shall not install new breakers for temporary power without first confirming that the panel has adequate capacity for the new breakers.
B. Upon completion of the Work, Contractor shall ensure that all utility services have been appropriately terminated in accordance with the Contract Documents and utility purveyor requirements.
C. Refer to Section 01 73 00.

1.05 SHUT-OFF PROCEDURES
A. Contractor shall be responsible for demolition of utility systems including cutting, capping and system shut down in accordance with local utility service purveyor requirements.
B. Contractor shall notify District a minimum of three working days prior to any proposed shut-down and shall provide written documentation of shut-down procedures as well as requirements for future system restart.
C. Domestic water main valves cannot be turned-off without a District representative being present. Any damage caused to the auto-flush valves, water filters, or any other plumbing fixture due to unauthorized shut-down of the system will be repaired at the Contractor’s expense.
D. Fire alarm systems must be put in test while they are being worked on. At the end of every workday, the systems must be back online and 100% operational. If any zone is not functioning properly,
Contractor is to post a “fire watch”. If the Contractor does not post a fire watch, the District will at the Contractor’s expense. In addition to the cost for the fire watch, the Contractor will be charged for all management time spent managing the situation, and any additional related incidental costs.

E. Fire sprinkler systems are not to be modified without approved submittals clearly defining the work to be performed, a fire sprinkler permit in-hand, and a District representative present at the time the system depressurized and drained. If the system is not 100% operational at the end of every workday, then Contractor is to notify the District and by-pass the tamper flow switches on the fire alarm system.

F. Power to breaker panels and the District’s equipment is not to be turned-off without approval from an authorized District representative. Any costs incurred by the District for having to re-start or re-program any of the mechanical or electrical systems due to unauthorized shut-down of any power supply will be the Contractor’s responsibility.

G. Contractor to work with District Representative to ensure HVAC fans in construction areas are to be shut down before construction begins to keep the ducts from getting contaminated with construction dust. If Contractor does not shut down the units and adequately protect the grills, then Contractor will be required to clean the ducts before Substantial Completion.

1.06 EMERGENCY SHUT-OFF SURVEY

A. Before construction begins Contractor shall field survey the building/buildings and site and work with the District Representative to develop an Emergency Shut-off Plan.

B. The plan will show graphically all shut-off locations for utilities clearly identified along with any special instructions and contact procedures.

C. The plan will include an emergency contact list for the Contractor, District Representative, District Facilities Manager and Assistant, Fire Department, Power and Water District.

D. The Contractor shall assemble any specialty tools required and keys for any locked areas.

E. The Emergency Shut-off Plan shall be posted in Contractor’s construction office with a copy of all items to be located in the front office.

1.07 PAYMENT PROVISIONS

A. District shall pay for permanent and temporary utility services.

B. Contractor shall use due diligence to observe sustainable and conservational utility use practices.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Related Requirements  
B. Scheduling of Work  
C. Construction Progress Schedule  
D. Three Week Look Ahead  
E. Recovery Schedule  
F. Submittals Schedule  
G. Deferred Submittals  
H. Site Specific Safety Plans  
I. Site Specific Staging and Logistics Plan  
J. Contractor Health and Safety Evaluation  
K. Construction Progress Reporting  
L. Periodic Work Observation  
M. Photographic Documentation

1.02 RELATED REQUIREMENTS

A. General Conditions of the Contract for Construction.

1.03 SCHEDULING OF WORK

A. The primary objectives of the project scheduling program are as follows:
   1. To ensure the adequate planning, scheduling, and execution of the construction activities so they may be prosecuted in an orderly and expeditious manner within the Contract Time and the Milestones stipulated by the Contract.
   2. To provide optimum coordination between Subcontractors.
   3. To establish the basis for measuring and monitoring individual Contractor progress and overall project progress.
   4. To detect problems for the purpose of taking corrective action to maintain the scheduled program and to provide a mechanism or tool for determining and monitoring such corrective actions.

B. If the Contractor should desire or intend to complete the Work earlier than any required Milestone or Completion date, the District, Engineer or the District’s Representative shall not be liable to the Contractor for any costs or other damages should the Contractor be unable to complete the Work before this earlier date. The duties, obligations and warranties of the District to the Contractor shall be consistent with and applicable only to the completion of the Work on the Milestone and Completion dates required in the Contract, unless the District, the District’s Representative and the Contractor otherwise agree in writing.

1.04 CONSTRUCTION PROGRESS SCHEDULE

A. Pursuant to the General Conditions of this Contract, the following additional scheduling requirements are a part of this Contract.

B. The Construction Progress Schedule shall be created using the current version of MS Project or approved equal.
C. Work under this Section shall consist of completing a Construction Progress Schedule showing in detail how the Contractor plans to execute and coordinate the Work.

D. Each work item on the Construction Progress Schedule, as well as being correlated to the payment document, shall be broken into feasible work segments/activities (where practicable) with individual starting and stopping dates.

E. Work shall be segmented to demonstrate its relationship to the various Milestone Dates. Activity titles shall be self-explanatory, and abbreviations shall be shown in the legend.

1.05 THREE WEEK LOOK AHEAD SCHEDULE

A. Each week the Contractor shall prepare and present an update schedule showing the planned activities for the next three weeks and 1 week prior. The schedule shall be coordinated with the master schedule and accurately portray activities completed and activities planned for the upcoming weeks. Unless otherwise directed by the District, the Contractor shall present this schedule at the weekly meeting.

B. Provide copies to the participants at the time of the weekly Progress Meeting.

C. Format shall be 11” by 17” or as necessary to be easily legible.

1.06 RECOVERY SCHEDULE

A. Should any conditions exist, such that certain activities shown on the Contractor's Construction Progress Schedule fall behind schedule to the extent that any of the critical path Milestones or Completion Dates are in jeopardy, the Contractor shall be required to, at no cost to the District, prepare and submit a supplementary Recovery Schedule. The Recovery Schedule shall be in a written form with appropriate details including an explanation and display on how he/she intends to reschedule those activities to regain compliance with the Construction Progress Schedule during the immediate subsequent pay period.

B. The Contractor and District’s Representative shall do the following after determination of the requirement for a Recovery Schedule:

1. Within three (3) calendar days, the Contractor shall present to the District’s Representative the Recovery Schedule.

2. The Recovery Schedule shall represent the Contractor's best judgment regarding how to reorganize and accelerate the Work to get back on schedule within the immediate subsequent pay period. The Recovery Schedule shall be prepared to a similar level of detail as the Construction Progress Schedule.

C. Five (5) calendar days prior to the expiration of the Recovery Schedule, the District’s Representative and the Contractor will meet at the job site to determine whether the Contractor has regained compliance with the Construction Schedule. At the direction of the District’s Representative, one of the following will happen:

1. If, in the opinion of the District’s Representative, the Contractor is still behind schedule, the Contractor in conjunction with the District’s Representative will prepare another Recovery Schedule, at the Contractor’s expense to take effect during the immediate subsequent pay period.

2. If, in the opinion of the District’s Representative, the Contractor has sufficiently regained compliance with the Construction Schedule, the use of the Construction Schedule will be resumed.

1.07 SUBMITTALS SCHEDULE

A. In conjunction with the preparation of the Construction Progress Schedule, the Contractor shall prepare a Submittals Schedule that shall outline all required submittals and when they are required
to be approved based on ordering lead times and the incorporation of products into the Work in conformance with the Construction Progress Schedule.

B. Contractor shall then reverse engineer the Submittals Schedule to determine when submittals need to be provided to the District and design team, noting latest approval dates and factoring in time for the re-submittal of items if necessary.

C. The Submittals Schedule shall be clearly identified within Construction Progress Schedule and shall be updated and reviewed at each Project Progress Meeting.

D. Contractor shall fill out District submittal log that will include all dates associated with submittals. The log will be updated accordingly and submitted weekly for approval. Contractor shall use District provided submittal log with dates.

1.08 DEFERRED SUBMITTALS

A. Certain components of the Work under this project are Delegated Design. It is the Contractor's responsibility to coordinate and assume or assign to subcontractors the complete responsibility for the design, calculation, submittals, fabrication, transportation and installation of the Delegated Design portions or components as required. Delegated Design components of the Work are defined as complete operational systems, provided for their intended use.

B. Submit deferred submittals for Delegated Design elements to the governing agency for the separate approval of each Delegated Design item. Where required, provide design and calculations stamped by a professional engineer licensed in the State of Oregon.

C. District shall not be responsible to pay for any delays, additional products, additional hours of work or overtime, restocking or rework required due to failure by the Contractor or the subcontractor to coordinate their work with the work of the other trades on the project or to provide the Delegated Design portion or component in a timely manner to meet the schedule of the project.

1.09 SITE-SPECIFIC SAFETY PLAN

A. In an effort to reduce accidents and maintain a safe work site, the Contractor, prior to any work on site, shall submit to the District a detailed site-specific safety plan which outlines, at a minimum, a detailed description of the following:
   1. Facility Safety and Security
   2. Construction Phase Safety and Security
   3. Disaster Response
   4. Emergency Procedures and Protection
   5. Safety and Health Procedures and Work Practices as applicable pertaining to:
      a. Demolition
      b. Electrical
      c. Excavations
      d. Fall Protection
      e. Fire Prevention
      f. Hazard Communications
      g. Heavy Equipment
      h. Housekeeping
      i. Mobile Cranes
      j. Scaffolding
      k. Signs — Barricades — Fencing

1.10 SITE SPECIFIC STAGING AND LOGISTICS PLAN

A. The Contractor, prior to any work on site, shall submit to the District a detailed site specific staging and logistics plan as outlined in (Section 01 14 00 Work Restrictions)
1.11 CONSTRUCTION PROGRESS REPORTING

A. The Contractor shall review the progress and quality of the Work on a daily basis and shall keep a daily written report in the event that the District may request them.

B. Written progress reports shall include, at a minimum:
1. Project name.
2. Date.
3. Author of report.
4. Weather conditions including wind, precipitation and temperature.
5. Trades present through the reporting period and count.
6. A summary of the Work performed that day.
7. Materials and equipment delivered, utilized and/or stored on site.
8. Conformance with Contract Documents and/or any observed deviations.
9. Conformance with or deviation from Construction Progress Schedule.
10. Tests and/or inspections performed inclusive of results
11. List of site visitors including regulatory agencies and/or testing and inspection entities.
12. Notes from any safety meetings

1.12 PHOTOGRAPHIC DOCUMENTATION

A. Contractor shall provide ground-level, color digital progress photos weekly for a permanent record of the Project. Photos should be dated and include a description of the picture and the camera location. Photos shall be provided to the District’s Representative.

PART 2 — PRODUCTS - NOT USED

PART 3 — EXECUTION - NOT USED

END OF SECTION
SECTION 01 25 00 – SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.00 SECTION INCLUDES

A. Related Requirements
B. Substitution Procedures (During Construction)
C. Product Substitution Procedures (During Construction)
D. Substitution Request Timing (During Construction)

1.01 RELATED REQUIREMENTS

A. General Conditions of the Contract for Construction

1.02 SUBSTITUTION PROCEDURES (DURING CONSTRUCTION)

A. All substitution requests shall be submitted as a Request for Information (RFI).

B. Contractor shall submit the substitution request, along with all associated cost adjustments using the District approved form.

C. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without first being approved through the RFI process.

D. In making request for substitution, Contractor represents that:
   1. It has personally investigated proposed product or method and have included a side-by-side comparison in the substitution request.
   2. It will coordinate installation of accepted substitution into Work, making such changes as may be required for Work to be complete in all respects at no additional cost to District once the substitution and related cost impacts have been accepted.
   3. It waives all claims for additional costs or time extensions related to substitution which consequently, become apparent after the substitution is approved.
   4. It will reimburse District for review or redesign services associated with re-approval by authorities.
   5. Should any proposed product substitution require any redesign work to accommodate the substitute product, costs for such re-design work shall be included in the proposal amount and shall be paid to the District consultants for the required re-design work.

E. District shall notify Contractor in writing of decision to accept or reject request via the RFI process.

F. Upon receiving the District’s decision to proceed with the substitution, Contractor is to initiate a PCO or Change Request to modify the contract and submit any additional submittals required as a result of changing products.

1.03 PRODUCT SUBSTITUTION PROCEDURES (DURING CONSTRUCTION)

A. Include in each request complete a side-by-side analysis of the following items:
   1. Product identification, including manufacturer’s name and address.
   2. Manufacturer’s literature.
3. Product description.
4. Performance and test data.
5. Reference standards.
6. Samples, when appropriate.
7. Name and address of similar projects on which product was used and date of installation.
8. Product availability and lead-time for delivery.
10. Itemized comparison of proposed substitutions with products and/or methods specified.
11. Data relating to changes in Project schedule.
12. Accurate cost data on proposed substitution in comparison with product or method specified.

