APPENDIX C

TECHNICAL SPECIFICATIONS

CONTRACT PROVISIONS

Lake Boren Park
City of Newcastle
Bid Set

March 10, 2023

PREPARED BY:
Berger Partnership
1927 Post Alley, Suite 2
Seattle, WA 98101

LAKE BOREN PARK

PROFESSIONAL STAMPS AND SIGNATURES

I certify that the portion of the technical submission described below was prepared by me or under my direct supervision. I am a duly licensed Professional Landscape Architect under the laws of the State of Washington.

Gregory E. Brower Date:

Specification Sections covered by this signature:

I certify that the portion of the technical submission described below was prepared by me or under my direct supervision. I am a duly licensed Professional Landscape Architect under the laws of the State of Washington.

Jason Anderson Date:

Specification Sections covered by this signature:

I certify that the portion of the technical submission described below was prepared by me or under my direct supervision. I am a duly licensed Professional Engineer under the laws of the State of Washington.

Gregory Juttner Date:

Specification Sections covered by this signature:

I certify that the portion of the technical submission described below was prepared by me or under my direct supervision. I am a duly licensed Professional Engineer under the laws of the State of Washington.

Jenifer Clapham Date: 2023-03-08

Specification Sections covered by this signature:
EARTHWORK - 31 00 00

LAKE BOREN PARK

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END OF TABLE OF CONTENTS

DIVISION 02

EXISTING CONDITIONS

SECTION 02 41 00 - DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Removal of concrete and asphalt paving as indicated on the drawings.
   2. Removal of rockeries and timbers within phase one improvement areas or as shown on the drawings.
   3. Removal of sod and shrubbery as shown on the drawings.

B. Related Sections
   1. Section 31 10 00 - Site clearing & Tree protection
   2. Section 31 20 00 - Earthwork

C. Drawings, general provisions of the Contract, and Division 1 Specification sections, apply to this section.

1.2 SUBMITTALS

A. Schedule indicating proposed sequence of operations for demolition work to Project Engineer for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

B. Photographs of existing conditions of structures, surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operation. File with Project Engineer prior to start of work.

1.3 GENERAL CONSIDERATIONS

A. See Site Clearing and Tree Protection Section For:
   1. Traffic
   2. Protection of Existing Improvements
   3. Salvage of Existing Improvements as directed by the Project Engineer

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate with site clearing & tree protection work.

B. Cover and protect surfaces to remain, equipment, and fixtures from spoilage or damage when salvage and demolition work is performed.

C. Locate, identify, stub off, and disconnect utility services that are not indicated to remain. Provide bypass connections as necessary to maintain continuity of service to occupied areas of adjacent facilities. Provide minimum of 72 hours advance notice to Project Engineer if shutdown of service is necessary during changeover. Approval for shutdown by the Project Engineer is required.

3.2 DEMOLITION

A. Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

B. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

C. Completely fill below-grade areas and voids resulting from demolition work.

D. Asphalt removal and disposal to a certified recycling center.

E. Remove any found and abandoned irrigation lines/components.

F. Removal of plants: All vegetation, including their root systems, shall be removed from below new surfaced area. The vegetation shall be stripped to a depth of twelve inches (12") minimum and to a depth of three feet (3') under new paving surfaces. Mechanically grind or remove stumps to a minus level of 12" below existing grade in paving areas.

G. Mechanically grind or remove stumps to a minus level of 12" below existing adjacent finish grade in lawn areas. Cut stumps to finish grades in vegetative beds unless otherwise indicated on the drawings.

H. Back fill root areas with on-site topsoil specified fill. Meet and match adjacent finish grade surfaces.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

C. Recycling: The contractor is encouraged to recycle as appropriate to the scope of work.

3.4 CLEAN-UP AND REPAIR

A. Contractor is responsible for complete clean-up and repair as needed to restore the site to the condition existing prior to construction.

END OF SECTION

DIVISION 03

CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Construct all formwork systems to provide only those lines and delineations indicated, unless otherwise approved by the Project Engineer, construct formwork to allow erection in proper sequence and to permit removal without damage to the finished concrete surfaces. Construct all formwork to the shapes, lines and dimensions of concrete members with specified tolerances.

B. Related Sections
   1. Section 03 20 00 - Concrete Reinforcement
   2. Section 03 30 00 - Concrete
   3. Section 32 13 13 - Concrete Paving

1.2 REGULATIONS

A. Conform to requirements of the IBC and City of Newcastle Public Works Standards as it pertains to structural cast-in-place concrete, except as supplemented and modified herein.

1.3 REFERENCE STANDARDS

A. Conform to requirements of the following Reference Standards as the Project Engineer judges them applicable and as modified and supplemented herein.
   1. ACI Specifications for Structural Concrete for Buildings, ACI 301.
   2. ACI Recommended Practice for Concrete Formwork, ACI 347.

1.4 QUALITY ASSURANCE

A. Special Inspection: Notify the Project Engineer at least 48 hours before inspection of forms will be required.

B. Inspection by Other Trades: Where items, such as anchors, fastenings, conduit, piping and other items are supplied by other trades and specified elsewhere in these specifications, in the forms, obtain approval of their placement prior to placing any concrete.

1.5 HANDLING

A. Protection of Forms: Design, construct, and erect all forms for reuse; withdraw projecting nails or other objects from contact surfaces before reusing; clean and completely recondition all forms prior to reuse; repair any damage to forming surfacing cause during previous usage. Obtain approval for each reuse; formwork with patches or repairs affecting appearance of the concrete surfaces will not be permitted.

B. In order that reused forms will not contain patches resulting from alterations, reuse forms on identical sections only; reuse no forms showing excessive surface wear or other imperfections impairing quality of finish of concrete surface.

C. Precautions: Contractor is responsible for the strength and suitability of the formwork.

PART 2 - PRODUCTS

2.1 FORMS

A. For Footings and Concrete Slabs: Fabricate forms of MDO plywood, metal or plastic as judged best suited for shapes. Construct with a minimum of joints, sufficiently tight to prevent leakage.

2.2 INSERTS/SLEEVES

A. As required by Manufacturer's specifications.

2.3 FORM RELEASE AGENTS

A. Release agent with non-staining and non-interference characteristic with bonding capabilities of paints, plasters, adhesives, other surface coatings or materials. Contractor shall guarantee proper bonding of such subsequent coatings or materials applied over concrete.

PART 3 - EXECUTION

3.1 DESIGN AND CONSTRUCTION

A. Erect forms to conform accurately to the shapes, dimensions, locations and profiles indicated; fit joints between adjacent assembled panels and components tightly and seal with gasket material. Inspect all contact surfaces prior to concrete placement; verify that surfaces are clean, smooth, and free from foreign matter or imperfections affecting appearance of finished concrete.

B. Camber: Design and erect formwork for anticipated deflection due to weight and pressure of fresh concrete. Provide positive means for adjustment of shores and struts to take up settlement during placement.

3.2 FORM TREATMENTS

A. Before erection of forming, plug and seal all cracks, holes, slits, gaps and other "telegraphing" imperfections in contact surfaces. Apply bond-breaking coating in amounts that will leave surfaces in proper condition to receive subsequent material application. Contractor shall be responsible for being certain that bond release coatings are applied only in amounts that will leave surfaces in proper condition to receive subsequent material application.

3.3 FORM REMOVAL

A. Formwork designed for easy removal without damaging or marring finished surfaces of the concrete. Prying against face of concrete will not be permitted; where mechanical means are necessary to release forms, use wood wedges only and then only if approved by the Project Engineer.

B. Removal Strength: Formwork for footings shall remain in place until concrete has hardened sufficiently to resist damage from the removal operations. Determine concrete removal strength based on test cylinders, field cured under the most unfavorable conditions prevailing for any portion of the work represented, or as approved by the Project Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 REGULATIONS

A. Conform to requirement of the IBC and the City of Newcastle Public Works Standards for concrete reinforcement, as supplemented and modified on drawings or herein.

B. Related Sections
   1. Section 03 10 00 - Concrete Formwork
   2. Section 03 30 00 - Concrete
   3. Section 32 13 13 - Concrete Paving

1.2 REFERENCE STANDARDS

A. Conform to requirements of the following Reference Standards as the Project Engineer judges them applicable and as modified and supplanted herein.
   1. American Concrete Institute (ACI) Building Code Requirements for Reinforced Concrete, ACI 318.
   2. ACI Specifications for Structural Concrete for Buildings, ACI 301.
   3. ACI Detailing Manual, ACI 315.

1.3 QUALITY ASSURANCE

A. Special Inspection: Notify the Project Engineer at least 48 hours before placing any concrete.

1.4 SUBMITTALS:

A. Product Data - Submit manufacturers' published literature for specified products and accessories as applicable, including manufacturers' specifications, physical characteristics and performance data. Submit as a supplement, manufacturers' instructions and directions for application if not included in manufacturers' published literature.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Where Drawings and General Structural Notes are at variance with the requirements of this Section, the more stringent requirements shall govern at the areas indicated.

B. Bars: ASTM A615; types, sizes and grades as indicated and noted on drawings; all bars free from rust and loose scale at time of delivery.

C. Tie wire: 16-gauge double annealed wire. Provide galvanized tie wire for exposed concrete.

PART 3 - EXECUTION

3.1 FABRICATION AND DETAILING

A. Fabricate steel bar reinforcement to shapes and dimensions as shown and placed as indicated.

B. Bending and Straightening: Form bars accurately to detail, other kinks or bends will not be permitted; conform to requirements of ACI 318. Make bends cold around pin with diameter at least 6 times bar

dimension; heating of reinforcement will be permitted only if entire operation is approved. No bending of reinforcement after partial embedment in concrete will be permitted.

C. Splices: Obtain approval of all splices not indicated on drawings. In general avoid splices at points of maximum stress. Saw, shear or flame-cut bar ends; straighten ends of sheared bars; chip and wire brush ends of flame-cut bars. Wire brush splice area to remove burrs, paint, oil, and other foreign matter before splicing. Splice overlap shall be at least 50 times the diameter of the bars or per ACI 318 02 Code.

3.2 PLACEMENT

A. Unless specified otherwise, all steel reinforcement shall be centered within the forms and approved by the Project Engineer prior to placement of concrete. No reinforcement shall be closer than 1 1/2” from any concrete surface.

B. Clean reinforcing bars free from loose rust, mud, oil and other foreign matter affecting or reducing bond using approved portable sandblasting equipment. Accurately position bars in accordance with approved placement drawings and secure against displacement. Lap at intersections as indicated or as directed; extend reinforcement through, and lap beyond, construction joints.

C. Displacement: If bars are displaced, or if it is necessary to move bars to avoid interference with other reinforcing or embedded items, and if bars are moved to exceed tolerances, obtain the Project Engineer’s approval of resulting arrangement prior to placing concrete.

D. Miscellaneous: After cutting tie-wire, turn wires to the inside of the section and bend in such manner that concrete placement will not force ends to exposed concrete surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Cast-in-Place concrete
   2. Concrete accessories

B. Related sections:
   1. Section 03 10 00 – Concrete Formwork
   2. Section 03 20 00 – Concrete Reinforcement

1.2 REFERENCES

A. American Concrete Institute (ACI)
   1. 301 - Specifications for Structural Concrete
   2. 315 - Details and Detailing of Concrete Reinforcement.