1.04 SUBSTITUTION REQUEST TIMING (DURING CONSTRUCTION)

A. Substitution may be considered for one or more of the following conditions:
1. Product unavailability beyond control of Contractor, such as strikes, lockouts, and discontinuance by the manufacturer or his authorized supplier.
2. Requirements for compliance with final interpretation of code requirements or insurance regulations.
3. District or consultant requested substitution.
4. If it can be shown that specified product or system is not well suited for proposed application, or that another is superior and/or less costly. Attach detailed documentation including cost savings/increase.
5. Subsequent information or data discloses inability of specified product to perform properly in the application and/or for the purpose for which it was intended.
6. Manufacturer’s or fabricator’s refusal to certify or guarantee performance of specified product as required.
7. Subsequent information that a long delivery date will not be compatible with the Contract construction period.
8. Proof for any of the above set forth conditions shall be submitted to the District representative in writing with all pertinent data in the form of a Change Request – Vendor Initiated (CR-VI).

B. District reserves the right to reject any and all substitution requests for any reason, without obligation or liability.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION
SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES
   A. Related Requirements
   B. Requests for Information (RFI)
   C. Architectural Supplemental Instructions (ASI)
   D. Construction Change Directives (CCD)
   E. Change Requests – Vendor Initiated (PCO)
   F. Change Orders

1.02 RELATED REQUIREMENTS
   A. Section 01 31 23 — Project Management Database

1.03 REQUESTS FOR INFORMATION
   A. Initiating the Request for Information (RFI).
      1. Where the Contractor requires additional information to assist in interpreting the documents or understanding how to apply the provisions of the Contract Documents, the Contractor shall submit an RFI to the Engineer via email to distribute as appropriate to the Project team.
      2. Upon submitting an RFI, Contractor is to determine if there are portions of the ongoing Work that are directly affected by the issue described in the RFI that need to be stopped until further direction is received, and they are to notify the Engineer and District of this in writing. The Engineer and/or District will direct Contractor as to whether or not they are to stop working in those areas.
   B. All requests shall include the following:
      1. RFI number (assign sequential numbers to RFIs).
      2. Specific reference to the drawings, specifications or field conditions that initiated the need for interpretation, including drawing number(s), detail number(s), and specification section numbers(s).
      3. List of subcontractors involved.
      4. Date of request.
      5. Date that response is needed.
      7. State Contractor's interpretation of the requirements of the Contract Documents.
      8. Provide statements in condensed and precise question format, and where appropriate, compose in such a way that "yes" or "no" would be acceptable response.
      9. If the statement of the question for which interpretation is requested is ambiguous or unclear, the Request shall be considered incomplete.
      10. Use additional forms, diagrams or marked-up Contract Drawings where necessary.
      11. Reason for need for information.
   C. Suggested options for resolution.
D. Indication of whether or not the issue appears to have potential impact on the Contract Sum or Contract Time.

E. Space for Engineer’s response.

F. Limit Requests for Information to not more than one issue or question
   1. Suggested options for resolution.
   2. Indication of whether or not the issue appears to have potential impact on the Contract Sum or Contract Time.
   3. Space for Engineer’s response.
   4. Limit Requests for Information to not more than one issue or question

G. Limit Requests for Information to not more than one issue or question Engineer’s Review
   1. After receipt of an RFI, Engineer will determine whether the Request is complete.
   2. If Request is determined to be incomplete, Engineer will notify Contractor in writing of the deficiencies. Engineer will take no further action on incomplete RFI until deficiencies are remedied.
   3. Allow 5 working days for review by Engineer.
      a. If a longer review time is deemed necessary, Engineer will notify Contractor of the anticipated response time, within 5 working days of receipt of the complete RFI.
      b. Indicate “URGENT” on RFIs which may impact the Project Schedule to notify Engineer of priority.
      c. Urgent RFIs will take precedence and be answered as soon as possible.

H. Engineer’s Response
   1. Responses issued by Engineer will be to explain and clarify the intent of the Contract Documents.
      a. Responses of the Engineer shall be consistent with the intent of the Contract.

I. Distribution and Notification
   1. Upon receipt of the Engineer’s response, Contractor shall distribute copies to the initiator of the request and to all affected parties.
   2. Contractor is responsible for immediately implementing the changes to the Contract Documents in accordance with the Engineer’s response. Contractor shall be responsible for costs incurred due to continuing with Work that is contrary to the direction given in the Engineer’s response.
   3. Contractor is to notify the District within 48 hours of receiving the Engineer’s response of any cost or schedule impacts due to the changes made to the Contract Documents by the Engineer’s response.
   4. If there is a cost impact or a schedule impact due to the Engineer’s response, Contractor shall process a Change Request – Vendor Initiated and obtain District’s approval before proceeding with the changes. While waiting for the District’s approval, Contractor shall not proceed with Work that will need to be redone if/when the cost or schedule impacts are approved.

J. Coordination with Contractor Submittals
   1. Contractor shall take special care to ensure that RFI responses are included and coordinated with all trades and required project Submittals and Shop Drawings.
   2. Submittals and Shop Drawings that do not incorporate all RFI responses shall be returned to Contractor without review as incomplete.

K. Administrative Costs
   1. Requests for Information (RFIs) for information that is already contained or provided for in the Contract Documents may result in additional administrative costs to the District, which the District may charge to the Contractor.
2. Requests for Information (RFIs) for solutions to Contractor’s errors may result in additional administrative costs to the District, which the District may charge to the Contractor.
3. Requests for Information (RFIs) for Substitution Requests may result in additional administrative costs to the District, which the District may charge to the Contractor.

1.04 ARCHITECTURAL SUPPLEMENTAL INSTRUCTIONS

A. The District, without invalidating the Contract, may issue Architectural Supplemental Instructions (ASI) authorizing changes in the Work.

B. Distribution and Notification
   1. Upon receipt of the ASI via email, Contractor shall distribute copies to all affected parties.
   2. Contractor is responsible for immediately implementing the changes to the Contract Documents in accordance with the ASI. Contractor shall be responsible for costs incurred due to continuing with Work that is contrary to the direction given in the ASI.
   3. Contractor is to notify the District within 48 hours of receiving the ASI of any cost or schedule impacts due to the changes made to the Contract Documents by the ASI.
   4. If there is a cost impact or a schedule impact due to the ASI, Contractor shall process a Change Request – Vendor Initiated and obtain District’s approval before proceeding with the changes. While waiting for the District’s approval, Contractor shall not proceed with Work that will need to be redone if/when the cost or schedule impacts are approved.

C. Coordination with Contractor Submittals
   1. Contractor shall take special care to ensure that AsI’s are included and coordinated with all trades and required project Submittals and Shop Drawings.
   2. Submittals and Shop Drawings that do not incorporate all ASI’s shall be returned to Contractor without review as incomplete.

1.05 CONSTRUCTION CHANGE DIRECTIVES

A. Where the District has requested a change to the Work and the District and Contractor cannot agree to the terms of adjustment to the Contract Sum or Contract Time, the District shall issue a Construction Change Directive compelling to the Contractor to commence with the change, tracking both the time and cost of the work until such time as the Contractor and District can come to an agreement.

B. Construction Change Directives shall contain a complete description of the changes in the work and shall designate the method to be followed to determine changes in the Contract Sum or Contract Time.

C. Contractor shall maintain detailed records on a time and materials basis of the Work required.

D. Upon completion of the change in the Work, the Contractor shall submit an itemized account and supporting data necessary to substantiate the cost and time adjustments to the Contract for preparation of a Change Order by the District’s Representative.

E. Payment to the Contractor shall not be made on basis of a Construction Change Directive until it is made into a Change Order approved by the District, its Representative, the Contractor and the Engineer. Portions of a Construction Change Directive shall not be eligible to be made into a Change Order for partial payment.
1.06 CHANGE REQUESTS

A. Contractor shall process a Potential Change Request (PCO) for changes to the Contract Documents that result in revisions in the Contract Sum or Contract Time.

B. A separate PCO shall be created for each issue.

C. Contractor is to submit the PCO to the Engineer for review via email.

D. The Engineer shall review the PCO’s scope and pricing and may request additional information or clarification from the Contractor.

E. After completing their review, the Engineer will forward the PCO to the District Representative with their comments.

F. The District will review the PCO’s scope and pricing and may request additional information or clarification from the Contractor or the Engineer.

G. After completing their review, the District Representative will forward the PCO to the District with their recommendation.

H. The District will review the PCO’s scope and pricing along with the Engineer’s comments and the District Representative’s recommendations and may request additional information or clarification from the Contractor, Engineer, or Project Manager.

I. Upon approval of the PCO by the District, the Contractor can officially proceed with the changes.
   1. Approved PCO’s will be rolled-up into a Change Order on a monthly basis.

1.07 CHANGE ORDERS

A. Change Orders shall be recorded as a revision to the Contract for Construction and Contractor shall immediately upon execution add their content and value to both the Construction Schedule and the Schedule of Values.

B. Applications for Payment shall include all executed change orders in order to be considered complete and acceptable for payment processing.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION
SECTION 01 29 00 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Related Requirements
B. Schedule of Values
C. Progress Payment Procedures
D. Payment for Stored Materials
E. Payment for Deposits on Ordered Materials

1.02 RELATED REQUIREMENTS
A. The General Conditions to the Contract

1.03 SCHEDULE OF VALUES
A. Within 10 days of the Contract Award, the Contractor shall submit to the District for review and approval, the Schedule of Values.
B. The Schedule of Values shall allocate the entire Contract Sum among the various portions of the Work and shall be prepared in such form as approved by the District and supported by such data to substantiate its accuracy.
C. The Schedule of Values shall be itemized to the following level of detail:
   1. Separate the costs into Specification Sections.
   2. No one line item shall be more than 5% of the Contract Sum.
D. District shall review and approve the Schedule of Values for use in the preparation of Applications for Payment.

1.04 PROGRESS PAYMENT PROCEDURES
A. Each Application for Payment shall be submitted based on the procedures outlined in the Contract.
B. Applications for Payment that have an inflated % complete for any given line item shall be rejected. Contractor shall revise and resubmit the Application for Payment with the corrected % complete. The Contractor shall be responsible for hardships due to delays in the approval of the Application for Payments that are caused by errors in the Applications.
C. General Conditions shall be billed monthly at the same % complete as the total % complete for that Application for Payment.

1.05 PAYMENT FOR STORED MATERIALS
A. Contractor may be entitled to receive payment for stored materials provided the following conditions have been met:
1. A valid off-site stored materials insurance certificate is to be provided to the District. The policy needs to reference the project that the materials are for, and the value of the policy needs to meet or exceed the value of stored materials. The District is to be listed as additional insured on the policy.

2. Materials shall be clearly labeled as District property and specific to the project, and shall be stored separately from other materials.

3. The District shall obtain verification from an independent third party that all items are present within the warehouse. The cost of the initial verification process will be the responsibility of the Contractor to pay for.

4. Digital photos of the off-site stored materials labeled for the project are to be submitted prior to the Application for Payment.

5. Contractor is to provide an executed bill of sale as proof of payment for stored materials.

6. Verification of stored materials and partial payment for such materials do not constitute acceptance on the part of the District. In the event that materials stored are found to be unsuitable for installation or incorporation into the Work for any reason, Contractor shall bear full responsibility for any and all corrections needed.

7. District shall not be responsible for any additional costs incurred for the storage of materials unless such storage is the result of and a part of an approved Change Order where the District is found to be responsible for such costs.

1.06 PAYMENT FOR DEPOSITS ON ORDERED MATERIALS

A. Where the Contractor has placed an order for materials or services and an initial deposit is required, the Contractor shall have the right to submit invoices for deposits as a part of the Application for Payment with supporting documentation indicating why such deposits are necessary.

B. The District shall review submitted invoices and shall have the right to approve or reject the payment for the deposit. The District is not obligated to pay for any deposits required for materials not present at the project site.

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 SECTION INCLUDES
   A. Related Requirements
   B. Project Coordination
   C. Construction Organization and Start-up
   D. Construction Coordination
   E. Coordinating Subcontractors’ Work
   F. Project Meetings

1.02 RELATED REQUIREMENTS
   A. General Conditions of the Contract for Construction

1.03 PROJECT COORDINATION
   A. Before submitting the Bid to the District, and continuously after the execution of this Contract, the Contractor shall carefully study and compare the Contract Documents and shall at once report to the District any error, inconsistency or omission it may discover including any requirement which may be contrary to any law, ordinance, rule, regulation or order of any public authority bearing on the performance of the Work.
   B. By submitting bid for this Contract and the Work under it, the Contractor agrees that the Contract Documents, along with any addendums or other supplementary written instructions issued that have become a part of the Contract Documents, appear accurate, consistent, and complete insofar as can reasonably be determined. If the Contractor has reported in writing an error, inconsistency or omission and has promptly stopped the affected Work until instructed, and otherwise followed the instructions of the District, the Contractor shall not be liable to the District for any damage resulting from any such errors, inconsistencies or omissions in the Contract Documents. The Contractor shall do no Work without Contract Documents and, when required, reviewed Shop Drawings, Product Data or samples for such portions of the Work.

1.04 CONSTRUCTION ORGANIZATION AND START-UP
   A. Establish on-site lines of authority and communications by attending Pre-construction Meeting and Progress Meetings as required by the Architect, Engineer, District and District’s Representatives.
   B. Comply with procedures for intra-project communications including but limited to:
      1. Submittals
      2. Reports and records
      3. Recommendations
      4. Coordination drawings
      5. Schedules
      6. Resolution of conflicts

1.05 CONSTRUCTION COORDINATION
   A. General Coordination:
      1. Coordinate various elements of the work and entities engaged to perform work.
      2. Coordinate the work with existing facilities/conditions, and with work by separate contractors and by the District.
1.06  COORDINATING SUBCONTRACTORS' WORK

A. Coordinate the Work of all Subcontractors and make certain that, where the Work of one trade is dependent upon the Work of another trade, the Work first installed is properly placed, installed, aligned, and finished as specified or required to properly receive subsequent materials applied or attached thereto.