B. American Society for Testing and Materials (ASTM)
   1. A615 Deformed and Plain Billet-Steel for Concrete Reinforcement
   2. C33 Specifications for Concrete Aggregates
   3. C94 Specifications for Ready Mixed Concrete
   4. C132 Test for Slump of Portland Cement Concrete
   5. C150 Specification for Portland Cement
   6. C156 Test Method for Water Retention by Concrete Curing Materials
   7. C171 Specification for Sheet Materials for Curing Concrete
   8. C260 Specifications for Air-Entraining Admixtures for Concrete
   9. C309 Specification for Liquid Membrane Forming Compounds for Curing Compounds
   10. C494 Specifications for Chemical Admixtures for Concrete
   11. C595 Blending Hydraulic Cements (excluding slag cements)
   12. D1751 Performed Expansion Joint Fillers for Concrete Paving and Structural Construction.

C. U.S. Army Corps of Engineers
   1. CRD-C-621-83 - Specifications for Non-Shrink Grout.

D. DOT/APWA - Specifications.

1.3 DEFINITIONS

A. Architectural Concrete: Formed concrete elements, which are exposed as an exterior surface in the completed structure.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301, unless indicated or specified otherwise.

B. Concrete work is subject to special testing and inspection.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather

F. Field Samples mock-ups:
   1. Provide mock-ups, as required by the Project Engineer, until approval is obtained.
   2. Do not proceed with subsequent work until approval of the mock-up is obtained.
   3. Approval of mock-up shall be the standard of workmanship and materials for the remainder of the work similar to the mock-up.
   4. Maintain mock-up in approved condition, until directed otherwise.
   5. Unless specified otherwise, remove mock-up at completion, when directed by Project Engineer.
   6. Unless specified or approved otherwise, schedule mock-ups a minimum of 5 working days between mock-up and actual installation of the work represented by the mock-up and actual installation of the work represented by the mock-up.
   7. Notify the Project Engineer a minimum of 5 working days prior to mock-up.

1.5 SUBMITTALS

A. Letter of verification regarding manufacturer's recommendation.
   1. Curing agents and applied surfacing system compatibility.
   2. Slab finish and applied surfacing, system capability.

B. Shop Drawings:
   1. Reinforcing and Concrete Configuration
      a. Detail reinforcing in accordance with ACI 315, or as shown on drawings. Indicate reinforcement sizes, spacings, locations and quantities of reinforcing, bending and cutting schedules, splicing and supporting and spacing devices.
      b. Indicate embedded items.
      c. Show concrete configurations.
   2. Slab Layouts: Dimension locations of control, expansion, and construction joints. Relate to stone banding surfacing.

C. Product Date: Submit for each accessory, admixture, and curing material proposed for the work.

D. Mix Designs: Prior to concrete work, submit mix designs and source supplier for approval and quality control monitoring.
   1. Coordinate the placement of joint devises with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Unless specified otherwise, conform to ACI 301.

B. "Dobe blocks" 2" height or equal as steel mat support per the manufacturer's recommendations.

C. Sleeves or Block-outs: Metal or plastic; fabricate to the shapes indicated.

D. "Sono Tube" or equal for post anchors.

2.2 REINFORCING STEEL:

A. Reinforcing Steel: Types as indicated on the drawings.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, normal - Type 1 Portland, gray color.

B. Normal Weight Fine and Coarse Aggregates: ASTM C33; severe weather exposure.

C. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Air-Entertainment: ASTM C260; Master Builders Inc. “Micro-Air” or “MMBVR” Euclid Chemical Co. “Air Mix” or approved.

B. Water Reducer Normal: ASTM C494, Type A; Master Builders, Inc. “Pozzolith N” Euclid Chemical Co., “Eucon WR 75” or approved.

C. High Range Water Reducer (Superplasticizer): ASTM C 494 Type F or G and shall be of the second or third generation type. Shall be batch planted added, extend plasticity time, reduce water 20 to 30 percent. Master Builders Inc. “Rheobuild”, Euclid Chemical “Eucon 37”, or approved.

D. Accelerator: ASTM C 494, Type C or E non corrosive, non-chloride; Master Builders “Pozzutech 20”, Euclid Chemical Co “Acclegard 90” or approved.

E. Set Retarder: ASTM C494, Type B.

F. Fiber Reinforcement: “Fibermesh” Manufacturing, or equal.

G. Colorants: “Sombrero Buff” by Schofield Manufacturing per rate recommended by mfr.

2.5 ACCESSORIES

A. Bonding Agent: Polyvinyl Acetate.

B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces or court coating surface, and will not impact subsequent treatments of concrete surfaces when applied to forms or form liners.

C. Control Joints: ¼" thickness zinc plated or approved equal. As manufactured by Terrazo Stone and Marble. Depth to 1½" thickness of the slab.

D. Curing Materials:
   1. Waterproof Sheet Material: Waterproof paper in accordance with ASTM C171; reinforced waterproof kraft paper; white color at exterior applications; Burke Kraft Curing Paper Type I-SK-30, or approved.
   2. Curing Compound: Must be thoroughly verified. ASTM C309; clear or translucent with fugitive dye; moisture loss not more than 0.03 gr./sq. cm. when tested in accordance with ASTM C156 and applied in a single coat at the manufacturer’s recommended rate. Euclid Chemical Co. “Kurz DR” or approved. Verify curing compounds are compatible with subsequently applied court surface coating and finishing systems.

2.6 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94, and in accordance with the requirements indicated on the structural drawings. Provide concrete with minimum 3,000 psi compressive strength, unless indicated otherwise.

B. Admixtures:
   1. All exposed concrete is integral color mix.
   2. All concrete shall contain the specified water reducing or high range water reducing admixture, except architectural concrete, and concrete with a required water/cement ratio of 0.45 or lower shall contain a high range water reducing admixture.
   3. All concrete required to be air entrained shall contain air entraining admixture to produce 4% to 6% air.
   4. All concrete placed in ambient temperatures from 40° F to 20° F, all slab concrete placed in ambient temperatures below 50° F, shall contain an accelerator at the manufacturer's required dosage.
   5. All concrete placed in ambient temperatures of 90° F or above, shall contain a set retarder at the manufacturer's required dosage.

C. Provide 28 day compressive strength as indicated on the Structural Drawings, provide minimum 3000 psi concrete unless indicated otherwise.

2.7 REINFORCEMENT FABRICATION

A. Fabricate as indicated on the drawings and in accordance with ACI 315.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Project Engineer in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.2 FORMWORK ERECTION

A. Verify lines, levels, and measurements before proceeding with formwork. Align form joints.

B. Use form coating on forms in accordance with the manufacturer's recommendations. Verify that form coatings will not affect the bond of subsequent concrete surface treatments.

C. Coordinate with work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

D. Tolerances: Comply with ACI 301, Table 4.3.1. - Tolerances for Formed Surfaces.

E. Where earth forms are used, hand trim sides and bottoms of earth forms. Remove loose dirt.

3.3 REINFORCEMENT

A. Place, support, and secure reinforcement against displacement.

B. Locate reinforcing splices not indicated on the drawings at points of minimum stress.

C. Provide laps and concrete cover as indicated in the Drawings.

3.4 PLACING CONCRETE

A. In accordance with ACI 301.

B. Bonding Agent: Verify that agents will not affect subsequent concrete surface treatment. Mix thoroughly and apply strictly in accord with the manufacturer's instructions; do not use when ambient temperature is below 45 ° F. Place concrete in contact immediately while bonding agent is still tacky.

3.5 SLABS

A. Expansion Joints:
   1. Place expansion joints where exterior slabs abut vertical walls.
   2. Place perpendicular to longitudinal axis of curbs.
   3. Form expansion joints with joint filler. Recess joint filler 1/2 inch below finished concrete surface with removable cap systems per manufacturer's recommendation to receive sealant specified in Section 07900.
   4. Tool expansion joints to edges 1/4 inch radius.
   5. Discontinue reinforcing at the expansion joint.

B. Control Joints
   1. Tolerance for horizontal control joints lines is 1/2 inch.
   2. Control joints shall be abutting end to end in a smooth straight continuous line throughout stone banding at 10' O.C minimum
   3. Control joints shall penetrate the slab a minimum of 1-1/2" the thickness of the slab.
   4. Locate control joints in relationship to stone surfacing unit.
   5. Align joints at the corner of the concrete bands.
   6. Control joints shall be upright and plumb.

C. Curing:
   1. Moisture cure all concrete for a minimum of 7 days, unless approved or specified otherwise.
   2. Curing compound may be used if verified by the surfacing manufacturer's recommendations compatible with subsequent surfacing.
   3. Apply all curing compounds in accordance with the manufacturer's recommendations and in compliance with surfacing manufacturer's recommendations.

D. Form Removal:
   1. Remove all below grade forming materials (i.e.: header and sono tubes); reinforcement blocks to remain.

E. Slab Tolerances:
   1. Bandings: The concrete surface shall be sloped as indicated on the drawings and finished so that the tolerance is 1/8 inch measured as the departure from the testing edge of a 10 foot straight edge held parallel to and in contact with the surface.

3.6 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete and control jointing concrete not conforming to required lines, details, dimensions, tolerances or specified requirements shall be removed and replaced at no additional cost to the Project Engineer.

B. Replacement of defective concrete will be determined by the Project Engineer.

END OF SECTION

SECTION 03 60 00 – GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Non-shrink non-metallic grout and repair mortar.

B. Related Sections:
   1. Section 05 50 00 - Metal Fabrications: Installation of grout and anchoring cement for metal fabrications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM) C827, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1, Shop Drawings, Product Data and Samples.

B. Product Data: Submit copies of manufacturer's product information on grout and repair mortar materials.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not place grout when temperature or humidity will affect the performance or appearance of the grout.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers of Non-Shrink Grout:
   1. Burke Company, San Mateo, CA, 800/423-9140 or 800/348-7601; or Portland, OR, 503/287-4151.
   2. Concrete Products, Inc., Woodland, CA, 916/666-3633.
   3. Dayton Superior.
   4. The Euclid Chemical Co.
   5. Fosroc Inc.
   6. A.C. Hom, North Bergen, NJ, 201/866-9307; Portland, OR, 503/245-1961.
   7. Master Builders, Cleveland, OH, 216/831-5500.
   8. Set Products, Inc.
   9. Sika Corp., Lyndhurst, NJ, 201/933-8800.
   10. Sonnebom Building Products Division, Rexnord Chemical Products, Minneapolis, MN, 612/835-3434.
   11. Thoro System Products, Miami, FL, 305/592-2081; Beaverton, OR, 503/640-3118.

END OF SECTION

DIVISION 04

MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, material, and equipment required for the installation of all brick masonry units and in locations and as detailed on the Drawings. Include sealing, graffiti-proofing and waterproofing masonry walls.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A36, Structural Steel
   2. ASTM A615, Deformed and Plain Billet Steel Bars for Concrete Reinforcement
   3. ASTM C144, Aggregate for Masonry Mortar
   4. ASTM C150, Portland Cement
   5. ASTM C207, Hydrated Lime for Masonry Purposes
   6. ASTM C216, Facing Brick (Solid Masonry Units Made From Clay or Shale)
   7. ASTM C270, Mortar For Unit Masonry

B. Brick Institute of America (BIA), Technical Notes on Brick Construction.

C. Structural Clay Products Institute.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1, Shop Drawings, Product Data and Samples.

B. Samples: Submit brick samples to Project Engineer showing complete range of color and surface texture. Only brick approved in writing shall be used.

1.4 QUALITY ASSURANCE

A. Mock-Ups:
   1. The first 10 s.f. of wall facing erected on the job may be used as sample wall to remain if approved. Remove and replace if disapproved.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Palletize masonry units to facilitate handling and storage on site and to protect from damage. Cover stacks at plant with a waterproof protective covering and maintain in place during transportation and storage. Keep brick clean and uncontaminated.

B. Keep bagged materials dry, protected from weather damage and with complete labels and identification on wrappings. Store aggregates in bins or piles on platforms out of mud and water, sheltered from weather. Remove and discard all damaged and contaminated material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cap:
   1. Pre-manufactured cast concrete cap as shown in drawings.
   2. Manufacturer: Stepstone, https://www.stepstoneinc.com, 800-572-9029

3. Product: Square Modular Wall Cap
4. Size:13-1/4” x 24” x 3-3/8”
5. Color: 1804 French Gray

B. Bricks:
1. Pre-manufactured wall bricks as shown in drawings.
2. Manufacturer: Mutual Materials, www.mutualmaterials.com, 1-888-688-8250
3. Product: Stocking Brick
4. Color: Coal Creek
5. Provide brick “solids” where detailed and as required where wide face is exposed.

C. Mortar: ASTM C270, Type S, 2000 psi.
1. Lime: Miracle Lime, ASTM4 C207.
2. Cement: ASTM C150, Type 1, light color.
3. Sand: Masons Sand, ASTM C144.
4. Brick mortar to be colored with non-fading mortar color, “Frank Davis” or Grace “Staybrite” color to match color as selected by Project Engineer.

D. Weep Holes: 1/4" white PVC tubing or oiled sash cord to form weep holes.

E. Brick Anchors: Galvanized adjustable wire ties, 3/16" diameter wire by the length necessary to anchor in mortar joint a minimum of 2". 1/4" diameter wire ties required for cavity space 2" or more between back face of brick and structural support. Brick anchor accessories by Hohmann & Barnard, Inc. adjustable wire veneer and back-up anchors, Type 315 12 gauge dovetail tie (concrete wall), Truss-Box mesh 165 (concrete unit masonry wall), Byna-Tie, Seis-a-clip, and continuous wire at each anchor location.

F. Reinforcing: Deformed steel bars conforming to ASTM A615, Grade 60. “Dur-O-Wal” and “Krimp-Lock” fabricated reinforcing. Structural steel linters and anchors of galvanized standard rolled section of size and weight as detailed, ASTM A36.

G. Masonry Water Seal:
1. Polysiloxane compound of oligomeric alkylalkoxy siloxane and water. Minimum siloxane solids to be 6% by volume.
2. Approved Products: Hydrozo “Enviroseal Double 7,” Hydrozo “Enviropel Plus,” Tammstech “Baracade M.E./9,” Unitex “2001 VOC,” and ProSoCo “Sure Klean Weather Seal Siloxane.”

H. Graffiti Protection: ProSoCo “Defacer Eraser SC-1” water base sacrificial anti-graffiti coating.

PART 3 - EXECUTION

3.1 INSTALLATION OF MASONRY UNITS

A. All work shall be performed in an accurate manner by mechanics skilled in laying masonry units. All items laid true and plumb with joints in perfect alignment. Units to be laid in full mortar beds, free of voids. Joints finished with a concave edge steel jointer tool, compacting the mortar to a dense smooth surface.

B. Inspect all surfaces supporting or joining masonry work, and report unsatisfactory conditions to Project Engineer for decision. Starting work indicates acceptance of surfaces by the Contractor. Do not lay masonry on frozen, frosted or water-saturated surfaces.

C. Provide approved method to maintain temperature above 40° F. in materials and work performed during freezing weather and protect from frost for minimum of 48 hours. Protect uncompleted work and

working surfaces from rain, work only under approved shelter when raining, and provide shade and water sprays as required to prevent rapid drying out in hot weather.

D. Measure materials accurately for each batch in conformance with approved mix design. Mix for at least five minutes in a mechanical batch mixer. Hand mixing not permitted without specific approval of Project Engineer. Use all mortar and grout within 2-1/2 hours after initial mixing and discard earlier if set has begun.

E. Brick Anchors:
   1. Provide approved anchors in compliance with UBC and not less than 24" o.c. spacing. Provide additional ties as required.
   2. Ties shall slope down and out not over 10' from horizontal, to divert water to outside, be of proper size for each installation and kept 5/8" minimum back of exposed masonry face.

F. Building-In and Setting Other Work: Built-in anchors, accessories, and work of other trades where installed in or supported by masonry, locating accurately by dimension or template.

G. Masonry Bond and Joints:
   1. Pre-wet brick to control rate of suction at time of laying to not exceed .025 oz. per square inch.
   2. Use standard running bond with all stretcher units unless otherwise detailed or required at cavity walls. Maintain regular modular dimensions horizontally and vertically with coursing as detailed. Cut all face units where required to maintain regular pattern except no units less than half a brick long without approval.
   3. Lay units with full head and bed joints and units shoved into place. Fully embed both surfaces of flashing in mortar within joints. Tool and compact exposed face joints to give concave rodded finish.
   4. Stop-off horizontal runs of masonry by racking back half a unit length in each course or in accordance with specified pattern bonds. Relay units that are moved or shifted, after mortar has stiffened, in fresh mortar.
   5. Remove mortar stains with clean water as work progresses. Protect all sills, ledges, offsets, and other projections from mortar and grout droppings.
   6. Upon completion of work, clean all exposed surfaces using methods and procedures as recommended by the Structural Clay Products Institute and the brick manufacturer.

H. Protection and Curing: Furnish temporary protection for all exposed masonry comers subject to injury. Protect masonry against too rapid drying by fogging or sprinkling thoroughly and often enough to properly cure the work.

I. Protecting Adjacent Work and Surfaces: Cover or mask with strong protective covering. Clean up spilled mortar and materials as required to prevent tracking into and damage to other areas. Repair damage to adjacent surfaces caused by masonry work.

3.2 INSTALLATION OF FLATWORK BRICK

A. All work shall be performed in an accurate manner by mechanics skilled in laying flatwork masonry units. All laid items laid true and parallel to referenced lined detailed in the drawings. All grades true and sloped for positive drainage.

B. Units shall be laid in thinset mortar bed but jointed, sand-swept. The finish surface shall be a smooth continual plan. Tolerance for vertical surface variation shall not exceed 1/8”.

C. Inspect flatwork surfaces and report unsatisfactory conditions prior to the installation of brickwork.

D. Provide approved method to maintain temperature above 40° F. up to 40 hours from the time of installation. Protect uncompleted work and completed work from rain and freeze.

E. Brick border and soldier course cut as required on radius borders for uniform butt jointing to match field. Except on units less than half a brick long.

F. Field of brick surfacing shall be standard running bond or herringbone pattern as indicated in drawings.

G. Cut all flat units where required to maintain regular pattern. Except no units less than half a brick long.

H. Discuss, meet and match conditions at all existing thresholds prior to construction. Threshold shall be fully accessible.

3.3 MASONRY SEALING - VERTICAL SURFACES ONLY

A. General: Sealing and graffiti barrier is not required in flatwork.
   1. All work shall be performed by workers skilled and experienced in the application of this coating material.
   2. Sealer to be applied in strict adherence to manufacturer's instructions.
   3. All material shall be delivered to the job site in original containers with labels and seals unbroken.
   4. Protect all adjacent surfaces from damage and contamination.

B. Restrictions:
   1. Do not apply on surfaces which have been wet or rained on during four preceding days or if rain is anticipated within twelve hours after application.
   2. Do not apply sealer to frost filled surfaces or when the temperature falls below 40' F.
   3. Do not apply sealer to non-absorbent materials such as glass, metal, glazed brick, or glazed tile.

C. Cleaning and Testing:
   1. Clean masonry additionally to remove all traces of dirt, mortar stains, and efflorescence. Use only cleaners recommended by sealer manufacturer. Do not use caustic or alkaline type cleaners.
   2. Test masonry for proper dryness as recommended by sealer manufacturer, and defer application of sealer until conditions are acceptable.

D. Application: Apply a light fogging spray to thoroughly wet the wall to break the surface tension. Follow immediately with the flood coat to achieve the deep penetration required for water repellence. Apply the flood coat with uniform, overlapping, horizontal strokes, and sufficient material saturation to cause an 8" to 10" rundown from the point of contact. Fully saturate all mortar joints.

3.4 CLEANING

A. Remove waste and excess material from site. Do not dump excess mortar and wash from mixer on the site. Leave grounds, pavements, and buildings areas clean. Protect flatwork from fertilizer over-spray.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. The extent of rock setting includes subgrade adjustment, base course installation, and rock placement, as shown on drawings.

B. Related sections:
   1. Section 31 10 00 - Site Clearing & Tree Protection
   2. Section 31 20 00 - Earthwork
   3. Section 32 32 00 - Drystack Rockery

C. Drawings, general provisions of the Contract, and Division-1 Specification Section apply to this section.

D. Qualifications:
   1. Stone placement shall be executed by a qualified and experienced firm. Defined as experience not less than 8 years of stone placement and in ownership of appropriate machinery to load, set and shift stone as described in Section 2.1 Materials.

PART 2 - PRODUCTS

2.1 LANDSCAPE STONES

A. Salvaged boulders from the project site where shown in the drawings.

B. New Stones:
   1. Pre-selected stones of weathered Bandera granite composition, located at Marenakos Select Rock, 30250 S.E. Highpoint Way, Issaquah, WA 98037 (206) 392-3313 / 222-5123 / (Fax) 222-7292. Stone sizes range vary from:

Rock Size	Weight
Small to large three man	700 - 2,000 lbs.
Small to large four man	2,000 - 4,000 lbs.
Five man	4,000 - 6,000 lbs.

   2. Stones matching the general size and shape as shown in the drawing per the approval of the Project Representative. Contractor is responsible for purchase, shipping, and placement of the stones. Designated stones shall be placed as spotted and approved on site by the Project Representative.
   3. Designated stones slated for special handling may be selected at Marenakos per the direction of the Project Engineer. Contractor is responsible for purchase, shipping, and placement of the stones. Designated stones shall be placed as spotted and approved on site by the Project Engineer.

PART 3 - EXECUTION

3.1 PLACEMENT

A. The placement of the stones shall be supervised by the Project Engineer for on site approval of vertical lines, location and face. Contractor shall follow general guidelines for stone placement, but expect alterations and placement adjustments. No stones should show a recent fractured surface; all fractured surfaces should either be covered with soil, or have other stone set adjacent to them.

3.2 INTENT

A. The stones are to appear as though blending in with the soil and environs adjacent to it. The stone is not to appear “perched” or sitting on top of the soil. Rock composition should not feel too tight, it should feel spread out. It is expected to have a preponderance of rock in one areas, then 2 or 3 stones pulled away (refer to the drawings). There will be few, vertical accents. The majority of the stones should appear flat and finished surface ± 18" or seat height.