B. Direct Subcontractors to correct defects in their workmanship when subcontractors of subsequent materials have a reasonable and justifiable objection to conditions of work.

C. Do not force Subcontractors to apply or install products to improperly finished product.

D. Coordinate changes to assure that:
   1. Requirements of Contract Documents are fulfilled.
   2. Changes in Contract requirements of all affected trades are reflected in executed Change Orders.

E. Scheduling and Installation Sequence:
   1. Coordinate scheduling, submittals, and Work of various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
   2. Schedule work in accordance with current Project Construction Schedule.
      a. Coordinate schedules of all trades.
      b. Verify timely deliveries of products for installation by other trades.
      c. Verify that labor and equipment are adequate for Work and schedule.
      d. Verify that material deliveries are adequate to maintain schedule.

1.07  PROJECT MEETINGS

A. Preconstruction Meetings:
   1. District’s Representative will manage the preconstruction meeting for execution of District-Contractor Contract and exchange of preliminary submittals.
   2. Contractor will administer a site mobilization conference at Project site for clarification of District and Contractor responsibilities in use of site and for review of administrative procedures. Agenda to include the following:
      a. Responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Critical work sequencing and long-lead items.
      d. Designation of key personnel and their duties.
      e. Lines of communications.
      f. Procedures for processing field decisions and Change Orders.
      g. Procedures for RFI’s.
      h. Procedures for testing and inspecting.
      k. Use of the premises and existing building. Work restrictions.
      l. Working hours.
      m. District’s occupancy requirements.
      n. Responsibility for temporary facilities and controls. Procedures for moisture and mold control.
p. Office, work, and storage areas. Equipment deliveries and priorities. First aid.
q. Security.
r. Progress cleaning.

B. Progress Meetings
   1. Contractor shall organize the project site meetings throughout the course of the Work. Contractor shall make physical arrangements for the meetings, prepare agenda with copies of the meeting minutes from the previous meeting and all necessary logs and schedules for the participants.
   2. The Contractor shall preside at site meetings.
   3. The Contractor will provide meeting minute’s format/template. The Contractor shall record the minutes at the meetings which shall be distributed within two days to District, Engineer, District’s Representative, and participants at the meetings, and those affected by decisions made at the meetings.
   4. Attendees shall include Contractor’s project manager and superintendent, District, District’s Representative, and Engineer as appropriate to the topics for each meeting.
   5. Suggested agenda topics: informational items, safety, schedule review, RFI & ASI review, submittal review, Contractor issues, design issues, District issues, change order requests and pay applications, and closeout.

C. Pre-Installation Meeting
   1. Prior to commencement of critical new activities on site, Contractor shall conduct a Pre-Installation Meeting. Contractor shall ensure that all relevant subcontractors are present inclusive of those performing work immediately prior and subsequent to the subject activity as well as those who are impacted by the Work. Advise Engineer and District’s Representative of scheduled meeting dates.
   2. The purpose of the meeting is to review field conditions to confirm that the site and all previous work is ready for the commencement of the new activity, confirm clear understanding of the intention of the plans and specifications and to identify potential risks and resolutions to those risks related to the proposed work.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION
SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.00 SECTION INCLUDES
A. Related Requirements
B. Certificates
C. Electronic Submittals
D. Shop Drawings, Product Data, and Samples

1.01 RELATED REQUIREMENTS
A. General Conditions of the Contract for Construction.

1.02 CERTIFICATES
A. When specified in an individual specification Section, submit a manufacturers' certificate to the Engineer for review, in quantities specified for Product Data.
B. Indicate how material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.
C. Certificates must be recent or previous test results on material or Product but must be acceptable to Engineer.

1.03 ELECTRONIC SUBMITTALS
A. All documents transmitted for purposes of administration of the contract submittals and product data, are to be in electronic (PDF) format and submitted via email.
   1. It is the Contractor's responsibility to submit all submittal and product data
   2. documents in the following format:
      a. Submittals shall be submitted by project and separated by specification divisions.
      b. Limit PDF size to 10MB, unless otherwise authorized by Engineer.
      c. Naming convention for a PDF for product submittals is to be approved by Architect.
   3. Subcontractors, suppliers, Engineer, and Engineer's consultants will be permitted to use certain modules available at no extra charge.
   4. Paper document transmittals will not be reviewed.
   5. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
B. Project Closeout: Coordinate with Engineer and District to verify that archive documents have been saved and remain accessible to Engineer and District prior to terminating the service for the project.

1.04 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
A. Shop Drawings are drawings, diagrams, schedules and other data specially prepared by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the
Work. Electronic pdf submittals may be accepted in lieu of paper submittals if acceptable to Engineer and District.

B. 
Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor which illustrates material, product or system for some portion of the Work.

C. 
Samples are physical examples which illustrate materials, equipment or workmanship including color, texture, and pattern. Approved samples will establish standards by which the Work will be judged.

D. 
The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work, or in the work of the District, or any separate contractor; all Shop Drawings, Product Data and Samples required by the Contract Documents.

E. 
If the District Directs the Contractor to submit hard copies of shop drawings and submittal documents, the following format will apply:

1. For standard manufactured items not requiring special Shop Drawings for manufacture, submit the number the Contractor requires plus four (4) copies of manufacturer’s catalog sheets showing illustrated cuts of item to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams and controls, and all other pertinent information. Mark each copy to indicate actual product to be provided. Four (4) copies of reviewed submissions will be retained by the District, its Representatives and Engineer. Hard copies are to be logged and tracked on e-Builder.

2. For all other Shop Drawings, submit three (3) legible, unfolded, reproducible print(s) for each drawing. Drawings are to show connections, details, dimensions, finishes, fasteners, and any other pertinent information drawn to an accurate scale. Each drawing shall have a clear space for stamps. When phrase “by others” appears on Shop Drawings, the Contractor shall indicate on the drawing whom is to furnish material or operations so marked before submittal. When Shop Drawings are checked “revise and resubmit”, the Contractor shall correct original tracing and submit a new transparency and opaque prints for review.

F. 
Samples: Submit (4) sets of samples unless indicated otherwise. Two sets will be returned. Maintain one returned set at the project site for purposes of quality control comparisons.

G. 
For use of all trades, the Contractor shall provide a number of prints required for field distribution.

H. 
By submitting Shop Drawings, Product Data and Samples, the Contractor represents that he/she has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he/she has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall adhere to any supplementary processing and scheduling instruction, pertaining to Shop Drawings, as may be issued by the District’s Representative.

I. 
Engineer will review submittals for design concept and conformance with the Contract Documents, and return submittals to the Contractor for distribution with corrections noted thereon.

J. 
The Contractor is advised that every Submittal returned to the Contractor, regardless of how marked, may not have been reviewed in every aspect, and that in no event should the Contractor assume that the review stamp certifies total compliance with the Contract Documents.

K. 
Stamp: The Engineer will stamp each submittal to be returned with a uniform, self-explanatory action stamp, appropriately marked and executed to indicate the status of the submittal. The stamp indicates and requires the follow action:

1. No Exception Taken: No further action is required.
2. Make Corrections Noted: Make the corrections upon fabrication of the material only.
3. Rejected: The material submitted is not acceptable and another material submission is required.
4. Revise and Resubmit: The material submittal is not acceptable and it is to be elaborated upon or corrected and resubmitted prior to material fabrication.
5. Submit Specified Item: Submittal is rejected and the material specified is to be submitted.
6. Checking is only for general conformance with the design concept of the Project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of his work with that of all other trades and the satisfactory performance of his work.

L. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Engineer’s review of Shop Drawings, Product Data or Samples unless the Contractor has received a Change Order. Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Engineer’s review thereof.

M. The Contractor shall make any corrections required by the Engineer and shall resubmit in electronic format, or if applicable, the required number of corrected hard copies of Shop Drawings, Product Data, or new Samples. Resubmittal of Shop Drawings necessitated by required corrections shall not be a cause for extension of time. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than the corrections requested on previous submittals.

N. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Engineer. All such portions of the Work shall be in accordance with approved submittals.

O. Schedule of Submittals:
1. Schedule of Submittals to be provided within 10 days of contract signing.
2. Prepare and keep current, for Engineer’s approval, a Schedule of Submittals which is coordinated with the Contractor’s Construction Schedule and allows Engineer reasonable time to review Submittals and in such sequence as to cause no delay in the Work.
3. List Submittals sequentially by date of transmittal.
4. Group Submittals pertaining to a single product or assembly, showing that they will be submitted together.
5. Schedule of Submittals shall include the following and per the District submittal form:
   a. Submittal number.
   b. Description of item.
   c. Name of party responsible for preparing Submittal.
   d. Reference to Contract Documents, Specifications and/or Drawings.
   e. Date of anticipated transmittal to Engineer.
   f. Date of anticipated return to Contractor.
   g. Scheduled date for commencement of fabrication.
   h. Estimated shipping date
   i. Scheduled date for installation.
6. Submit initial Schedule of Submittals within 14 calendar days after date established in Notice to Proceed for Engineer and Contracting Officer review.

P. Time Schedule for Submittals:
1. Shop drawings: submit to the engineer for review. The engineer will review within 15 calendar days.
2. Schedule submissions to allow ample time for ordering and delivery of materials after review.
3. It is the responsibility of the Contractor to Order long-lead items in an expedited manner so as not to cause any delay in construction schedule.

4. The District will not be responsible for expedited shipping costs or schedule delays resulting from late submission of long-lead item submittals.

5. Product data: submit to the engineer for review. The engineer will review within 15 calendar days. Schedule submissions to allow ample time for ordering and delivery of materials after review.

6. Samples: submit to the engineer for review. The engineer will review within 15 calendar days. Schedule submissions to allow ample time for ordering and delivery of materials after review.

PART 2 — PRODUCTS - NOT USED

PART 3 — EXECUTION - NOT USED

END OF SECTION
SECTION 01 40 00 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Related Requirements
B. Quality Control
C. Tolerances
D. References
E. Labeling
F. Mockup Requirements
G. Testing and Inspection Services
H. Manufacturers’ Field Services

1.02 RELATED REQUIREMENTS
A. General Conditions of the Contract for Construction.

1.03 QUALITY CONTROL
A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
C. Perform Work using persons qualified to produce required and specified quality.
D. Products, materials, and equipment may be subject to inspection by Engineer and the District at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.
E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.04 TOLERANCES
A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers’ recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

1.05 REFERENCES
A. For products or workmanship specified by association, trade, or other consensus standards, complies with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.
C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
E. Contract Documents by mention or inference in reference documents shall not be altered by contractual relationships, duties, or responsibilities of parties in Contract, nor those of Engineer.
1.06  LABELING

A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer’s or fabricator’s identification, approved agency identification, and the following information, as applicable, on each label:
   1. Model number.
   2. Serial number.
   3. Performance characteristics.

C. Manufacturer’s nameplates, trademarks, logos, and other identifying marks on products are not allowed on surfaces exposed to view in public areas, interior or exterior.

1.07  MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.

B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mockups shall be comparison standard for remaining Work.

D. Where mockup has been accepted by Engineer and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by Engineer.

1.08  TESTING AND INSPECTION SERVICES

A. The District will select, employ, and pay for specified services of an independent firm to perform testing and inspection. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by Engineer and authorities having jurisdiction.
   1. Laboratory: Authorized to operate in State of Oregon.
   2. Laboratory Staff: Maintain full-time specialist on staff to review services.
   3. Testing Equipment: Calibrated at reasonable intervals with devices that are accurate and traceable to the National Bureau of Standards or accepted values of natural physical constants.

B. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Architect/Engineer or the District.

C. Reports shall be submitted by independent firm to the District, Engineer, Contractor, and authorities having jurisdiction, in duplicate when so directed, indicating observations and results of tests and compliance or noncompliance with Contract Documents. Submit final report indicating correction of Work previously reported as noncompliant.

D. Contractor is to cooperate with independent firm and furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify independent firm 48 hours before expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor’s use.

E. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
F. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Architect/Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

G. Agency Responsibilities:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
   3. Perform indicated sampling and testing of products according to specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
   6. Perform additional tests required by Engineer.
   7. Attend preconstruction meetings and progress meetings.

H. Agency Reports: After each test, promptly submit electronic copies of report to the District, Construction Manager, Engineer, Contractor, and authorities having jurisdiction. Written inspection or test reports shall include:
   1. Name of testing agency or test laboratory.
   2. Date issued.
   3. Project title and number.
   4. Name of inspector and individuals present.
   5. Date and time of sampling or inspection.
   7. Location in Project.
   8. Type of inspection or test.
   9. Date of test.
   10. Complete inspection or test data.
   11. Results of tests.
   12. Interpretations.

I. Limits on Testing Authority:
   1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency or laboratory may not approve or accept any portion of the Work.
   3. Agency or laboratory may not assume duties of Contractor.
   4. Agency or laboratory has no authority to stop the Work.

1.09 MANUFACTURER’S FIELD SERVICES

A. When specified in individual Specification Sections, required material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment and commissioning as applicable, and to initiate instructions when necessary.

B. Fabricator: Company specializing in performing work associated with the project with documented experience, and proper certifications.

C. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer is subject to approval of Architect/Engineer. Observer is subject to approval by the District.
D. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION
SECTION 01 52 00 – CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.00 SECTION INCLUDES
   A. Related Sections
   B. Temporary Utilities
   C. Temporary Controls
   D. Construction Facilities
   E. Removal of Utilities, Facilities and Controls

1.01 RELATED REQUIREMENTS
   A. General Conditions of the Contract for Construction

1.02 RELATED SECTIONS
   A. Section 01 11 00 — Summary of Work
   B. Section 01 14 00 — Work Restrictions
   C. Section 01 18 00 — Project Utility Sources
   D. Section 01 73 00 — Execution and Closeout Requirements, final cleaning

1.03 TEMPORARY UTILITIES
   A. Temporary Electricity:
      1. Contractor shall use existing District provided power.
   B. Temporary Water Service:
      1. Contractor shall use existing-District provided water service required for construction operations.
   C. Temporary Sanitary Facilities:
      1. Provide and maintain adequate number of required facilities and enclosures for use of all persons and trades employed on Work during construction period. Existing building toilet facilities will be off-limits at all times.
      2. Toilet facilities.
      3. Washing facilities.
   D. Temporary First Aid Facilities: Provide adequate first aid facilities for construction personnel. Provide local hospital directions and phone number.
   E. Temporary Fire Protection:
      1. Take all precautions to prevent possibility of fire resulting from construction operations. Particularly avoid hazardous accumulations of rubbish and unsecured flammable materials.
      2. Provide emergency fire extinguishing equipment of adequate type and quantity, readily available and properly maintained.
      3. Keep local Fire Department's telephone number prominently displayed near telephone.

1.04 TEMPORARY CONTROLS
   A. Barriers and Fencing
1. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
2. Provide barricades and covered walkways required by governing authorities for public rights of way.
3. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
4. Provide temporary commercial grade chain link fencing at the limits of construction for the duration of construction, until Work has been accepted or occupied by District. Maintain site fencing as needed and equip with vehicular gates with locks.

B. Water Control:
1. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
2. Protect site from pooling or running water. Provide water barriers as required to protect site from soil erosion.
3. Exercise care in cleaning out equipment, etc., so as to prevent materials from clogging catch basins and yard drains.
4. Leave all drainage items clean and in proper working condition.

C. Dust Control:
1. Utilize water application or other methods approved by the Oregon Department of environmental Quality to control dust on access roads and the project site to the satisfaction of the District.
2. Contractor shall provide air barriers as required within the Contract Documents to address the airborne spread of hazardous materials during the course of the Work. Air barriers shall remain effective during construction and during non-working hours to prevent adverse distribution of materials due to wind or other non-construction related impacts to the site.
3. Maintain dust control operation to prevent flying dust from leaving the project site. Use power sweepers for street, parking lot, playground areas, staging areas and cleaning as necessary.
4. Continue vacuum cleaning on as-needed basis until building is ready for Substantial Completion or Occupancy.
5. Utilize sticky mats at all construction transition areas, replace frequently and install by competent person.
6. Contractor shall use sweeping compound during sweeping activities to mitigate dust migration.

D. Pollution Control:
1. Burning or burying of rubble and waste materials on Site is prohibited. Provide covered dump box for collection of waste materials.
2. Disposal of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems is prohibited.
3. Keep Site and surrounding areas clear of accumulations of waste material and rubbish resulting from operations on a daily basis under this Contract. Remove waste from Site immediately upon completion of Work.

E. Protection of Installed Work:
1. Protect installed Work and provide special protection where specified in individual specification Sections.
2. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
3. Provide and maintain temporary shoring and lateral bracing of structure during erection to resist all loads including:
   a. Wind
   b. Seismic
   c. Construction
   d. Materials
e. Moving equipment
4. Do not remove temporary bracing and shoring until adequate permanent connections or structural elements are in final position and positively anchored.
5. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
6. Protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials such as Tyvek.
7. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
8. Prohibit traffic from landscaped areas.

F. Tree and Plant Protection:
1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
2. Provide barricades or fencing and maintain same around all trees, shrubs or other landscaped areas adjacent to work of this Contract to protect such areas from damage of any nature caused by construction operations.
3. Replace any plantings damaged or destroyed with plants of equivalent size, type and nature as approved by Architect.
4. Any plants to be removed and replanted shall be removed as to not damage roots and will be maintained through the course of construction.

G. Exterior Enclosures:
1. See Specification Section 01 11 00, Summary of Work, for additional requirements for protecting existing structure.
2. Provide temporary weather tight closure of exterior work areas to accommodate acceptable working conditions and protection of Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons.
3. Provide access doors with self-closing hardware and locks.
4. Provide temporary roofing as required.
5. Provide scaffolding enclosures.

H. Security:
1. Provide security and facilities to protect Work from unauthorized entry, vandalism or theft.
2. Keep exterior doors locked to prevent unauthorized access to the buildings.
3. Coordinate with District’s Security program.

I. Pest Control:
1. The Contractor is required to create a pest control plan that is intended to mitigate both the presence of pests on site at the outset of and during the construction process as well as impede their migration to offsite locations.
2. Pest control may include both mechanical and chemical measures for eradication. Contractor shall maintain site to remove pests following termination with consideration to mitigating the possibility of humans or domestic pets coming in contact with exterminated animals.
3. Prior to the commencement of work, Contractor shall enlist the services of a Pest Control Professional to provide a comprehensive pest control plan for the Project throughout the course of the work.

1.05 CONSTRUCTION FACILITIES
A. Provide and maintain access to fire hydrants, free of obstructions.
B. Provide means of removing mud from vehicle wheels before entering streets. Any dirt, mud or other debris tracked onto streets must be removed immediately.

C. Provide barricades, warning signs, flagmen or other traffic regulators which may become necessary for protection of public, construction personnel and property.

D. Parking: Arrange for temporary parking areas to accommodate construction personnel, project visitors and District’s Employees.

E. When site space is not adequate, provide additional off-site parking as allowed by the City.

F. Progress Cleaning:
   1. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   2. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   3. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
   4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations. Utilize containers intended for holding waste materials of type to be stored.
   5. Daily cleaning shall include magnetic sweep of jobsite to pick up all nails and metallic debris.
   6. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces prior to enclosing the space.
   7. Broom and vacuum clean interior areas prior to the start of surface finishing and continue cleaning to maintain a dust-free space during the finishing operations.
   8. Remove waste materials, debris, and rubbish from site periodically and dispose offsite.

G. Field Offices and Sheds:
   1. The District will provide a room or classroom at each job site that can serve as the construction office. This space will be available for contractor use after classes release for summer break.

1.06 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore District property, and adjacent private and public property damaged or used during construction, to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION
SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.00 SUMMARY

A. This Section includes the following:
   1. Protection of existing trees, plants, and roots from damage.
   2. Pruning of existing trees and plants

1.01 RELATED SECTIONS

A. Section 32 80 00 - Irrigation
B. Section 32 90 00 - Planting
C. Section 32 91 19 - Landscape Grading

1.02 REFERENCE STANDARDS

A. ANSI A300 - Tree Care Operations Standards

1.03 DEFINITIONS

A. Designated Trees: Existing Trees to Remain as indicated on Drawings.
B. Critical Root Zone (CRZ): The CRZ for trees 4 inches in caliper or smaller shall be an area with a radius at least 5 feet from the trunk. The CRZ for trees over 4 inches in caliper shall be an area with a radius of at least 1 foot 6 inches from the trunk for every 1 inch of caliper size.
C. Zone of Protection: As indicated on Drawings.
D. Weed: A plant that is undesirable where it is growing.

1.04 PROHIBITED ACTIVITIES

A. Cutting of roots 1 inch in diameter or larger without approval. Damaging tree bark, branches.
B. Removal of protective fencing or notice posted on trees prior to approval of Substantial Completion.
C. Activities prohibited within the Zone of Protection (without prior approval) are, but not limited to: construction, operation of machinery, storage of materials, paving, grading, cutting, filling, travel within, dumping, disposal of liquids, and parking of vehicles or equipment.
PART 2 - PRODUCTS

2.00 TREE PROTECTION FENCING

  A. Chain Link Fence
     1. 6 feet tall metal chain link fence set in metal frame panels of sufficient size to hold the fence erect without be driven into the ground. Fence panels shall be fastened together so they cannot be easily breached.

2.01 TREE PROTECTION SIGN

  A. Heavy-duty, waterproof signs, 8.5 inches x 11 inches, colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the tree protection fence every 50 feet o.c. The tree protection sign shall read “Tree, Plant, and Root Protection Area - Keep Out”.

PART 3 - EXECUTION

3.00 SITE EXAMINATION

  A. Examine the site, tree, plant and soil conditions. Notify the District's Representative in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

3.01 COORDINATION WITH PROJECT WORK

  A. The Contractor shall coordinate with all other work that may impact the completion of the work.

3.02 NOTICE

  A. Notify all workers, including subcontractors, of the requirements to protect Designated Trees, plants and their roots.

3.03 PREPARATION

  A. Prior to the preconstruction meeting, layout the limits of the Tree and Protection Fencing and pruning trenches. Obtain the District's Representative's approval before Construction Activities.

  B. Flag all trees and shrubs to be removed by wrapping orange plastic ribbon around the trunk and obtain the District's approval prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.

  C. Flag all trees and shrubs to remain with white plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the District's Representative's approval of all trees and shrubs to be remain prior to the start of tree and shrub removal.

  D. Prior to any construction activity, install all tree protection fencing, tree protection signs, and Mulch as shown on the drawings.

3.04 ROOT PRUNING

  A. Root pruning shall be in conformance with ANSI A300 (part 8) latest edition. Use approved root-pruning devices.
B. Prior to any excavating into the existing soil grade within the CRZ, root prune where identified on the plans to a depth of 24 inches below existing grade or as directed by the District's Representative.

C. Prune roots encountered during construction. Make clean, vertical cuts. Do not leave split or frayed ends. Obtain District's Representative's approval prior to cutting roots larger than 1 inch in diameter.

D. Cover exposed roots overnight with 4 layers of wet burlap or 5 inches of wet Mulch. Backfill exposed roots with Soil Material as specified in Division 32 as soon as Work is completed.

3.05 PROTECTION
A. Protect the Zone of Protection at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil, bark or leaves with construction material, debris, silt, fuels, oils, and any chemical substances. Notify the District's Representative of any spills, compaction, or damage and take corrective action immediately using methods approved by the District's Representative.

3.06 TRENCHING AND EXCAVATION WITHIN ZONE OF PROTECTION
A. Trenching and excavation within the Zone of Protection is to be performed with the use of an air spade, pressurized water, vacuum excavation, or by hand. Obtain District's Representative approval of trenching and excavation locations and methods prior to performing any work.
   1. Air or water pressure shall be a maximum of 90-100 psi.
   2. Restore soil within the trench as soon as the Work is completed. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.

3.07 WATERING
A. Water trees where identified on the Drawings. Watering will be required if it is judged that root removal is necessary for construction and threatens the survival of the tree. Use a slow drip or soaker hose to provide one-inch water per week until completion of construction.

3.08 WEED REMOVAL
A. During the construction period, control any plants that seed in and around the fenced Zone of Protection at least three times a year.
   1. All plants that are not shown on the planting plan or on the Tree Preservation and Removal Plan shall be considered as weeds.

3.09 CLEAN-UP
A. Remove and dispose of excess Mulch and other material brought to the site by the Contractor.

3.010 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION
A. At the end of the construction period or when requested by the District's Representative remove protection fencing, mulch, and any other Tree Protection material.

3.011 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN
A. Actual tree damage such as trunk scoring and broken limbs or damaged roots inside the Zone of Protection will be assessed according to the percentage of loss of tree value. Percentage of tree...
value will be determined by the District's Representative. Tree value will be determined from “Evaluation of Landscape Trees, Shrubs, and Other Landscape Plants” by International Society of Arboriculture.

B. Any remedial work on damaged existing trees recommended by the consulting arborist shall be completed by the Contractor at no cost to the District. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators.

C. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

END OF SECTION
SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. General Requirements
B. Products
C. Material and Equipment Selection.
D. Product delivery requirements.
E. Manufacturer’s Instructions.
F. Product storage and handling requirements.
G. Product options.

1.02 GENERAL REQUIREMENTS
A. General conditions of the Contract for Construction.

1.03 PRODUCTS
A. At minimum, comply with specified requirements and reference standards.
B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.
E. Furnish interchangeable components from same manufacturer for components being replaced.

1.04 MATERIAL AND EQUIPMENT SELECTION
A. Manufactured and fabricated products:
   1. Design, fabricate and assemble in accordance with the best engineering and shop practices.
   2. Manufacture like parts of duplicate units to standard sizes and gauges and to be interchangeable.
   3. Where two or more items of the same kind are indicated, provided items that are identical and by the same manufacturer.
   4. Provide products suitable for service conditions.
   5. Adhere to equipment capacities, sizes, and dimensions shown or specified unless variations are specifically approved in writing.
B. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
C. Fabricate and install equipment to deliver its full rated capacity at the efficiency for which it was designed.
D. Select and install equipment to operate at full capacity without excessive noise or vibration.
E. Provide electrical products with Underwriter’s Laboratories Label or as approved by the local inspection authority.