3.3 LANDSCAPE STONES

A. The minimum a rock will be buried is 1/4 and as a rule 1/3 to 1/2 on compacted base to prevent settling. Each stone shall be water settled. Setting base should be brought up to subgrade with well draining structural fill material. Adjacent subgrade around the rocks shall be 1' for the inclusion of good topsoil around these stones.

END OF SECTION

DIVISION 05

METALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Examine Drawings for required items and furnish in sizes, number, and kind to complete the Work.
   2. Shop fabricate miscellaneous steel, including custom center plates brackets, railings, angles, anchors, supports, or other items shown on Drawings for support or connection of other Work.
   3. Furnish items to other trades when setting and installation is part of their Work.

B. Related Sections:
   1. 06 20 00 – Finish Carpentry

1.2 REFERENCES

A. American Institute of Steel Construction (AISC).

B. American Society for Testing and Materials (ASTM) A36, Structural Steel.

C. The American Welding Society (AWS).

D. Steel Structures Painting Council (SSPC).

1.3 SUBMITTALS

A. Submit the following in accordance with WSDOT Standard Specifications, Shop Drawings, Product Data and Samples.

B. Shop Drawings: Submit Shop Drawings for review by the Project Engineer before fabrication. Cross reference shop drawing details to detail numbers on the Drawings to facilitate checking. Submit Shop Drawing for handrails for Project Engineer's approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Steel –
   1. Handrails and posts
      a. 1-1/2" Dia. galvanized steel
      b. Per plans and details
   2. Boardwalk guardrail posts
   3. Shelter supports
   4. Shelter roof panel

B. Stainless steel – Cable Rail
   1. Manufacturer: Jakob Rope Systems, Jakob-usa.com, 561-330-6502 or alternate
   2. Product: Stainless steel cable, fittings, and hardware
   3. Stainless steel cable: 8mm 6x7 W+C, Per manufacturer system

C. Corten Steel – Guardrail panels
   1. Manufacturer: Revamp, revamppanels.com, 509-919-0460
   2. Panels per drawings and details.

2.2 FABRICATION

A. Examine Drawings for required items and furnish in sizes, number and kind to complete the Work.

B. Cut shapes to pattern, sizes, and dimensions as detailed and approved. Punch and drill holes accurately, maintaining proper edge and end clearance and proper diameter to fit each fastening-

C. Furnish and shop assemble all items true to measurements taken at the job, disassembled and ship to the job, complete with all sleeves, bolts, etc., necessary for erection.

D. Mark each member or assembly of members with erection marks for identification; furnish an erection diagram. Ship assembled units in such a manner that they may be transported and unloaded without being excessively stressed, deformed or otherwise damaged. Place fabricated material on skids, off the ground, keep clean and properly drained.

E. All welding performed by Certified Welders (WABO certification) and in accordance with AWS DI.I. Grind welds on architecturally exposed items to make smooth and flush, ready for prime/paint.

F. Grind exposed ends and cut edge of all items smooth and slightly beveled to remove sharpness, burrs, and cutting marks. Use gas cutting torch in the field to cut holes or correct fabrication errors only after submitting each condition to Project Engineer for review.

PART 3 - EXECUTION

3.1 ERECTION

A. Furnish items to other trades when setting and installation is part of their Work.

B. Do not set permanent bolting or welding until as much of the assembly as will be stiffened thereby has been properly aligned and within tolerances.

C. Set steel elements accurately to the lines and elevations indicated. Align and adjust the various members before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

D. At completion of erection, grind exposed welds smooth, touch-up paint field bolts and welds and abrasions with the same paint used for shop painting or zinc-rich paint on galvanized items.

END OF SECTION

DIVISION 06

WOOD, PLASTICS, & COMPOSITES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Wood kiosks / signs
   2. Wood railing
   3. Shelter cladding

B. The following sections contain requirements that relate to this Section:
   1. Section 03 30 00 - Concrete (for footings associated with wood fabrications)

1.2 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract, and Division-1 Specification sections, apply to this section.

1.3 SUBMITTALS

A. Product data for each type of factory-fabricated product and process specified, including details of construction relative to materials, dimensions of individual components, profiles, textures and colors.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicated type of preservative used, net amount of preservative retained and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

B. Samples for verification purposes of the following:
   1. For each species and cut of lumber without a factory-applied finish, provide a 6" length sample.
   2. For each finish system and color of lumber and without a factory-applied finish, provide a 6" length sample with specified finish.

1.4 QUALITY ASSURANCE

A. Uniform Building Code 1997 Edition.

B. Minimum Quality Standard: Architectural Woodwork Institute (AWI) Quality Standards, 6th Edition, Version 1.1, 1994:
   1. Grade: Custom unless indicated otherwise.
   2. Installation of finish carpentry by a firm that can demonstrate successful experience in installing finish carpentry items similar in type and quality to those required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

B. If finish carpentry must be stored in other than installation areas, store only in areas where environmental condition meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Obtain and comply with woodwork fabricator's advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork will be within optimum moisture content at date of construction.

B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
   2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements and other related units of Work specified to ensure that woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber Standards: Comply with DOC PS 20, AWI standards and grades and other rules noted:
   1. Source lumber from FSC certified sources providing FSC certified wood products.
   2. Provide lumber dressed on all exposed faces, unless otherwise indicated.
   3. Do not use twisted, warped, bowed or otherwise defective lumber.
   4. Sizes indicated are nominal, unless otherwise indicated.
   5. Do not mark or color lumber, except where such marking will be concealed in finish work.
   6. Softwood: Comply with NBS PS 20 and AWI grading rules.
   7. Hardwood: Comply with AWI grading rules.
   8. Moisture Content: Not greater than that required by applicable grading rules; provide kiln-dried lumber.

B. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
   1. For exposed lumber furnish pieces with grade stamps applied to ends or back o each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Water-Repellent Preservative Treatment by Non-pressure Process: AWPA N1.
   1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC).
   2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
   3. Application: Exterior standing and running trim, rails and sills.

2.3 WOOD APPLICATIONS

A. Hardwood Lumber Trim for Transparent Finish (Stain Custom Finish): Clear, kiln-dried finished lumber (S4S) or as otherwise noted on drawings.
   1. Species: As noted on drawings, solid lumber stock.
   2. Cut: Plain sliced.
   3. Texture: Surfaced (smooth).

B. Refer to Project Drawings for locations of stained and painted (opaque) finished wood.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
   1. Countersink nails, fill surface flush, and sand where face nailing is unavoidable.

B. Fasteners for Exterior Finish Carpentry: Provide nails or screws of the following materials, in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer:
   1. Hot-dip galvanized steel.

C. Adhesives: Comply with manufacturer's recommendations for adhesives.

D. Wood Filler for Transparent Finish Woodwork: Match final finish color.

E. Sealants: Comply with requirements in Division 7, Section "Joint Sealants" for materials required for siding work.

F. Coat hardware in contact with metals of dissimilar galvanic range. Use primer and body coats of asphaltic paint.

2.5 FABRICATION

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry in relation to relative humidity conditions existing during tie of fabrication and in installation areas. Provide finish carpentry with moisture content that is compatible with project requirements.

B. Fabricate finish carpentry to dimensions, profile and details indicated. Ease edges to radius indicated for the following:
   1. Lumber less than 1 inch in nominal thickness: 1/16 inch.
   2. Lumber 1 inch or more in nominal thickness: 1/8 inch.
   3. Back out or kerf backs of interior standing and running trim, except members with ends exposed in finished work, and except shoe mold and crown mold.

PART 3 - EXECUTION

3.1 Examination

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 Preparation

A. Clean substrates of projections and substances detrimental to application.

B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation for a minimum of 24 hours unless longer conditioning recommended by manufacturer.

C. Prime lumber for exterior applications to be painted, including both faces and edges. Cut top required lengths and prime ends. Comply with requirements in Division 9, Section “Painting”.

3.3 Installation, general

A. Do not use finish carpentry materials that are unsound, warped, bowed, twisted, improperly treated or finished, not adequately seasoned, or too small to fabricate with proper jointing arrangements.
   1. Do not use manufactured units with defective surfaces, sizes or patterns.

B. Install finish carpentry plumb, level, true and aligned with adjacent materials. Use concealed shims where required for alignment.
   1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts and recommended by manufacturer.
   2. Install to tolerance of 1/8 inch in 8 feet for plumb and level. Install adjoining finish carpentry with 1/16 inch maximum offset for flush installation and 1/8 inch maximum offset for reveal installation.
   3. Coordinate finish carpentry with materials and systems that may be in or adjacent to carpentry. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of the structure.
   4. Set nails and stain putty for flush finish. Stain after installation to avoid touch-up.

3.4 Standing and running trim and rails

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim and rails. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane back of casings to provide uniform thickness across joints if required.
   1. Match color and grain pattern across joints.

3.5 Adjusting

A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

B. Touch-up and Final Finishing: Complete specified shop finish. Provide field touch-up with same materials.

3.6 Cleaning

A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 Protection

A. Provide final protection and maintain conditions that ensure finish carpentry is without damage, or deterioration at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The CONTRACTOR shall furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.2 REFERENCES

A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.
   1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods:
   2. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
   3. ASTM D 732 Shear Strength of Plastics by Punch Tool
   4. ASTM E 84 Surface Burning Characteristics of Building Materials

1.3 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall furnish shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.

B. The CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.

C. The CONTRACTOR shall submit the manufacturer’s published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.

D. The CONTRACTOR may be requested to submit sample pieces of each item specified herein for acceptance by the Project Engineer as to quality and color. Sample pieces shall be manufactured by the method to be used in the WORK.

1.4 QUALITY ASSURANCE

A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.

B. Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.

C. Manufacturer shall be certified to the ISO 9001-2000 standard.

D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for it’s facilities or products (UL, DNV, ABS, USCG, AARR).

1.5 PRODUCT DELIVERY AND STORAGE

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.

B. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Pultruded grating shall be Safe-T-Span® as manufactured by:
   1. Fibergrate Composite Structures Inc.
      5151 Belt Line Road, Suite 700
      Dallas, Texas 75254-7028 USA
      (800) 527-4043 (972) 250-1530 Fax

2.2 GENERAL

A. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.

B. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.

C. Resins shall be {VINYL ESTER *or* ISOPHTHALIC - *choose one*} with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.

D. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.

E. All pultruded structural shapes shall be further protected from ultraviolet (UV) light with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to help produce a resin rich surface.

F. All FRP products shall have a tested flame spread rating of 15 or less per ASTM E-84 Tunnel Test. Gratings shall also have a tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10 millimeters per ASTM D635.

G. All grating clips shall be manufactured of Type 316SS (stainless steel).

2.3 PULTRUDED GRATING

A. Manufacture: Grating components shall be high strength and high stiffness pultruded elements having a maximum of 70% and a minimum of 60% glass content (by weight) of continuous roving and continuous strand mat fiberglass reinforcements. The finished surface of the product shall be provided with a

surfacing veil to provide a resin rich surface which improves corrosion resistance and resistance to ultraviolet degradation. Bearing bars shall be interlocked and epoxied in place with a two piece cross rod system to provide a mechanical and chemical lock. Cross rods should be below the walking surface of the grating. Gratings with cross rods that are flush with the walking surface are excluded.