1.05 PRODUCT DELIVERY REQUIREMENTS
B. Transport and handle products according to manufacturer’s instructions.
C. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
D. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.06 MANUFACTURER’S INSTRUCTIONS
A. Perform work in accordance with manufacturer’s printed installation instructions. Obtain and distribute copies of such instructions to parties involved in the installation.
B. Maintain one set of complete instructions at the job site during installation and until completion.
C. Handle, install, connect, clean, condition, and adjust products in strict accordance with manufacturer’s printed instructions and in conformity with specified requirements.
D. Consult with the Architect for further instructions should job conditions or specified requirements conflict with manufacturer’s instructions.
E. Do not proceed with work without clear instructions.
F. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by the Contract Documents.

1.07 PRODUCT STORAGE AND HANDLING REQUIREMENTS
A. Store and protect products according to manufacturer’s instructions.
B. Store products with seals and labels intact and legible.
C. Store sensitive products in weather-tight, climate-controlled enclosures in an environment suitable to product.
D. For exterior storage of fabricated products, place products on sloped supports aboveground.
E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.
F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.08 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
B. Products Specified by Naming One or More Manufacturers: Products of one of the manufacturers named and comply with Specifications; no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 25 00 - Substitution Procedures.
D. Or Approved Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved", comply with provisions Specification Section 01 25 00

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION
SECTION 01 70 10 – EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Related Requirements
B. Related Sections
C. Starting of Systems
D. Demonstration and Instructions
E. Testing, Adjusting, and Balancing
F. Project Record Documents
G. Operation and Maintenance Data
H. Spare Parts and Maintenance Products
I. Product Warranties and Product Bonds
J. Maintenance Service
K. Examination
L. Preparation
M. Execution
N. Protecting Installed Construction
O. Final Cleaning

1.02 RELATED REQUIREMENTS
A. General conditions of the Contract for Construction.

1.03 RELATED SECTIONS
A. Section 01 11 00 — Summary of Work
B. Section 01 18 00 — Project Utility Sources
C. Section 01 33 00 — Submittal Procedures
D. Section 01 73 29 — Cutting and Patching
E. Section 01 77 00 — Closeout Procedures

1.04 STARTING OF SYSTEMS
A. Execute startup under supervision of manufacturer’s representative or Contractors’ personnel according to manufacturer’s instructions.
B. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check and approve equipment or system installation prior to startup and supervise in placing equipment or system in operation.
C. Submit a written report according to Section 01 33 00 — Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.05 DEMONSTRATION AND INSTRUCTIONS
A. Demonstrate operation and maintenance of products to District’s personnel two weeks prior to date of Substantial Completion.
B. Demonstrate Project equipment by qualified manufacturer’s representative who is knowledgeable about the Project.
C. For equipment or systems requiring seasonal operation, perform demonstration for another season within six months.
D. Use operation and maintenance manuals as basis for instruction. Review contents of manual with District’s personnel in detail to explain all aspects of operation and maintenance.
E. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.

F. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instruction.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, product data, and Samples.
   6. Manufacturer’s instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by District.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates used.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
   1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, RFI’s, and change orders.
   2. Include locations of concealed elements of the Work.
   3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
   4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
   5. Identify and locate existing buried or concealed items encountered during Project.
   7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit in PDF composite electronic indexed file.

B. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in two parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:
      a. Significant design criteria.
b. List of equipment. Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

c. Parts list for each component. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

d. Operating instructions. Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions. Include sequence of operation by controls manufacturer.

e. Maintenance instructions for equipment and systems. Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

g. Safety precautions to be taken when operating and maintaining or working near equipment.

h. Piping Diagram: Include Contractor's coordination drawings with color-coded piping diagrams as installed. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

3. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed. Include color-coded wiring diagrams as installed

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS
A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.
B. Salvaged materials shall be palletized, shrink-wrapped, and delivered to a place and location as directed by District.
C. Deliver to Project Site or another location as directed by District; obtain receipt prior to final payment.

1.09 PRODUCT WARRANTIES AND PRODUCT BONDS
A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors suppliers, and manufacturers within ten days after completion on applicable item of Work.
B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
C. Verify documents are in proper form, contain full information, and are notarized.
D. Co-execute submittals when required.
E. Time of Submittals:
   1. For equipment or component parts of equipment put into service during construction with District's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.010 MAINTENANCE SERVICE
A. Furnish service and maintenance of components indicated in Specification Sections for one (1) year from date of Substantial Completion during warranty period unless a longer service period is indicated in Specification Sections.
B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of District.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
C. Examine and verify specific conditions described in individual Specification Sections.
D. Verify that utility services are available with correct characteristics and in correct locations.

3.02 PREPARATION
A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.03 EXECUTION
A. Comply with manufacturer's installation instructions, performing each step-in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.
B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.
D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
   1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
   2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
   3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Architect/Engineer for final decision.
E. Allow for expansion of materials and building movement.
F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
   1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
   2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.
G. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for particular application indicated.
   1. Refer questionable mounting heights choices to Engineer for final decision.
2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.
I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

3.04 PROTECTING INSTALLED CONSTRUCTION
A. Protect installed Work and provide special protection where specified in individual Specification Sections.
B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.
C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.
E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
F. Prohibit traffic from landscaped areas.
G. Refer for Section 01 11 00 — Summary of Work for more information.

3.05 FINAL CLEANING
A. Execute final cleaning prior to final Project assessment.
B. Employ experienced personnel or professional cleaning firm.
C. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.
D. Clean debris from roofs, gutters, downspouts, and drainage systems.
E. Clean Site; sweep paved areas, rake clean landscaped surfaces.
F. Remove waste and surplus materials, rubbish, and construction facilities from Site.
G. Repair, patch, and touch up marred surfaces.

END OF SECTION
SECTION 01 73 29 – CUTTING AND PATCHING

PART 1 - GENERAL

1.00 SECTION INCLUDES
A. Related Requirements
B. Repair and Protection
C. Submittals

1.01 RELATED REQUIREMENTS
A. General Condition of the Contract
B. Section 01 11 00 - Summary of Work
C. Section 01 25 00 - Substitution Procedures
D. Section 01 33 00 - Submittal Procedures
E. Section 01 40 00 - Quality Requirements
F. Section 01 60 00 - Product Requirements
G. Section 01 73 00 — Execution and Closeout Requirements

1.02 REPAIR AND PROTECTION
A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
B. Repair and protection are Contractor’s responsibility, regardless of the assignment of responsibility for quality-control services.

1.03 SUBMITTALS
A. See Section 01 33 00 — Submittal Procedures for additional requirements.
B. Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather-exposed or moisture-resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   5. Work of District or separate contractor.
C. Include in request:
   1. Identification of Project.
   2. Location and description of affected work.
   3. Necessity for cutting or alteration.
   4. Description of proposed work, and products to be used.
   5. Alternatives to cutting and patching.
   6. Effect on work of District or separate contractor.
   7. Written permission of affected separate contractor.
   8. Date and time work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS
A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
B. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 25 00 — Substitution Procedures.
PART 3 - EXECUTION

3.01 GENERAL

A. Execute cutting, fitting, patching and finishing including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install ill-timed work.
   3. Match work that has been cut to adjacent work.
   4. Repair areas adjacent to cuts to required condition.
   5. Repair new work damaged by subsequent work.
   6. Remove and replace defective and non-conforming work.
   7. Remove samples of installed work for testing.
   8. Provide openings in elements of Work for penetrations of mechanical and electrical work.
   9. Provide finished appearance of surfaces and to match adjacent surfaces (unless otherwise noted) affected by the Work.

3.02 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
B. After uncovering, inspect conditions affecting performance of work.
C. Beginning of cutting or patching means acceptance of existing conditions.
D. Review District’s AHERA Management Plan and Hazardous Materials Survey to become aware of any asbestos containing materials or lead containing painted surfaces that may be impacted prior to the execution of the Work.
   1. If unsafe or otherwise unsatisfactory conditions are encountered, inform the District immediately and take corrective action before proceeding with the Work.

3.03 PREPARATION

A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of Project from damage.
B. Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations. Maintain excavations free of water.
C. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.04 PERFORMANCE

A. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.
B. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
C. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer’s written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. When possible, remove existing materials back to joints or break points. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

5. Roofing: At locations where existing roofing must be removed to accommodate new construction, remove roofing, including insulation as necessary. Provide a temporary cutoff in strict accordance with roofing manufacturer’s recommendations, to provide a 100 percent watertight seal.
   a. If any water is allowed to enter under the existing roofing, follow the procedures outlined in Section 01 11 00 — Summary of Work regarding water intrusion incidents.

D. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable as determined by District. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to the nearest intersection; for an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to the condition of substrate, Contractor shall repair substrate prior to repairing finish. Remove defective work to the limit of pre-existing joint or edge. Replacement of defective work will not create new seams or joint lines.
   4. Restore work with new products in accordance with requirements of Contract Documents.
   5. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
   6. At penetrations of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, full thickness of the construction element.
   7. For flooring adjacent to new partitions, impacted where removing walls or partitions extends one finished area into another, or damage by work, patch and repair floor surfaces in the new space. Provide an even surface of uniform color and appearance. For continuous sheet flooring areas where patching is not feasible, replace entire floor or to the nearest seam in a manner acceptable to District.
   8. For painted surfaces affected by work, match paint of a uniform color and appearance and paint adjacent areas affected by work to the nearest natural seam or intersection.

E. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements. Materials subject to testing and inspection in the specifications shall be retested after cutting and patching operations are completed.

END OF SECTION
SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 SECTION INCLUDES:
A. Plan Requirements
B. Submittals
C. Construction Waste Management Plan
D. Construction Waste Recycling
E. Construction Waste Adaptive Reuse
F. Construction Waste Collection
G. Construction Waste Disposal

1.02 RELATED REQUIREMENTS
A. General Conditions of the Contract for Construction.

1.03 PLAN REQUIREMENTS
A. Develop and implement construction waste management plan as approved by Engineer and District.
B. Comply with City of Portland requirements for managing and recycling construction waste.
C. Comply with Metro and State of Oregon rules and regulations pertaining to solid waste management.
D. Intent:
   1. Divert construction, demolition, and land-clearing debris from landfill disposal.
   2. Redirect recyclable material back to manufacturing process.
   3. Generate cost savings or incur minimal additional cost to Project for waste disposal.

1.04 SUBMITTALS
A. Section 01 33 00 — Submittal Procedures contains requirements for submittals.
B. Construction Waste Management Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:
   1. Transportation company hauling construction waste to waste processing facilities.
   2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
   3. Construction waste materials anticipated for recycling and adaptive reuse.
   4. On-Site sorting and Site storage methods.

1.05 CONSTRUCTION WASTE MANAGEMENT PLAN
A. Construction Waste Landfill Diversion: Minimize weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.
B. Implement construction waste management plan at start of construction.
C. Review construction waste management plan at preconstruction meeting and progress meetings specified in Section 01 31 00 — Project Management and Coordination.
D. Distribute approved construction waste management plan to Subcontractors and others affected by plan requirements.
E. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.
F. Purchase products to prevent waste by:
   1. Ensuring correct quantity of each material is delivered to Site.
   2. Choosing products with minimal or no packaging.
   3. Requiring suppliers to use returnable pallets or containers.
   4. Requiring suppliers to take or buy back rejected or unused items.
1.06 CONSTRUCTION WASTE RECYCLING
   A. Use source separation method or comingling method suitable to sorting and processing method of
      selected recycling center. Dispose nonrecyclable trash separately into landfill.
   B. Source Separation Method: Recyclable materials separated from trash and sorted into separate bins
      or containers, identified by waste type, prior to transportation to recycling center.
   C. Comingling Method: Recyclable materials separated from trash and placed in unsorted bins or
      container for sorting at recycling center.
   D. Materials suggested for recycling include:
      1. Packing materials including paper, cardboard, foam plastic, and sheeting.
      2. Recyclable plastics.
      3. Organic plant debris.
      4. Earth materials.
      5. Native stone and granularfill.
      6. Asphalt and concretepaving.
      7. Wood with and without embedded nails and staples.
      8. Glass, clear type.
      11. Acoustical ceiling tile.
      12. Casework and casework pad.
      15. Roofing with asbestos testing.

1.07 CONSTRUCTION WASTE ADAPTIVE REUSE
   A. Arrange with processing facility for salvage of construction material and processing for reuse. Do not
      reuse construction materials on-Site except as allowed by District.
   B. Materials suggested for adaptive reuse include:
      1. Concrete and crushed concrete.
      2. Masonry units.
      3. Lumber suitable for re-sawing or refinishing.
      4. Casework and millwork.
      5. Doors and doorframes.
      7. Window glass and insulating glass units.
      8. Hardware.
     11. Fluorescent light fixtures and lamps.
     12. Incandescent light fixtures and lamps.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.00 CONSTRUCTION WASTE COLLECTION
   A. Collect construction waste materials in marked bins or containers and arrange for transportation to
      recycling centers or adaptive salvage and reuse processing facilities.
   B. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with
      materials separated to eliminate co-mingling of materials required to be delivered separately to
      waste processing facility.
C. Store construction waste materials to prevent environmental pollution, fire hazards, hazards to persons and property, and contamination of stored materials.

D. Cover construction waste materials subject to disintegration, evaporation, settling, or runoff to prevent polluting air, water, and soil.

E. 3.01 CONSTRUCTION WASTE DISPOSAL

A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.

B. Dispose of construction waste not capable of being recycled or adaptively reused by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

END OF SECTION
SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.00 SECTION INCLUDES
   A. Related Sections
   B. Preliminary Closeout Reviews
   C. Substantial Completion Documentation
   D. Closeout Requirements

1.01 RELATED SECTIONS
   A. Section 01 73 00 — Execution and Closeout Requirements

1.02 PRELIMINARY CLOSEOUT REVIEWS
   A. When Contractor considers Work Substantially Complete, submit written certification that:
      1. Contract Documents have been reviewed.
      2. Contractor has inspected Work for compliance with Contract Documents.
      3. Work has been completed in accordance with Contract Documents.
      4. The Project, properties, and streets are finally cleaned of debris and dirt caused by Contractor operations.
      5. Work is substantially complete and ready for final inspection.
      6. Provide preliminary punch list identifying any known corrective items
   B. District Representative will coordinate inspection of the Work to verify completion status as soon as possible after receipt of Contractor’s certification.
   C. Should District Representative consider Work incomplete or defective:
      1. Representative will promptly notify Contractor in writing, listing incomplete or defective work.
      2. Contractor shall immediately remedy deficiencies and send second written certification that Work is complete.
      3. Representative will coordinate re-inspection of the Work.
   D. When District, District Representative and Engineer find Work acceptable under Contract Documents, they will jointly request Contractor to make closeout submittals.
   E. Re-inspection Fees: Should more than two Substantial inspections or one Final inspection be required due to Contractor’s failure to correct specified deficiencies, the Contractor shall bear all costs (including compensation for the Construction Manager, and Engineer’s additional services) made necessary thereby.

1.03 SUBSTANTIAL COMPLETION DOCUMENTATION
   A. General: Contractor shall submit documentation for Substantial Completion when it is evident that the Project can be occupied for its intended use and Final Completion can be achieved within thirty (30) days.
   B. Complete the following before requesting review for certification of Substantial Completion, either for entire Work or for portions of Work.
      1. Create a list of items that are incomplete with the request. Include the value of incomplete Work, and reason for Work being incomplete.
      2. Include supporting documentation for completing as indicated in these Contract Documents.
      3. Submit statement showing accounting of changes to Contract Sum.
      4. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
      5. Deliver tools, spare parts, extra stock of material and similar physical items as directed by the District.
CLOSEOUT REQUIREMENTS

A. Subsequent to final punch list sign-off and prior to Application for Final Payment, submit all record documents to District that are required by governing or other authorities.

B. Deliver salvaged materials, extra stock materials, and maintenance supplies to District.

C. Perform onsite training for new mechanical and electrical systems as specified in Section 01 73 00 — Execution and Closeout Requirements.

D. Complete the testing and balancing requirements and confirm that all systems are functioning properly.

E. Coordinate necessary service contracts.

F. Remove all temporary services and contractor property from premises and restore affected areas.

G. Provide the following Closeout Documents:

   a. A Table of Contents, tab dividers for each item, and divider sheets describing the information to follow behind each tab divider.
   b. A list of subcontractors with contact information (including emergency phone number), and a summary description of their scope of work.
   c. A list of manufacturers with phone numbers and addresses of local distributors, service representatives and parts dealers. Include 24-hour service representatives when available.
   d. Warranties and guarantees from all subcontractors and suppliers including contact information for each warranty and a detailed description of their scope of work.
   e. The letter from the Contractor stating that the Work is Substantially Complete.
   f. The Engineer's Substantial Completion Observation Reports and punch lists.
   g. The signed Substantial Completion Certificate.
   h. Record of the final punch list work being completed and accepted by District, Construction Manager, and Engineers.
   i. The final Application for Payment.
   j. Contractor's affidavit of payment of debts and claims.
   k. Certificate of consent of surety company to final payment.
   l. Contractor's certificate of completion and release of liens.
   m. Final permit(s) with all required signatures.
   n. Temporary Certificate of Occupancy and/or Certificate of Occupancy.
   o. Special inspector's final report.
   p. Structural engineer's final sign-off.
   q. Testing and balancing reports.
   r. Signed transmittal for delivery of salvaged parts, extra stock materials, and maintenance supplies to the District.
   s. A summary of trainings completed and participants.
H. Final Payment Documentation: The final payment for the remaining retained percentages shall not become due until the Contractor submits:
   1. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the District or the District’s property might in any way be responsible, have been paid or will be paid or otherwise satisfied within thirty (30) days after receipt of final payment from the District.
   2. Consent of surety to final payment.
   4. All Closeout Documents have been accepted by the District.
   5. If any third party fails or refuses to provide a release of claim or waiver of lien as required by the District, the Contractor shall furnish a bond satisfactory to the District to indemnify the District from liability.

1.05 RECORD DRAWINGS (ONE ELECTRONIC COPY):
   A. Contractor shall submit a color scan of their fully-updated Record Drawings as defined in Section 01 73 00 — Execution and Closeout Requirements.

1.06 RECORD SPECIFICATIONS (ONE ELECTRONIC COPY):
   A. Contractor shall submit a color scan of their fully-updated Record Specifications as defined in Section 01 73 00 — Execution and Closeout Requirements.

1.07 OPERATION AND MAINTENANCE MANUAL (ONE ELECTRONIC COPY):
   A. Contractor shall submit 0&M manuals as defined in Section 01 73 00 — Execution and Closeout Requirements.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION
SECTION 01 56 39 – TEMPORARY TREE AND PLANT PROTECTION

PART 1 - PART 1 GENERAL

1.00 SUMMARY

A. Section includes:
   1. Protection of existing trees, plants, and roots from damage.
   2. Pruning of existing trees and plants

1.01 RELATED SECTIONS

A. Section 32 80 00 - Irrigation.
B. Section 32 90 00 - Planting.
C. Section 32 91 19 - Landscape Grading

1.02 REFERENCE STANDARDS

A. ANSI A300 - Tree Care Operations Standards

1.03 DEFINITIONS

A. Designated Trees: Existing Trees to Remain as indicated on Drawings.
B. Critical Root Zone (CRZ): The CRZ for trees 4 inches in caliper or smaller shall be an area with a radius at least 5 feet from the trunk. The CRZ for trees over 4 inches in caliper shall be an area with a radius of at least 1 foot 6 inches from the trunk for every 1 inch of caliper size.
C. Zone of Protection: As indicated on Drawings.
D. Weed: A plant that is undesirable where it is growing.

1.04 PROHIBITED ACTIVITIES

A. Cutting of roots 1 inch in diameter or larger without approval. Damaging tree bark, branches.
B. Removal of protective fencing or notice posted on trees prior to approval of Substantial Completion.
C. Activities prohibited within the Zone of Protection (without prior approval) are, but not limited to: construction, operation of machinery, storage of materials, paving, grading, cutting, filling, travel within, dumping, disposal of liquids, and parking of vehicles or equipment.

PART 2 - PRODUCTS

2.00 TREE PROTECTION FENCING

A. Chain Link Fence
1. 6 feet tall metal chain link fence set in metal frame panels of sufficient size to hold the fence erect without be driven into the ground. Fence panels shall be fastened together so they cannot be easily breached.

2.01 TREE PROTECTION SIGN

A. Heavy-duty, waterproof signs, 8.5 inches x 11 inches, colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the tree protection fence every 50 feet o.c. The tree protection sign shall read “Tree, Plant, and Root Protection Area- Keep Out”.

PART 3 - EXECUTION

3.00 SITE EXAMINATION

A. Examine the site, tree, plant and soil conditions. Notify the Owner’s Representative in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

3.01 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

3.02 NOTICE

A. Notify all workers, including subcontractors, of the requirements to protect Designated Trees, plants and their roots.

3.03 PREPARATION

A. Prior to the preconstruction meeting, layout the limits of the Tree and Protection Fencing and pruning trenches. Obtain the Owner’s Representative’s approval before Construction Activities.

B. Flag all trees and shrubs to be removed by wrapping orange plastic ribbon around the trunk and obtain the Owner’s approval prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.

C. Flag all trees and shrubs to remain with white plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the Owner’s Representative’s approval of all trees and shrubs to be remain prior to the start of tree and shrub removal.

D. Prior to any construction activity, install all tree protection fencing, tree protection signs, and Mulch as shown on the drawings.

3.04 ROOT PRUNING

A. Root pruning shall be in conformance with ANSI A300 (part 8) latest edition. Use approved root-pruning devices.

B. Prior to any excavating into the existing soil grade within the CRZ, root prune where identified on the plans to a depth of 24 inches below existing grade or as directed by the Owner’s Representative.
C. Prune roots encountered during construction. Make clean, vertical cuts. Do not leave split or frayed ends. Obtain Owner's Representative's approval prior to cutting roots larger than 1 inch in diameter.

D. Cover exposed roots overnight with 4 layers of wet burlap or 5 inches of wet Mulch. Backfill exposed roots with Soil Material as specified in Division 32 as soon as Work is completed.

3.05 PROTECTION

A. Protect the Zone of Protection at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil, bark or leaves with construction material, debris, silt, fuels, oils, and any chemical substances. Notify the Owner's Representative of any spills, compaction, or damage and take corrective action immediately using methods approved by the Owner's Representative.

3.06 TRENCHING AND EXCAVATION WITHIN ZONE OF PROTECTION

A. Trenching and excavation within the Zone of Protection is to be performed with the use of an air spade, pressurized water, vacuum excavation, or by hand. Obtain Owner's Representative approval of trenching and excavation locations and methods prior to performing any work.
   1. Air or water pressure shall be a maximum of 90-100 psi.
   2. Restore soil within the trench as soon as the Work is completed. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.

3.07 WATERING

A. Water trees where identified on the Drawings. Watering will be required if it is judged that root removal is necessary for construction and threatens the survival of the tree. Use a slow drip or soaker hose to provide one-inch water per week until completion of construction.

3.08 WEED REMOVAL

A. During the construction period, control any plants that seed in and around the fenced Zone of Protection at least three times a year.
   1. All plants that are not shown on the planting plan or on the Tree Preservation and Removal Plan shall be considered as weeds.

3.09 CLEAN-UP

A. Remove and dispose of excess Mulch and other material brought to the site by the Contractor.

3.10 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION

A. At the end of the construction period or when requested by the Owner's Representative remove protection fencing, mulch, and any other Tree Protection material.

3.11 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

A. Actual tree damage such as trunk scoring and broken limbs or damaged roots inside the Zone of Protection will be assessed according to the percentage of loss of tree value. Percentage of tree value will be determined by the Owner's Representative. Tree value will be determined from
“Evaluation of Landscape Trees, Shrubs, and Other Landscape Plants” by International Society of Arboriculture.

B. Any remedial work on damaged existing trees recommended by the consulting arborist shall be completed by the Contractor at no cost to the Owner. Remedial work shall include but is not limited to soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators.

C. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

END OF SECTION
SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.01 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain.
   2. Removing existing vegetation.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Stripping and stockpiling rock.
   6. Removing above- and below-grade site improvements.
   7. Disconnecting, capping or sealing, and removing site utilities and abandoning site utilities in place.

1.02 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Tualatin High School.

1.04 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain District's property, cleared materials shall become Contractor's property and shall be removed from Project site.
1.05 INFORMATIONAL SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.06 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.07 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed trafficways if required by District or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining District's property will be obtained by District before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on District's premises where directed by District's representative.

D. Utility Locator Service: Notify Call Before You Dig or area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."

G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

H. Do not drive any equipment on to artificial turf fields without protections in place.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.00 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection" for all vegetation in proximity to construction activities.
C. Protect all existing site improvements to remain from damage during construction.

3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.02 TREE AND PLANT PROTECTION – see spec section 01 56 39.

3.03 EXISTING UTILITIES

A. District will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
   1. District will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Generally retain "Interrupting Existing Utilities" Paragraph below unless there are no existing utilities. Coordinate with requirements in Section 01 50 00 "Temporary Facilities and Controls" for temporary utilities.

E. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Do not proceed with utility interruptions without Architect's written permission.

F. Excavate for and remove underground utilities indicated to be removed.

3.04 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
   3. Use only hand methods or air spade for grubbing within protection zones.
   4. Chip removed tree branches and dispose of off-site.

B. Retain paragraph below if required. Coordinate with Section 31 20 00 "Earth Moving."
C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.05 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth indicated on Drawings in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to 72 inches. Do not stockpile topsoil within protection zones.
   2. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.06 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.07 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off District's property.
   1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION
SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.01 SUMMARY

A. This Section Includes the following:
1. Preparing subgrades for slabs-on-grade walks pavements lawns and grasses and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Base course for concrete walks pavements.
5. Subbase and Base course for asphalt paving.
7. Excavating and backfilling for utility trenches.
8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

1.02 UNIT PRICES

A. Unit prices for earthwork are included in Division 01.
B. Quantity allowances for earthwork are included in Division 01.
C. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches outside of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches beneath bottom of concrete slabs-on-grade.
6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.03 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.
B. Base Course: Course placed below the hot-mix asphalt paving.
C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, drainage fill, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.04 SUBMITTALS

A. Product Data: For the following:
   1. Soil Materials

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D2487 of each on-site and borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D1557 for each on-site and borrow soil material proposed for fill and backfill.