B. Non-slip surfacing: Grating shall be provided with a silica sand grit bonded and baked to the top surface of the finished grating product.

C. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Manufacturer may be required to provide certification of ASTM E84 test on grating panels from an independent testing laboratory. Test data shall be from full scale testing of actual production grating, of the same type and material supplied on the project. Test data performed only on the base resin shall not be acceptable.

D. Resin system: The resin system used in the manufacture of the grating shall be {VEFR, VINYL ESTER *or* ISOFR, ISOPHTHALIC - *choose one*}. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments. Corrosion resistance data of the base resin from the manufacturer is not a true indicator of grating corrosion resistance and shall not be accepted.

E. Color: Dark Gray – confirm color chart with Project Engineer.

F. Depth: 1.5" deep load bars with a tolerance of plus or minus 1/32".

G. Mesh Configuration: 2" load bar spacing, 12" tie bar spacing on centers. Grating shall be SAFE-T-SPAN® T2515V *or* T2515I as manufactured by Fibergrate Composite Structures Incorporated

H. Load/Deflection: Grating shall meet manufacturers published safe recommended loadings with deflection not to exceed the following:
   1. Uniform distributed load over a 54" span: 50 pounds per square foot, with a maximum deflection of 0.11".

I. Substitutions: Other products of equal strength, stiffness, corrosion resistance and overall quality may be submitted with the proper supporting data to the Project Engineer for approval.

2.4 GRATING FABRICATION

A. Measurements: Grating supplied shall meet the minimum dimensional requirements as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work. Determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.

B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating supports shall be provided at openings in the grating by contractor where necessary to meet load/deflection requirements specified herein. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.

C. Sealing: All shop fabricated grating cuts shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.

D. Hardware: Type 316 stainless steel hold-down clips shall be provided and spaced at a maximum of four feet apart with a minimum of four per piece of grating, or as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

A. Shop inspection is authorized as required by the Project Engineer and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided.

B. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits.

3.2 INSTALLATION

A. Contractor shall install gratings in accordance with manufacturer’s assembly drawings. Lock grating panels securely in place with hold-down fasteners as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

END OF SECTION

DIVISION 31

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section includes:
   1. General site grading
   2. Earthwork for structures and utilities

1.2 STANDARD SPECIFICATIONS

A. All work to be performed and materials to be used shall be in accordance with the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), unless otherwise indicated herein.

B. The Contractor shall have one copy of the Standard Specifications at the job site.

C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

1.3 QUALITY ASSURANCE

A. Soil Testing
   1. The Project Engineer will engage a Geotechnical Consultant to test soil materials proposed for use in the work and for quality control testing during excavation and fill operations.
   2. Samples of materials shall be furnished to the Geotechnical Consultant by the Contractor at least one week before their anticipated use.
   3. Under this contract, smooth out areas for density tests and otherwise facilitate testing work as directed.

1.4 EXISTING CONDITIONS

A. Site Information: Subsurface conditions were investigated by Associated Earth Sciences, Inc. Their report and any other available data is included in the Basis of Design.

PART 2 - PRODUCTS

2.1 STRUCTURAL FILL

A. Structural fill shall be on-site or imported well graded granular material free of organics and debris. Maximum particle size 4 inches and no more than 5 percent fines (material passing No. 200 sieve).

2.2 NONSTRUCTURAL FILL

A. Nonstructural fill shall be on-site or imported well-graded granular material free of organics and debris. Maximum particle size 4 inches and no more than 30 percent fines (material passing No. 200 sieve). Material shall be capable of being compacted as specified under the weather conditions prevailing at time of construction.

2.3 GRAVEL BACKFILL FOR PIPE ZONE BEDDING

A. Gravel backfill for pipe zone bedding shall conform with Section 9-03.12(3) of the WSDOT Standard Specifications.

2.4 SAND

A. Sand shall conform with Section 9-03.13 of the WSDOT Standard Specifications.

2.5 GRAVEL BACKFILL FOR DRAINS

A. Gravel backfill for drains shall conform to Section 9-03.12(4) of the WSDOT Standard Specifications.

2.6 QUARRY SPALLS

A. Quarry spalls shall be crushed quarry rock. Spalls shall be hard, sound and unweathered. Quarry spalls shall meet the following gradation requirements:

Sieve Size	Percent Passing
6-inch	100
3-inch	40 max.
3/4-inch	10 max.

2.7 TRAIL SURFACE

A. Trail surface shall conform with guidelines provided in the geotechnical report.

2.8 BASE COURSE

A. Base course shall conform with the requirements for crushed surfacing top course as specified in Section 9-03.9(3) of the WSDOT Standard Specifications.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Project Engineer. Unauthorized excavation, as well as remedial work directed by the Project Engineer, shall be at no change in contract amount.
   1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with CDF or lean mix concrete. The bottom width of the excavation shall be defined by a line extending downward and out from the outer edge of the footing at an angle of 1H:1V.
   2. Elsewhere, backfill and compact unauthorized excavations with structural fill as specified herein.

B. Overexcavation: In certain areas where soft spots occur in the subgrade, satisfactory sub-grade shall be achieved by overexcavation and replacement with structural fill material or lean mix concrete.
   1. Location and extent of soft spot areas to be verified by Project Engineer's Geotechnical Consultant in the field.

C. Stability of Excavations: Slope the sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or

stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

D. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
   1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
   2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure to convey water. Do not use trench excavations as temporary drainage ditches.

E. Material Storage: Stockpile excavated materials as required. Place, grade, shape and cover stockpiles for proper drainage and to prevent accumulation of excess moisture.
   1. Locate and retain soil materials away from edge of excavations.
   2. Dispose of excess soil material and waste materials legally off-site.

F. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown within a tolerance of plus or minus 0.10-foot.

G. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10-foot.

H. Excavation for Trenches
   1. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations.
   2. Where rock is encountered, carry the excavation 6 inches below the required elevation and backfill with a 6-inch layer of structural fill.
   3. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe.

I. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.2 SUBGRADE VERIFICATION

A. Following site preparation and excavation for the building, paved surfaces and roadways, the exposed subgrades shall be observed and approved by the Project Engineer's Geotechnical Consultant.

B. Overexcavate any soft, loose or disturbed soils identified by the Geotechnical Consultant and replace with compacted structural fill.

C. If required by Geotechnical Consultant, provide equipment and labor for proofrolling.

3.3 BACKFILL AND FILL

A. For backfill of all excavations use material sampled and tested by the Project Engineer's Geotechnical Consultant.

B. All fill used for the following shall be structural fill:
   1. Fill beneath footings and foundations.

2. Backfill against footings, foundations and structural walls, except 18 inches of gravel backfill for walls shall be placed immediately adjacent to structures for drainage, unless otherwise shown on the drawings.
3. Fill within 3 feet vertically of the base of pavements.

C. Fill beneath areas to be landscaped shall be nonstructural fill.

D. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Acceptance by Project Engineer of construction below finish grade including, where applicable, waterproofing, dampproofing, piping, conduits and perimeter insulation.
2. Inspection, testing, approval and recording locations of underground piping and conduits. Coordinate locations with surveyor for as-built survey.
3. Removal of concrete formwork.
4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

E. Ground Surface Preparation
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. On existing sloped surfaces, steeper than 1 vertical to 4 horizontal, cut benches into hillsides of 10 feet minimum width and 5 feet maximum height.
2. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to within 2 percent of the optimum moisture content, and compact to required depth and percentage of maximum density.

F. Placement and Compaction: Allowable thickness of fill lifts will depend on the material type and compaction equipment used. In no case place backfill and fill materials in layers more than 8 inches in loose depth for material compacted by heavy compaction equipment, and more than 4 inches in loose depth for material compacted by hand-operated tampers. For fill deeper than 3 feet below the base of pavements, lifts may be 12 inches maximum in loose depth.
1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content.
2. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
3. Do not place backfill or fill material on surfaces muddy, frozen, or containing frost or ice.
4. Place backfill and fill materials in such a manner as to prevent wedging action of backfill against structures.

3.4 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D 1557 ("Modified Proctor"):
1. Structures: Compact top 12 inches of subgrade where exposed, and each layer of backfill or fill material to 95 percent of maximum dry density.
2. Lawn or Unpaved Areas: Compact top 12 inches of subgrade and each layer of backfill or fill material to 85 percent of maximum dry density.
3. Walkways: Compact top 12 inches of subgrade and each layer of backfill or fill material to 95 percent of maximum dry density.

4. Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 95 percent of maximum dry density.
5. Utility Bedding and Backfill: Compact each layer of bedding and backfill to 95 percent of maximum dry density.
6. Granular Fill Placed Against Subgrade Walls: Compact to 90 percent of maximum with small hand-operated equipment to avoid overcompaction.

C. Base course shall be placed and compacted in conformance with Section 4-04.3 of the WSDOT Standard Specifications, except that the base course shall be compacted to 95 percent of the maximum dry density as determined in accordance with ASTM D 1557.

D. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material. Prevent free water from appearing on surface during or subsequent to compaction operations.
1. Remove and replace, or scarify and air dry, soil material too wet to permit compaction to specified density.
2. Soil material removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.5 GRADING

A. General: Uniformly grade areas of work including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

C. Compaction: After grading, compact surfaces to the depth and percentage of maximum density for each area classification.

3.6 WET WEATHER PROVISIONS

A. Schedule earthwork operations to minimize the potential for erosion, siltation, and disturbance of site soils.

B. Perform earthwork operations in discrete areas as required to minimize the exposure of disturbed soils to wet weather.

C. Compact exposed soil to reduce the infiltration of rain water.

D. Direct surface water away from fills and excavations.

E. Provide temporary pumping equipment to keep excavations and construction free of water.

F. Soils that become too wet for compaction shall be removed and replaced with compacted structural fill.

3.7 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport acceptable excess excavated material to temporary stockpile areas on the Owner's property. Remove any unused excess excavated material from the site, and dispose of legally off the Owners property, prior to final inspection.

B. Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of legally off the Owner's property.

3.8 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow Project Engineer's Geotechnical Consultant to observe, test and approve subgrades and fill layers before further construction work is performed.

B. Footings for structures shall be observed by the Geotechnical Consultant for bearing capacity verification prior to concrete placement. Compaction tests shall be performed if in the opinion of the Geotechnical Consultant they are necessary.

C. If subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense.

3.9 PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Protection of existing trees and root structures
   2. Removal of trees and other vegetation
   3. Clearing and grubbing
   4. Removal of existing site improvements

B. Related Sections
   1. Section 02 41 00 - Demolition
   2. Section 31 00 00 - Earthwork

C. Drawings, general provisions of the Contract, and Division-1 Specification sections, apply to this section.

1.2 GENERAL CONSIDERATIONS - SITE ACCESS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties and on Project Engineer's property. Restore damaged improvements to their original condition, as acceptable to authority having jurisdiction without additional cost to the Owner.

C. Salvage of Existing Improvements: Carefully remove items indicated to be salvaged, and store on project premises where indicated or directed.

1.3 PROTECTION OF EXISTING TREES AND VEGETATION

A. The site shall be photographed by the Contractor to document original site conditions. Provide a copy of the photographs to the Project Engineer. The photographs will be used for determination of the extent of restoration required.

B. Prior to commencement of site work, erect and maintain protective fencing around existing trees and vegetation identified by the Project Engineer to be saved. Individual trees shall have protective fencing erected beyond the drip line as indicated on the drawings. Groups of trees and other vegetation shall have protective fencing erected around entire group. Areas within protective fencing shall remain undisturbed and shall not be used for any purpose.

C. Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, foot or vehicular traffic, or parking or vehicles within drip line.

D. Roots will be cleanly cut prior to removal. Provide protection for roots over 1-1/2" diameter cut during construction operations. Temporarily cover exposed roots of existing trees to remain with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

1.4 DAMAGED TREES

A. Any tree which is not ordered removed or provided for removal by the Project Engineer which is destroyed or damaged to the extent that, in the opinion of the Project Engineer, the continued life of the tree is questionable, or which is disfigured by Contractor because of carelessness, negligence, or for any other reason, shall be removed by the Contractor at his own expense. In addition thereto, liquidated damages will be assessed against the Contractor according to rates set by the International Society of Arboriculture and by methods contained within their publication. Where any tree has been removed which has not been ordered removed or provided for removal by Project Engineer, the Project Engineer shall determine cross-section measurement of stump and Contractor shall be assessed damages in accordance with the following chart, with a minimum assessment of $500.00.
   1. Use 'tree caliper' or greatest tree trunk diameter measured 30" above ground.

3/4" to 4 inches	$ 500.00
5 inches	$ 600.00
6 inches	$ 880.00
7 inches	$1,200.00
8 inches	$1,530.00
9 inches	$1,950.00
10 inches	$2,430.00
11 inches	$2,950.00
12 inches	$3,480.00
13 inches	$4,070.00
14 inches	$4,730.00
15 inches	$5,480.00
16 inches	$6,330.00
17 inches	$7,250.00
18 inches	$8,300.00
19 inches and over, use	$ 500.00 per caliper inch
All shrubs	$ 150.00 each

B. Any tree which is not ordered removed or provided for removal by the Project Engineer which is destroyed, damaged or removed as noted above shall be replaced as specified in Paragraph 2.3.

PART 2 - PRODUCTS

2.1 PLANTS

A. See planting plans for trees requiring protection.

2.2 TREE PROTECTION FENCE

A. Install temporary barriers as indicated in plans to protect existing vegetation during the entire period of construction.

2.3 REPLACEMENT MATERIALS

A. All replacement plants shall be of the same variety as damaged or destroyed plant materials they are replacing. All replacement coniferous trees shall be a minimum of 15 feet in height and all replacement deciduous trees shall be a minimum of 3" in caliper, as approved by Project Engineer prior to installation.

B. All replacement plant material will be warranted for a period of one year commencing on the date of installation.

PART 3 - EXECUTION

3.1 PROTECTION OF EXISTING TREES AND VEGETATION

A. Prior to commencing site work, erect and maintain protective fencing around existing trees and vegetation identified by Project Engineer as shown on drawings. Tree protection fencing shall be accepted by the Project Engineer prior to commencing any site work.

B. Individual trees shall have protective fencing beyond the drip line of each tree or as shown on the drawings.

C. Groups of trees and other vegetation shall have protective fencing erected around entire group a minimum of 5' beyond the drip lines of all the trees in the group.

D. Areas within protective fencing, or under canopies of trees, to remain clean of unsightly debris by hand methods only, and may not be used for any purpose, including but not limited to the following:
   1. Parking of construction or other vehicles.
   2. Circulation routes for persons or vehicles of any kind.
   3. Storage of construction materials.
   4. Storage of landscape materials – other than a designated nursery hold area.
   5. Storage of portable toilets.

3.2 REMOVAL OF IMPROVEMENTS

A. Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated. Do not shut off or cap utilities without 72 hours prior notice and approval by the Project Engineer.

B. In the event the Contractor encounters utility lines not shown on the site plan or otherwise indicated to be saved, removed, or abandoned, the location of such lines shall be marked in the field and the Project Engineer notified.

C. Make a vertical saw cut between any existing pavement that is to remain and the portion to be removed.

3.3 EROSION CONTROL

A. Contractor shall provide erosion and sedimentation control facilities as needed to prevent erosion and stop sediment laden waters from leaving the site as shown and recommended and required by City of Seattle's "Best Construction Management Practices 1994".

3.4 DISPOSAL OF WASTE MATERIALS

A. Removal from Site Property: The refuse resulting from clearing and grubbing shall be disposed of by the Contractor in a manner consistent with all government regulations. In no case shall refuse material be left on the project site, shoved onto abutting private properties, or be buried in embankments or trenches on the project site. Debris shall not be deposited in any stream or body of water, or in any street or alley, or upon private property except by written consent of the private property owner. Maintain hauling routes clean and free of any debris resulting from the work of this Section.

B. Recycling: The contractor is encouraged to recycle as appropriate to the scope of work.

END OF SECTION

DIVISION 32

EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Restoration of on-site asphalt damaged by construction.
   2. Restoration of off-site asphalt roads, if damaged by construction.
   3. Penetration through non-structural surfaces for mechanical, irrigation, and electrical work.

B. Related sections:
   1. Section 31 00 00 – Earthwork
   2. Section 32 13 13 – Concrete Paving

C. Drawings, general provisions of the Contract, and Division-1 Specification Sections apply to this section.

1.2 SYSTEM DESCRIPTION

A. This work shall consist of one or more courses of plant mixed asphalt concrete placed on a prepared foundation or base in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross-sections of the existing condition.

B. Asphalt concrete shall be composed of asphalt and aggregate which, with or without the addition of mineral filler and blending sand as may be required, shall be mixed in the proportions specified to provide a homogenous, stable and workable mixture.

1.3 SUBMITTALS

A. Submit mix design for Class B, Hot Mix Asphalt that has been approved for use by the Washington State Department of Transportation within 90 days from the date of this contract.

1.4 QUALITY ASSURANCE

A. Mixing plant to be member of Asphalt Paving Association of Washington and approved by the Project Engineer.

B. Meet all requirements of Regulatory Agencies and obtain all permits and required inspections; pay fees.

1.5 DELIVERY AND HANDLING

A. As applicable to hot mix asphalt.

1.6 PROJECT SITE CONDITIONS

A. Environmental Requirements: In accordance with referenced standard specifications and the following:
   1. Do no paving in rain or when subgrade or base is wet or frozen.
   2. Do not apply tack coats when temperature is below 50 degrees F. or when base is wet.
   3. Apply asphalt concrete paving only when temperature is above 40 degrees F. and when base is dry.

1.7 SEQUENCING/ SCHEDULING

A. Phase-in properly with Project Engineer reviewed/ accepted Progress Schedule.

B. Provide access at all times during construction by phasing construction to allow vehicles to move through area without conflict with construction operations.

1.8 WARRANTY

A. Note that work correction is to include aggregate separation, soft spots, and excess porosity.

B. Repair cracks; repair unsatisfactory elevation irregularities immediately upon notification; replace any paving not draining properly.

PART 2 - PRODUCTS

2.1 GENERAL

A. Comply with "Quality Assurance" provisions, "References", Specifications, and Manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 LIQUID ASPHALT

A. Liquid asphalt for tack coats and treatment of aggregate base shall be grade MC 250.

2.3 ASPHALT PAVEMENT

A. Asphalt concrete Class B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes your acceptance of conditions as satisfactory.
   1. Construction shall conform to the details, dimensions and grades specified. Maximum variations in finished grade of paving shall be +/- 0.05 feet.
   2. All areas to be paved shall be graded and compacted in accordance with Section 31 00 00.

3.2 PREPARATION

A. Protect surrounding areas and surfaces to preclude damage from work of this Section.
   1. Protect work of other trades. Take special care in work adjacent to buildings.
   2. Should any defacement or damage occur, repair or replace as directed.

B. Where existing asphalt concrete pavement is required to be removed, the pavement shall be saw-cut.

C. Adjust all utility surface features such as grates, manholes, and valve boxes to new grades.

3.3 ASPHALT PAVEMENT

A. Joints shall be constructed as indicated on drawings.

B. Surface shall be smooth.

C. Asphalt shall be rolled and compacted flush, even to existing adjacent asphalt.

3.4 CLEANING

A. After completion of paving operations, clean surfaces of excess or spilled asphaltic materials.

B. Do not permit vehicular traffic on asphaltic paving until it has cooled and hardened, and in no case sooner than six hours after placing.

C. Provide barricades and warning devices as required.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all material, labor, services and related items required to complete concrete paving work indicated on drawings and/or specifications. The items of work to be performed shall include but are not necessarily limited to:
   1. Concrete flatwork, slabs, sidewalks, and associated work.

B. Related Sections
   1. Section 03 10 00 – Concrete Formwork
   2. Section 03 20 00 – Concrete Reinforcement
   3. Section 31 00 00 – Earthwork

1.2 REFERENCES

A. This section references the latest revisions of the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail. Other references are as follows:
   1. American Association of State Highway and Transportation Officials (AASHTO) “Standard Specifications for Highway Materials and Methods of Sampling and Testing”

1.3 SUBMITTALS

A. The Contractor shall submit to the Project Engineer materials containing the following information:
   1. Procedures to be used in the construction under this Section with regard to the division of labor and the responsibilities of the Contractor and all sub-contractors involved.
   2. Furnish samples, manufacturer's product data, test reports, and materials certifications for Portland cement products, expansion joint materials, fillers, sealants, etc.
   3. Provide mock-up of concrete finishes, colors, and joints on a sheet of plywood, minimum 48 inches square. Concrete mock up shall be provided for the Project Engineer’s review a minimum of 48 hours in advance of concrete delivery.

1.4 QUALITY ASSURANCE

A. The Contractor shall provide, at the request of the Project Engineer, original supplier invoices for concrete. Concrete found not to be consistent with these specifications shall be removed from the project site(s) unless otherwise approved by the Project Engineer. The Project Engineer may copy the original invoices and then return them to the Contractor in a timely manner.

B. Prior to commencing the work of this Section, the Contractor shall verify the accuracy of layout and grading. Verify that all sub-grade and base course aggregate conditions are as specified. Notify the Project Engineer of any discrepancies and coordinate the correction of those discrepancies with other trades as necessary.

C. Notify Project Engineer a minimum of 48 hours prior to any concrete pour for inspection of base course aggregates, forms, reinforcing steel, and placement of joint materials. Anticipate pours to provide adequate time for inspection without causing delays to other trades.

D. Protect all finished work. Vandalized work will be rejected by the Project Engineer and repaired/replaced by the Contractor at their expense, as directed by the Project Engineer.

PART 2 - PRODUCTS

2.1 CONCRETE TYPE. SEE PLANS FOR LOCATIONS.

A. CIP Concrete
   1. Color: None
   2. Finish: Light broom finish

2.2 CONCRETE MIX

A. Concrete mix shall be Class 5 (3/4) and have characteristics as follows:
   1. 28 day compressive strength 2,300 psi
   2. 94# Sacks Cement per Cubic Yard (see "Cement", below) 5
   3. dry Fine Aggregate (Type 2) (see "Aggregates", below) 291 lb. per sack
   4. dry Coarse Aggregate (Type 5) (see "Aggregates", below) 387 lb. per sack
   5. Max. Water 6.5 gal. per sack
   6. Fiberous Reinforcement 1.5 lb. per CY
   7. Slump (per ASTM C143) 2 - 3.5 inches

2.3 PORTLAND CEMENT

A. Use only Type II Portland Cement, as specified in City of Newcastle Public Works Standards (most recent edition), and AASHTO M 85.