C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.05 FIELD CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify Architect or Engineer not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect’s or Engineer’s written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.00 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, as outlined in the Geotechnical Report, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, as outlined in the Geotechnical Report, or a combination of these groups.

   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 200 sieve, as outlined in the Geotechnical Report

E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve, as outlined in the Geotechnical Report

F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 3/4-inch sieve and at least 50% retained on the No. 16 sieve, such as pit run gravel or sand, or non-plastic soil excavated from the trench.

G. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

H. Trench backfill:

   1. Class B backfill shall be used in all other locations where Class A backfill is not designated. Material used for Class B backfill shall be earth, sand, gravel, rock or combination thereof, free of humus, organic matter, vegetable matter, frozen material, clods, sticks, and debris and containing no stones having a dimension greater than three inches. The materials shall predominate in the finer sizes and, in place, shall present no voids and no isolated points or areas of larger stones which would cause fracture or denting of the utility or structure or subject it to undue stress. All Class B backfill shall be placed in 8" lifts and compacted per the recommendations of the geotechnical report.

   2. Class A backfill shall be used in building areas, under paved areas, in trenches parallel to street, other areas subject to wheel traffic, under sidewalk or as designated on the plans. The backfill shall be ¾ inch and less than 8 percent passing the U.S. No. 200 sieve. The material shall be free of organic matter and other deleterious materials. Top of rock elevation shall be
held down at the specified depth in areas designated to receive asphalt paving. All Class A
backfill will be placed in eight inch lifts and compacted to 92% of the laboratory maximum dry
density as determined by ASTM Test Method D1557. Trench backfill located within 1 foot of
finished subgrade elevation should be placed and compacted per the recommendations of the
gotechnical report.

3. Maintenance and Backfill: Notwithstanding the type of backfill placement, the backfilled trench
or excavation surface shall be maintained until all construction has been completed and
accepted by the Owner and Engineer. This maintenance shall include but not be limited to the
addition of backfill in settled areas and surface rock or pavement in roadways to keep the
trench reasonably smooth and free from excessive ruts and potholes.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural
sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0
to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C33; fine aggregate, natural, or manufactured sand.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.01 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking
and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a
description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for
marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick,
continuously inscribed with a description of the utility, with metallic core encased in a protective
jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches
deep; colored as follows:
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.00 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by
settlement, lateral movement, undermining, washout, and other hazards created by earthwork
operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris,
obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site
Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section
"Site Clearing," during earthwork operations.

D. General
1. The rough excavation shall be carried to the necessary depth to obtain the specified depth of
subgrade densification shown on the plans. Likewise, on embankments, the depth of
subgrade densification shall be as shown on the plans or specified. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace the excavation with approved materials, in an approved manner and condition, at his own expense. All excavating, moving, placing and depositing of all materials are subject to approval by the Engineer and the Engineer shall determine the suitability of material to be placed in embankments. All materials determined unsuitable shall be disposed of in waste areas or as directed. Topsoil and strippings shall not be used in fills or in subgrades but shall be handled and placed as specified.

2. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for any excavated material which is used for purposes other than those designated. All spoil areas shall be leveled to a uniform line and section and shall present a neat appearance before project acceptance.

3. If existing pavement areas that will be left in place are damaged due to hauling or to any other activity of the Contractor, they shall be replaced at the Contractor's expense as directed by the Engineer. Those areas outside of the pavement area which are disturbed due to the Contractor's operations shall be restored to their original condition prior to final acceptance of the project.

4. Spillage of excavation materials on paved areas shall be immediately cleaned up by the Contractor. Cleanup shall include brooming and flushing with water, by mechanical means.

5. If it is necessary to interrupt existing surface drainage, sewers or underdrainage, conduits, utilities, or similar underground structures, or parts thereof, the Contractor shall be responsible for and shall take all necessary precautions to protect and preserve or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal, if necessary. The Contractor shall, at his own expense, satisfactorily repair all damage to such facilities or structures which may result from any of his operations during the period of the contract.

6. Where remaining ends of abandoned pipes or portions of other items partially removed under this specification would be left exposed, removal shall be carried into the slope or below grade to furnish no evidence of their existence in the finish surface. Remaining ends of sewer pipes and conduits shall be capped or plugged in a watertight manner.

E. Contractor's responsibility for utility properties and services

1. At points where the Contractor's operation could cause damage or interference to railway, telegraph, telephone, television, power, oil, gas, water, irrigation, or other private, public, or municipal utilities, the Contractor shall suspend work until all arrangements necessary for the protection thereof have been made by the Contractor.

2. The Contractor shall notify all utility offices which are affected by the construction operation at least 48 hours in advance of excavation. Under no circumstances shall the Contractor expose or interrupt any utility without first requesting permission and being granted to do so from the affected agency. It shall be the Contractor's responsibility, once permission from the utility has been granted, to locate, if necessary, and expose all of the existing underground utilities in advance of the trenching operation.

3. The Contractor shall be solely and directly responsible to the Owner and utility companies for any damage, expense, or claims of any kind brought because of injuries, damages or delay which may result from the carrying out of the work to be done under the Contract.

4. In the event of interruption to domestic water or to other utility services as a result of accidental breakage, or as a result of being exposed, unsupported, or a lack of coordination, the Contractor shall promptly notify the Engineer and the agency involved. The Contractor shall cooperate with the said authority in restoration of services as promptly as possible and shall bear any and all costs of repairs. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior to approval of the Engineer or agency involved is granted.
5. Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the location of the underground utilities being other than that shown on the plans or for the existence of underground utilities not shown on the plans.

3.01 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system, specified in Division 31 Section "Dewatering," to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.02 EXPLOSIVES

A. Explosives: Do not use explosives.

3.03 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
      a. 24 inches outside of concrete forms other than at footings.
      b. 12 inches outside of concrete forms at footings.
      c. 6 inches outside of minimum required dimensions of concrete cast against grade.
      d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
      e. 6 inches beneath bottom of concrete slabs on grade.
      f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.04 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work. Refer to geotechnical report for direction on excavation at any wall locations to the foundation or footings.
   2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
3.05 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.06 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths, minimum 18 inches, to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 6 inches each side of pipe or conduit as indicated.

C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Field Relocation: During construction, minor relocations of the line may be necessary. Such relocations shall be made only with approval from the Engineer. Unforeseen obstructions encountered as a result of such relocations will not become subject to claims for additional compensation by the Contractor to any greater extent that the original lump sum of the contract or unit price of the utility being installed.

E. Opening Trenches: The Contractor shall not begin the trench excavation until the necessary material is on hand to complete the work involved. The trenches shall be opened in accordance with the lines and grades given for the work, at such times and as far in advance of the work as may be required by the Engineer. Not more than a total of 300 feet of trench shall be opened in advance of the competed utility unless authorized by the Engineer. Related structures must be competed and backfilled at the time of line installation.

F. Barricades, Guards, and Safety Provisions: To protect persons from injury and to avoid property damage, adequate barricades, construction signs, warning lights, and guards as required shall be placed and maintained during the progress of the work and until it is safe for public use. Watchman or flag personnel shall be provided as necessary. Rules and regulations of all local and Federal authorities regarding safety provisions shall be observed. The Contractor will be solely responsible for accidents caused by inadequate or insufficient safety provisions.

G. Interfering Structures or Roadways:

1. The Contractor shall remove, replace and/or repair any damage done by the Contractor during construction to fences, buildings, cultivated fields, drainage crossings, and any other properties at his own expense without additional compensation from the Owner. The Contractor shall replace or repair these structures to a condition as good or better than their original condition prior to commencing work in the area.

2. Where paved roadways are cut, backfill will be Class A as defined hereinbefore. New pavement shall be equal or better than the existing paved surface and shall not deviate by more than one-quarter inch from the existing elevations.

3. If the Contractor encounters existing structures which will prevent construction and are not adequately shown on the plans, he shall notify the Engineer before continuing with the work in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing conditions. The cost of waiting or “downtime” during such field revisions shall be borne by the Contractor without additional cost to the Owner or liability to the Engineer. If the
Contractor fails to so notify a conflict of this nature is encountered, but proceed with construction despite this interference, he shall do so at his own risk with no additional payment.

H. Shoring and Sheathing: The Contractor shall use whatever means necessary to maintain safe working conditions and protect adjacent property and structures from damage due to excavation. The Contractor shall conform to all federal, state, and local regulations governing shoring, sheathing, and excavation. When shoring or sheathing is installed, the trench width shall be increased accordingly. The shoring or sheathing shall remain in place until the utility or structure is backfilled to a point where caving could not damage the installation. No payment will be made for shoring or sheathing. All costs involved in placement and removal of shoring and sheathing shall be considered incidental to the work.

3.07 SUBGRADE INSPECTION

A. Notify Architect or Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.08 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.09 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

B. Location of Excavated Materials: During excavation the Contractor shall locate excavated material so as not to block any public right-of-way, traveled roadways, public or private; and unless otherwise approved by the Engineer, roadway shall be kept open to at least one lane of traffic. The Contractor shall store or waste excavated materials only in designated areas unless otherwise approved by the Engineer. Utmost care shall be taken to prevent spillage or damage to property adjacent to the project.
3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."

D. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

E. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."

F. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway base.

G. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

H. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.
C. Place soil fill on subgrades free of mud, frost, snow, or ice.

D. Immediately prior to the placing of the fill materials, the entire area upon which the embankment is to be placed, except where limited by rock, shall be scarified and broken by means of a disc harrow or plow, or other approved equipment, to a depth of six inches. Scarifying shall be done approximately parallel to the axis of the fill. All roots, debris, large stone, or objectionable material that would cause interference with the compaction of the foundation or fill shall be removed from the area and disposed of as specified.

E. The grading operations shall be conducted, and the various soil strata placed, to produce a soil structure as shown on the typical cross section or as specified. All materials entering the embankment shall be reasonably free of organic matter such as leaves, grass, roots and other objectionable material. Soil, granular material, and any other material permitted for use in embankment shall be spread in successive layers as specified.

F. Operations on earth work shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing weather, or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

G. The material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. Wetting or drying of the material and manipulation when necessary to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on all portions of the embankment thus affected shall be delayed until the material has dried to the required moisture content. Sprinkling shall be done and approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals. From these tests, corrections, adjustments and modifications of methods, materials, and moisture content shall be made to construct the embankment.

H. Subgrade and Building Pad Compaction shall be compacted as specified within the Geotechnical Report prepared by Geo-Design, included herein and shall be built to the minimum section indicated on the construction plans.

I. During construction of the embankment, the contractor shall route his equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that cemented gravel or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

J. In the construction of embankments, starting layers shall be placed in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

K. When rock and other embankment materials are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than eight (8) inches in their greatest dimension will not be allowed in the top one (1) foot of the subgrade. Rock fill shall be brought up on layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material to form a dense, compact mass. Rocks or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designed by the Engineer.

L. Where embankments are constructed predominately of rock fragments, the thickness of layers shall be as the Engineer may direct, but not greater than 18 inches. All voids between rocks, boulders, etc. shall be filled with earth material brought to optimum moisture content and compacted as specified.
M. If in the opinion of the Engineer, the material is unstable, rolling shall continue until the embankment is stable.

N. The Contractor shall be responsible for the stability of all embankments made under the contract and shall replace any portion, which, in the opinion of the Engineer, has become displaced due to carelessness or negligence on the part of the Contractor.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material as outlined in the Geotechnical Report.
   2. Under walkways, scarify and recompact top 8 inches below subgrade and compact each layer of backfill or fill soil material as outlined in the Geotechnical Report.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material as outlined in the Geotechnical Report.
   4. For utility trenches, compact each layer of initial and final backfill soil material as outlined in the Geotechnical Report.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Unstructured lawn or Unpaved Areas: Plus or minus 1 inch.
   2. Walks: Plus or minus 1/2 inch.
   3. Pavements: Plus or minus 1/4 inch.
   4. Playfield surfaces: Plus or minus 1/4 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/4 inch when tested with a 10-foot straightedge.
3.16  SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage."

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Retain one of two options in subparagraph below if compaction of filter material is required. In first option, revise percentage if required.
   2. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.

3.17  BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place base course under pavements and walks as follows:
   1. Shape base course to required crown elevations and cross-slope grades.
   2. Place base course 6 inches or less in compacted thickness in a single layer.
   3. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D1557, as outlined in the Geotechnical Report.

3.18  DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Place drainage course 6 inches or less in compacted thickness in a single layer.
   2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   3. Compact each layer of drainage course to required cross sections and thicknesses as outlined in the Geotechnical Report.