2.4 AGGREGATES

A. Fine Aggregate shall be Mineral Aggregate Type 2. Fine Aggregates shall consist of sand or other inert materials, or combinations thereof, having hard, strong, durable particles, free from an adherent coating. The Fine Aggregate shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious matter. Mineral Aggregate Type 2 Particle Gradation shall be as follows:

Sieve Size	% Passing
#4	95 - 100
#8	68 - 86
#16	47 - 65
#30	27 - 42
#50	9 - 20
#100	0 - 7
#200 (wet)	0 - 2.5

B. Coarse Aggregate shall be Coarse Aggregate Type 5, per the City of Newcastle Public Works Standards (most recent edition). Coarse Aggregate shall consist of gravel, crushed stone, or other inert material or combination thereof having hard, strong, and durable pieces free from adherent coatings. Coarse Aggregate shall be washed to thoroughly remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious material. Mineral Aggregate Type 5 Particle Gradation shall be as follows:

Sieve Size	% Passing
1" Square	100
3/4" Square	80 - 100
3/8" Square	10 - 40
#4	0 -4
#200	0 -0.5

2.5 FORMS

A. Forms shall be made of steel, wood, or other suitable materials and shall be of size and strength to resist movement during concrete placement. Use straight forms, free of defects. Use flexible spring steel forms or laminated boards to form curved edges if specified.

2.6 STEEL REINFORCEMENT

A. Welded wire mesh to be furnished in flat sheets not rolls, unless otherwise specified or approved.

B. Steel reinforcement bar.

2.7 EXPANSION JOINT MATERIALS

A. Joint Filler: Pre-formed non-extruding resilient material; ASTM D1752, Type I, 3/8 inch wide by depth required to bring top surface within 1/2 inch of slab surface.

B. Joint Sealer: Self-leveling polyurethane; ASTM C920, Type M, Grade SL, Class 25 (color shall match concrete color).

2.8 CURING MATERIALS

A. Curing shall be per City of Newcastle Public Works Standards (most recent edition), or, as approved by the Project Engineer.

2.9 UTILITY SLEEVES

A. Refer to the drawings and details for the locations of sleeves under paving. Sleeves shall be installed prior to placement of paving and shall be done as follows:
   1. Sleeves required for utility lines located under paving (pathways and service roads within the park site) where vehicles are anticipated, shall be, Schedule 40 PVC or better. The inside diameter (I.D.) of the sleeve shall be twice (2 times) the outside diameter (O.D.) of the inserted pipe with a maximum of one (1) insert pipe per sleeve. All wiring shall be in its own separate Schedule 40 PVC sleeve, independent from the piping sleeves.
   2. Sleeves under roadways (street rights-of-way, boulevards or parkways) where heavy vehicular traffic is anticipated, shall be ductile iron pipe. The inside diameter (I.D.) of the sleeve shall be at least twice (2 times) the outside diameter (O.D.) of the total inserted pipes with multiple pipes inserted per sleeve (only as directed by the Project Engineer). All wiring shall be in separate Schedule 80 PVC electrical conduit (min. 2” O.D.) within the ductile iron pipe.
   3. All sleeves shall be inspected and approved by the Project Engineer after forms are set and before paving operations are executed.

PART 3 - EXECUTION

3.1 BARRIERS

A. The Contractor shall erect and maintain barricades, canopies, guards, lights and warning signs to the extent required by law and as is prudent for the protection of the public and protection of the work.

3.2 FORM CONSTRUCTION

A. Set forms to required grades and alignments rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:
   1. Top of forms not more than 1/8” in 10 feet.
   2. Vertical faces, on longitudinal axis, not more than 1/4" in 10 feet.

C. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

3.3 REINFORCEMENT

A. Locate and place reinforcement as indicated on the contract drawings. Support reinforcing steel or wire fabric with pre-cast concrete blocks at spacing that will ensure minimum deflection of the reinforcement.

B. Concrete Architected Reinforcing Fibers (Optional for slabs only instead of or in conjunction with steel reinforcement where vehicle traffic is anticipated): Add reinforcing fibers to concrete mix per manufacturer's instructions for specified comprehensive concrete strength.

3.4 UTILITY SLEEVES

A. Pipe trenches located under areas of existing or new paving shall have sleeves installed. Sleeves shall extend 12” beyond the pavement on each side. Trenches shall be back-filled with sand (6 inches above and 4 inches below the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in firm unyielding condition. All trenches shall be left flush with the adjoining grade. The Contractor shall set in place; cap and pressure test all piping under paving prior to paving work.

B. All sleeves installed by the Contractor prior to and during the installation of the rest of the irrigation system shall be inspected by the Project Engineer.

3.5 CONCRETE PLACEMENT

A. Do not place concrete until sub-base, forms, and reinforcement have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at time concrete is placed.

B. The concrete shall be placed and spread uniformly between the forms and thoroughly compacted with a steel shod strike-board.

C. After the concrete has been thoroughly compacted and leveled, it shall be floated with wood floats and finished at the proper time with a metal float.

3.6 JOINTS

A. All Joints shall be edged with a quarter-inch (1/4") radius edger, and sidewalk edges with a half-inch (1/2") radius edger or saw cut as directed by the Project Engineer in the field.

B. Expansion Joint placement shall be 10' to 15' spacing (with no more than approx. 200 square feet or pavement between expansion joints), with control joint spacing equal and alternating in between. Provide Joints as shown on the Contract Drawings or as directed by the Project Engineer in the field.

C. Provide Expansion Joints, dividing the concrete areas as indicated on the Drawings:
   1. Provide pre-molded 3/8” joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects as applicable or as indicated in the Contract Drawings.

2. Expansion Joints shall be located and placed according to the Contract Drawings, and sufficiently supported to ensure final placement perpendicular to the finished surface of the pavement.
3. Extend joint fillers full width and depth of joint and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after concrete has been placed on both sides of joint before sealant is applied.

D. Provide Control Joints, dividing the concrete areas as indicated on the Drawings.
1. Form Control Joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
2. Saw Control Joints into hardened concrete using power saws equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

3.7 CONCRETE FINISHING

A. After striking off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface irregularities, and refloat repaired area to provide a continuous smooth finish.

B. After completion of floating and trowelling when excess moisture or surface sheen has disappeared, complete finishing as follows:
1. Light broom finish, by drawing fine hair broom across concrete surface, perpendicular to line of traffic after the tooled grid is installed. The Project Engineer's decision will be final on acceptance of joint finishing details and surface finishes.

3.8 CURING

A. Protect and cure finished concrete paving, complying with applicable requirements of the References specified in this Section. Use only pre-approved curing and sealing compound or moisture curing method.

3.9 CLEAN-UP

A. Repair and replace broken or defective concrete as directed by the Project Engineer.

B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least fourteen (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.

C. Sweep concrete pavement and wash free of stains, discoloration, dirt and other foreign material just prior to final inspection.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. All labor, material, and equipment required for the installation of concrete pavers in location shown on the Drawings.

B. Related sections:
   1. Section 32 13 13 – Concrete Paving
   2. Section 32 12 16 – Asphalt Paving
   3. Section 31 00 00 – Earthwork

C. Drawings, general provisions of the Contract, and Division-1 Specification Sections apply to this section.

1.2 REFERENCES

A. American society for Testing Materials (ASTM):
   1. ASTM C33, Specification for Concrete Aggregates
   2. ASTM C67, Method of Sampling and Testing Brick and Structural Clay Tile
   3. ASTM C136, Standard Method for Sieve Analysis of Fine and Course Aggregate
   4. ASTM C140, Standard Method of Sampling and Testing Concrete Masonry Units
   5. ASTM C936, Specification for Solid Interlocking Concrete Paving Units

B. National Concrete Masonry Association (NCMA): Shapes and Sizes Directory.

1.3 SUBMITTALS

A. Submit the following in accordance with Division 1, Shop Drawings, Product Data and Samples.

B. Samples: Submit samples of concrete paving units to indicate color and shape selections.

C. Test Reports:
   1. Submit sieve analysis for grading of bedding and joint sand.
   2. Submit test results for compliance of paving units to requirements of ASTM C936 from an Independent Testing Laboratory (ITL).

1.4 MOCK UPS

A. Install a 10 ft. x 10 ft. paver area mockup as described in Part 3, Installation, below. This area will be used to determine surcharge of the sand layer, joint sizes, lines, laying pattern, color, and texture of the job. This area shall be the standard from which the Work will be judged.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete pavers to the site in plastic wrapped cubes capable of transfer by forklift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.

B. Sand shall be covered with waterproof weighted covering to prevent exposure to rainfall or removal by wind.

1.6 ENVIRONMENTAL CONDITIONS

A. Do not install sand or pavers during rain or snowfall.

B. Do not install frozen sand.

1.7 Provide 50 square feet additional paver material for use by Owner for maintenance and repair as attic stock.

A. Pavers to be from the same production run as installed materials.

B. Store paver materials in Project Engineer designated location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers:
   1. Hanover Architectural Products, www.hanoverpavers.com

B. Other Manufacturers: Submit Substitution Requests prior to bid date in accordance with Section 01 64 00, Approval for Substitution and Product Option.

2.2 MATERIALS

A. Concrete unit pavers
   1. Dimensions: 8”x8”
   2. Multisided Prest Brick Hexagonal with Square Edge
   3. Colors: 30% Light Grey, 40% Medium Grey, 30% Dark Grey, mixed randomly

B. Pavers shall meet the following requirements set forth in ASTM C936:
   1. Minimum average compressive strength of 8000 psi.
   2. Maximum absorption of 5% when tested in accordance with ASTM C140.
   3. Resistance of 50 freeze-thaw cycles when tested in accordance with ASTM C67.

2.3 BEDDING AND JOINT SAND

A. Bedding and joint sand shall be clean, non-plastic, and free from foreign matter. The sand shall be natural or manufactured from crushed rock. Grading of samples shall be done according to ASTM C136. The particles shall be sharp and conform to the grading requirements of ASTM C33 as shown below:

Grading Requirements for Bedding and Joint Sand

Sieve Size	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that base is dry and ready to support sand, pavers, and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Verify location, type, installation, and elevations of edge restraints around the perimeter area to be paved.

D. Beginning of installation means acceptance of base and edge restraints.

3.2 INSTALLATION

A. Spread the sand evenly over the base course and screed to 1" thickness. The screed sand should not be disturbed. Place sufficient sand to stay ahead of the pavers in place.

B. Ensure that pavers are free of foreign materials before installation.

C. Lay the pavers in the pattern as shown on the Drawings, large pavers in stacked bond pattern, and small pavers in herringbone pattern. Maintain straight pattern lines.

D. Joints between the pavers shall be between 1/16" and 1/8" wide.

E. Fill gaps at the edges of the paved area with cut pavers or edge units.

F. Cut pavers to be placed along the edge with a double bladed splitter or masonry saw.

G. Use a low amplitude, high frequency plate vibrator capable of 3000 to 5000 lbs. centrifugal compaction force to vibrate the pavers into the sand;

H. Vibrate the pavers, sweeping dry sand into the joints and vibrating until they are full. This will require at least two or three passes with the vibrator. Do not vibrate within 3' of the unrestrained edges of the paving units.