3.19  FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

C. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2922, and ASTM D2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.22 EASEMENTS

A. Where portions of the work located on private property, easements and permits will be obtained by the Owner. Easements shall provide for the use of property for construction purposes to the extent indicated on the easements. Copies of these easements and permits will be available from the Owner for inspection by the Contractor. It shall be the Contractor's responsibility to determine the adequacy of the easement obtained in every case. The Contractor shall confine his construction operations to within the easement limits or street right-of-way limits or make special arrangements with the property owners for the additional area required and notify the Engineer of any such conditions.

B. Any damage to private property, either inside or outside the limits of the easements provided by the Owner, shall be the responsibility of the Contractor. Before final payment will the authorized by the Engineer, the Contractor will be required to furnish the Owner with written releases from property owners where special agreements or easements have been obtained by the Contractor or where the Contractor's operations for any reason, have not been kept within the construction right-of-way obtained by the Owner. Any such special agreements must be in written form and shall not involve the Owner or Engineer as to liabilities in any way.

3.23 FINISHING:

A. Work under this specification is to be done after the earthwork has been substantially completed and will involve any or all of the following items of work as may be applicable or pertinent.

B. All side slopes in excavation and fills shall be trimmed and shaped as specified herein and shall be made free of all exposed roots and debris and of all stones exceeding two (2) inches in size which
are loose or liable to become loosened. Embankments need not be finished to a fine degree of perfection, but shall be made as smooth, safe and slightly as practicable with the compatibility of materials used in construction of the embankments. If directed by the Engineer, embankment slopes flatter than four to one and constructed of rocky material shall be covered with a layer of earth, talus or other fine material

C. In the vicinity of bridge ends, culvert ends, inlets, walls, etc., all extraneous matter shall be removed and the areas shaped and trimmed as directed. All sewers, culverts, drains and their appurtenances constructed under the contract shall be cleaned out.

D. All materials removed in connection with the above operations shall be disposed of in a manner satisfactory to the Engineer.

END OF SECTION
SECTION 32 13 13 – CONCRETE PAVING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.01 SECTION INCLUDES
   A. This Section includes exterior cement concrete pavement for the following:
      1. Driveways and roadways.
      2. Parking lots.
      3. Curbs and gutters.
      4. Walkways.
      5. Unit paver base.
   B. Related Sections include the following:
      1. Division 03 Section Miscellaneous Cast-in-Place Concrete for general building applications of concrete.
      2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
      3. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.
      4. Division 32 Section "Asphalt Paving" for pavement markings.

1.02 DEFINITIONS
   A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.03 SUBMITTALS
   A. Product Data: For each type of manufactured material and product indicated.
   B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   C. Qualification Data: For manufacturer and testing agency.
   D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
      1. Aggregates.
   E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
      1. Cementitious materials.
      2. Steel reinforcement and reinforcement accessories.
      3. Admixtures.
      4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

F. Field quality-control test reports.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C94/C94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C1077 and ASTM E329 for testing indicated, as documented according to ASTM E548.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.


D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
   1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete producer.
      d. Concrete pavement subcontractor.

1.05 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.00 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.01 FORMS
A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves with a radius 100 feet or less.
B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT
A. Plain-Steel Welded Wire Reinforcement: ASTM A185, fabricated from as-drawn steel wire into flat sheets.
C. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.
D. Steel Bar Mats: ASTM A184/A184M; with ASTM A615/A615M, Grade 60 deformed bars; assembled with clips.
E. Plain Steel Wire: ASTM A82, [as drawn] [galvanized].
F. Deformed-Steel Wire: ASTM A496.
G. Joint Dowel Bars: Plain steel bars, ASTM A615/A615M, Grade 60. Cut bars true to length with ends square and free of burrs.
H. Tie Bars: ASTM A615/A615M, Grade 60, deformed.
I. Hook Bolts: ASTM A307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
   1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.03 CONCRETE MATERIALS
A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project, unless otherwise specified on the plans:
   1. Portland Cement: ASTM C150, Type [I]
B. Normal-Weight Aggregates: ASTM C33, graded, 1-1/2-inch nominal maximum aggregate size.
C. Water: ASTM C94/C94M; potable.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

2.04 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C309, Type 1, Class A

2.05 RELATED MATERIALS


B. Bonding Agent: ASTM C1059, Type II, non-dispersible, acrylic emulsion or styrene butadiene.

2.06 CONCRETE MIXTURES

A. Comply with ACI 301 requirements for concrete mixtures

B. Normal-weight concrete: Prepare design mixes, proportioned according to ACI 301, as follows, or as specified on the plans:
1. Minimum compressive strength: 3000 psi at 28 days
2. Maximum Water-Cementitious Materials Ratio: 0.46
3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch
4. Air Content: 5% +/-1% by volume.

2.07 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.00 EXAMINATION
A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
   1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
   2. Revise minimum weight or type of vehicle in first subparagraph below if required.
   3. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
   4. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."
C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.01 PREPARATION
A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION
A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.03 STEEL REINFORCEMENT
A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Zinc-Coated Reinforcement: Use galvanized steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963/D3963M.

G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.04 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

2. Provide tie bars at sides of pavement strips where indicated.

3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints as indicated on the Landscape drawings.

2. Extend joint fillers full width and depth of joint.

3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of the concrete thickness, as follows

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove marks on concrete surfaces.
2. Sawed Joints: Not to be used unless otherwise directed by Engineer.
3. Dowelled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
E. Do not add water to concrete during delivery or at Project site.
F. Do not add water to fresh concrete after testing.
G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
   1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Engineer.
J. Screed pavement surfaces with a straightedge and strike off.
K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
   1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

O. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water 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 Contractor's option.
   2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
   2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
   3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.
C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.08 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.
   4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
   5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
   6. Alignment of Tie-End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
   7. Alignment of Dowel-End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
   8. Joint Spacing: 3 inches.

3.09 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
   1. Spread glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.
3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes drilled or cast into wheel stops at one-quarter to one-third points. Firmly bond each dowel to wheel stop and to pavement. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
   4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C39/C39M; test 1 specimen at 7 days and 2 specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland Cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION
SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.01 SUMMARY

A. This Section includes the following:
   1. Piping joining materials.
   2. Transition fittings.
   3. Sleeves.
   4. Identification devices.
   5. Grout.
   6. Flowable fill.
   7. Piped utility demolition.
   8. Piping system common requirements.
   9. Equipment installation common requirements.
   10. Concrete bases.
   11. Metal supports and anchorages.

1.02 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.


D. CPVC: Chlorinated polyvinyl chloride plastic.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.03 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Identification devices.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.
1.05  QUALITY ASSURANCE

A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.06  DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.07  COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 033000 "Cast-in-Place Concrete."

1.08  PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness, unless otherwise indicated.
      a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
   2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BA1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Solvent Cements for Joining Plastic Piping:
1. ABS Piping: ASTM D2235.
2. CPVC Piping: ASTM F493.
3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.
4. PVC to ABS Piping Transition: ASTM D3138.

H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

1.09 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 (DN 40) and Smaller:
1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 (DN 50) and Larger:
1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:
1. Description: [CPVC] [CPVC and PVC] [PVC] one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint[ or threaded] end.

E. Plastic-to-Metal Transition Unions:
1. Description: MSS SP-107, [CPVC] [CPVC and PVC] [PVC] four-part union. Include brass[ or stainless-steel] threaded end, solvent-cement-joint[ or threaded] plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
1. Description: ASTM C1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1.010 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

B. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

C. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.


G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
1.011 GROUT

A. Description: ASTM C1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

1.012 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.
   2. Density: [115- to 145-lb/cu. ft. (1840- to 2325-kg/cu. m)].
   3. Aggregates: ASTM C33, natural sand, fine and crushed gravel or stone, coarse.
   6. Water: Comply with ASTM C94/C94M.
   7. Strength: [100 to 200 psig (690 to 1380 kPa)] at 28 days.

PART 2 - EXECUTION

2.00 PIPED UTILITY DEMOLITION

A. Refer to Section 02 41 19 "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
   3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
   5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

2.01 PIPING INSTALLATION

A. Install piping according to the following requirements and utilities Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
D. Install piping to permit valve servicing.
E. Install piping at indicated slopes.
F. Install piping free of sags and bends.
G. Install fittings for changes in direction and branch connections.
H. Select system components with pressure rating equal to or greater than system operating pressure.
I. Sleeves are not required for core-drilled holes.
J. Permanent sleeves are not required for holes formed by removable PE sleeves.
K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas [2 inches (50 mm)] above finished floor level.
2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
   a. [PVC] [Steel] Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
   b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.
L. Verify final equipment locations for roughing-in.
M. Refer to equipment specifications in other Sections for roughing-in requirements.

2.02 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
H. Soldered Joints: Apply ASTM B813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B32.

J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. ABS Piping: Join according to ASTM D2235 and ASTM D2661 appendixes.
   3. CPVC Piping: Join according to ASTM D2846/D2846M Appendix.
   4. PVC Pressure Piping: Join schedule number ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
   5. PVC Nonpressure Piping: Join according to ASTM D2855.
   6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D3138 Appendix.

L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.

M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D3212.

N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657.
   1. Plain-End PE Pipe and Fittings: Use butt fusion.
   2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

2.03 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:
   1. Install unions, in piping NPS 2 \( (DN \ 50) \) and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 \( (DN \ 65) \) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
   3. Install dielectric fittings at connections of dissimilar metal pipes.

2.04 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

2.05 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
   1. Construct concrete bases of dimensions indicated, but not less than 4 inches \( (100 \ mm) \) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Install anchor bolts to elevations required for proper attachment to supported equipment.

6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use [3000-psi (20.7-MPa)] 28-day compressive-strength concrete and reinforcement as specified in [Section 03 30 00 "Cast-in-Place Concrete."] [Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."]

2.06 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION
SECTION 33 14 16 – WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.00 SUMMARY

A. This section specifies requirements for water line distribution piping.
   1. Pipe and fittings for potable water line and fire water line.

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections
   1. Section 31 23 17 Trenching

C. AWWA – American Water Works Association.

1.02 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on pipe materials, pipe fittings, valves, lids and accessories.

C. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

D. Project Record Documents: Record as-constructed locations of piping mains, valves, connections, thrust restraints, and invert elevations.

E. Identify and describe unexpected variations to subsoil conditions or discoveries of uncharted utilities.

1.03 QUALITY ASSURANCE

A. A. Perform Work in accordance with Uniform Plumbing Code and local water authority.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with manufacturer’s name and pressure rating labeling in place.

B. Store pipe and pipe materials in designated areas on-site.

C. Store polyethylene materials out of sunlight.
PART 2 - PRODUCTS

2.00 WATER PIPING

A. Public Water mains 6" and larger.

B. Private water lines 4" and larger
   2. PVC AWWA C-900 and AWWA C905, designated for potable water use. Class DR 18, 150 psi, and DR 14, 200 psi.

C. Private water lines 2" and smaller
   1. PVC Schedule 40 designated for potable water use.
   2. Copper pipe type K

2.01 FITTINGS

A. Ductile Iron Fittings shall conform to ANSI / AWWA C110 / A21.10 and/or ANSI / AWWA C153/A 21.53. Fitting joints shall have mechanical joint (MJ) ends.

B. Mechanical Joint Fittings and Restraints
   1. Mechanical joint fittings shall be ductile iron short pattern.
   2. Fittings shall conform to ANSI / AWWA C110 / A21.10 and shall be of a class at least equal to that of the adjacent pipe.
   3. Bolts shall be domestic Cor-Ten or ductile iron tee-head bolts.
   4. Mechanical Joint Restraints.
      a. The restraint shall be MEGALUG Series 1100 restraint device as manufactured by EBAA Iron, Inc.

C. Flanged Fittings
   1. Flanged fittings shall conform to ANSI / AWWA C110/A21.10 and shall be faces and drilled Class 124 flanges that match ANSI B16.1 fittings.
   2. Flanged fittings shall be ductile iron
   3. Flange bolts and nuts shall be Grade 304 or 316 stainless steel with standard course threads. Threads on bolts and nuts shall be coated with a food grade anti-seize material to prevent thread galling.

D. Gaskets
   1. Gasket material for flanged joints in ductile iron pipe shall consist of 1/8-inch thick, full-face one-piece, cloth inserted, rubber gaskets conforming to section 4 of ANSI/ AWWA C207 and ANSI B16.21.

E. Restrained Joints
   1. Joints shall be restrained using either mechanical joint restraints or Field LokTM (Tyton), FastiteTM (American) gaskets.
   2. Thrust block and straddle block materials shall be 3,500 psi minimum compressive strength concrete.
2.02 VALVES and VALVE BOXES

A. For 1” Water Line Valve, use 1” brass ball valve with drain on building side of valve per local plumbing code.

B. Use Brooks 37MB 12” x 20” Concrete Box or equal for Water Gate Valve.

PART 3 - EXECUTION

3.00 PREPARATION

A. Verify existing utility water main size, location and invert are as indicated on the Drawings.

3.01 EXCAVATION

A. Excavate pipe trench in accordance with Section 31 23 17 Trenching. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

3.02 INSTALLATION

A. Install ductile iron pipe and fittings in accordance with AWWA C600 and manufactures’ instructions.

B. Install PVC pipe in accordance with AWWA C605 and manufactures’ instructions.

C. Install access lid and valve boxes as required to provide access to valves.

3.03 DISINFECTION AND TESTING

A. Disinfection and testing shall be in conformance with local water district standards.

END OF SECTION