I. All work to within 3' of the laying face must be left fully compacted with sand-filled joints at the completion of each day. Cover the remaining compacted edge of the laying face with sand with waterproof covering.

J. Sweep off excess sand when the job is complete.

K. The final surface elevations shall not deviate more than 3/8" under a 10' long straight edge.

L. The surface elevations of pavers shall be 1/8" to ¼" above adjacent drainage inlets, concrete collars, or channels.

3.3 FIELD QUALITY CONTROL

A. After removal of excess sand, check final elevations for conformance to the Drawings.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Wetland buffer fencing, play area fencing.
   2. Trash Enclosure

B. Drawings, General Provisions of the Contract and Division 1 Specifications, apply to this section.

1.2 SUBMITTALS

A. Furnish Project Engineer with a verification of order and schedule for product delivery.

B. Furnish a shop drawing showing dimensional layout, gates, and post spacing. Include any revisions proposed in order to clear existing tree trunks and branches. Indicate top of fence resolution (running horizontal slope or stepped arrangement).

C. Furnish manufacturer's data, warranty, unit weights of framework and catalog cuts on post, rail, and fencing products.

1.3 FENCE TYPES

A. Wetland buffer fence and play area fence shall be wood, 3 rail, and 4 feet in height.

B. Fence shall contain three horizontal rails, evenly spaced vertically. Posts shall have evenly spaced, round mortises to accept rail tenons.

C. Trash Enclosure fence shall be wood with wood corner and line posts, steel gate posts, and horizontal wood slats.

PART 2 - MATERIALS

2.1 RAIL FENCE

A. All material used in construction of wood fences and gates shall be #1 and better Lodge Pole Pine. Treat all wood in accordance with AWPA specifications for the pressure treatment of Western Woods, latest edition. Where possible, pre-cut material before treatment. All field cuts and drilled holes shall be field treated in accordance with AWPA M-4.
   1. All lumber shall be pressure-treated as follows:

Species/Type	Treatment	Retention
Lodge Pole Pine AWPA Standard C2	ACQ	0.20

   2. All treatment shall be in accordance with AWPA C2
   3. CCA treated lumber shall not be stained brown with factory-applied stain.

B. Posts shall be 6-inch diameter, with 6-foot length for 4 feet exposed and 2 feet buried.

C. Rails shall be 3-inch diameter, maximum length of 8 feet

PART 3 - INSTALLATION

3.1 GENERAL

A. Verify with General Contractor the surveyed fence locations prior to construction.

B. Protect and maintain survey monuments.

C. Verify and coordinate with the General Contractor, the location of existing utilities.

D. Field stake fence lines at intervals not exceeding 500 feet or line of sight. Field stake terminal and corner posts.

3.2 TERMINAL AND LINE POSTS

A. Line posts shall be spaced at intervals not exceeding 8 feet, plumbed, in line and placed in a vertical position. Rail fence posts to be direct bury. Enclosure fence posts to be bracket mounted.

3.3 RAIL FENCE POST SETTING

Diameter of Hole	Minimum Depth of Hole	Post Embedment	Height of Fence	Post
9 inches	24 inches	24 inches	4 feet	Line
9 inches	24 inches	24 inches	4 feet	Terminal

3.4 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Dry stack rockery construction from new materials includes subgrade adjustment, base course, topsoil backfill and rock placement as shown on drawings.

B. Related sections:
   1. Section 31 20 00 – Earthwork
   2. Section 04 41 00 – Stone Setting

C. Drawings, general provisions of the Contract, and Division-1 Specification Sections apply to this section.

1.2 REFERENCES

A. Association of Rockery Contractors (ARC Standards 1993).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Granite or Basalt: One-man and less than one-man and two-man, to be supplied by Marenakos Rock Center (206) 392-3313.

2.2 ROCK QUALITY

A. Rocks shall be purchased and shall be sound, unweathered, weathering resistant. The longest dimension of any individual rock should not exceed three (3) times its shortest dimension.

2.3 ROCK SIZES

A.

ROCK SIZE	WEIGHT
One man	200-400 lbs.
Two man	500-800 lbs.
Three man	900-1200 lbs.

PART 3 - EXECUTION

3.1 QUALIFICATIONS

A. Stone placement shall be executed by a qualified and experienced firm. Defined as experience not under eight (8) years of stone placement and in ownership of appropriate machinery to load, set and shift stone as described above.

3.2 SLOPES

A. Minimum slope of soil above rockery is 2%. Wall height does not exceed 4' height. Maximum slope of planting area above the wall shall not exceed 3:1 (Horizontal:Vertical).

3.3 FILL COMPACTION

A. Per Site Grading and Earthwork Sections.

3.4 ROCK SELECTION

A. Rocks that have shapes that do not match the spaces offered by the previous course or rock should be placed elsewhere to obtain a better fit. Rock should be of a generally cubical, tabular or semi-rectangular shape. Any rocks of basically rounded or tetrahedral form will be rejected or used for filling large void spaces.

B. Use smaller rocks (one man size minus) to create a "top edge" to rockery.

C. Provide tight joints. Voids are not to exceed 1-3/4" without chink stones.

3.5 ROCK PLACEMENT

A. Install the first course of rock on firm unyielding soil. Provide full contact between the rock and soil. The bottom of the first course of rock shall be a minimum of 12" below the lowest adjacent site grade.

B. Place rocks so that there are no continuous joint planes in either the vertical or lateral direction. Each rock shall bear on at least two (2) rocks below it. Rocks shall be placed so that there is some bearing between flat rock faces rather than on joints. Joints between courses shall slope downwards towards the material being protected (away from the face of the rockery).

C. Eroded wall ends shall be approved by the Project Engineer.

3.6 FACE INCLINATION

A. The face of the rockery should be inclined at a gradient as shown on drawings.

B. Provide a consistent batter, flat vertical faces, and top course.

3.7 STONE FINISH

A. Do not clean any weathered Bandera stones without the direction of the Project Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Performance and material requirements for the installation of an efficient and fully automatic irrigation system.

1.3 REFERENCES

A. WSDOT, Road and Bridge Standards

B. ASTM B43 - Standard Specification for Brass and Copper Pipe and fittings

C. ASTM D1785 - Standard Specification for Schedule 40 PVC Pipe

D. ASTM D2241 - Standard Specification for PVC Plastic pipe

E. ASTM D2466 - Standard Specification for Schedule 40 PVC fittings.

F. ASTM D2466-78 - Schedule 80 PVC fittings

G. ASTM D2564 - Standard Specification for PVC Solvent Cements

H. ASTM D2855 - Standard Recommended Practice for making Solvent Cemented Joints with PVC Pipe and Fittings

I. ASTM D3139 - Swing joint pipe and fittings

J. ASTM F-656 - Standard Specifications for PVC Primers

K. Foundation for Cross Connection Control and Hydraulic Research - University of Southern California

1.4 WORK INCLUDED

A. The Work covers a complete, automatically controlled, spray irrigation system including: all required trenching, backfilling and compacting; sleeving, installation of pipe, valves, fittings, and all other appurtenances; connections to water, gate valves, testing; removal and relocation of irrigation controller, electrical connections, wiring, and system fine tuning. Coordinate all Work with other trades.

1.5 REQUIREMENTS

A. Work and materials shall be in accordance with the latest rules, regulations and other applicable state or local-plumbing, electrical and health codes. Nothing in the Contract Documents is to be construed to permit Work not conforming to these codes.

1.6 SUBMITTALS

A. Submit the following items under provisions of Section 01 33 00 (if used).
   1. Product Data: Submit product data before beginning work. Include manufacturer's product literature for all products to be installed in this system. Include material showing manufacturer's name, catalog numbers, catalog cuts, technical data and installation, operation and maintenance instructions for each product.
   2. Point of Connection Water Pressure Test: Test water pressure at point(s) of connection. Verify pressure is in the range indicated on the drawings. Submit written results of test to the Project Engineer.
   3. Maintain a current record of all pipe and equipment placement and shall record any variations approved by the Project Engineer. Upon completion of the system and prior to release of final payment, the Contractor shall provide the Project Engineer with a neat and legible record drawing of the completed system (reproducible vellum or Mylar only). Any pipe not installed in accordance with the plans as originally contracted shall be sufficiently dimensioned to a permanent structure for location after burial. Record drawings shall be updated DAILY.
   4. Digitally photograph all pipe, equipment placement, and installation progress on a daily basis. Note photograph locations on a separate record drawing. Include measuring tape, ruler, or other device in photograph to set scale. Digital photographs shall be .jpg format and minimum 72 dpi. Photographs shall be available to Project Engineer as needed. Upon completion of the irrigation system and prior to release of final payment, provide digital photograph files on dvd(s) or usb thumb drive along with legible record drawing of the photograph locations. Place in maintenance manual.
   5. Maintenance Manuals: Provide minimum of two (2) operation and maintenance manuals in digital format. The manuals shall be indexed and tabbed and include the following items/information.
      a. List of authorized distributors and service representatives (in the area) for each item of irrigation equipment: include names, addresses and phone numbers.
      b. Guarantee/warranty certificates for all equipment used and Contractor's written warranty for entire system one (1) year guarantee.
      c. Manufacturer's maintenance sheets, replacement parts list and equipment brochures for all equipment used. All composite data sheets shall have the specified products used in the field clearly highlighted.
      d. Winterization and Spring start up procedures.
      e. A pocket for one (1) copy of the approved record drawings to be added at the time of final inspection.
      f. A pocket for one (1) copy of the approved photograph record drawings to be added at the time of final inspection.
      g. A pocket for digital photograph dvd(s) or usb.
      h. A reduced size copy of the plans
      i. Provide one zone chart per controller. Controller chart shall fit in behind controller door.
      j. The Chart shall be a bond copy print with a different pastel transparent color to show each separate zone. Verify that the zone number as shown on the Controller Chart matches the number on the actual control valve identification tag. Numbering of zones shall be done as specified above in this section.
      k. When completed and approved, hermetically seal (laminate) the chart between two pieces of plastic.

1.7 SUBSTITUTIONS

A. Substitutions will be considered during the bid process per Section 01 25 00 (if used).

1.8 QUALITY ASSURANCE

A. Qualifications: Washington State licensed landscape/irrigation contractor with a minimum of three years of experience installing irrigation systems of this scale.

B. Work and materials shall be in strict accordance with the latest codes, regulations and other applicable state or local laws. Nothing in the Contract Documents is to be construed to permit work not conforming to these codes.

C. The contractor shall obtain and pay for all permits and approvals required by the local jurisdictional authorities for the full operation of the system.

D. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications. Do not install the sprinkler system as indicated on the drawings when it is obvious in the field that obstructions or grade conditions exist which cause discrepancies with the construction plans, details, legend or specific notes. All such discrepancies shall be brought to the attention of the Project Engineer. In the event this is not done, the Contractor shall assume full responsibility for the necessary revisions.

E. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. Carefully investigate the structural and finished conditions affecting all of this work and plan accordingly. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation system, planting and architectural features.

F. The work is subject to tests and inspections by the Project Engineer as specified. Furnish written notice to the Project Engineer one week prior to the required test or inspection.

G. Winterizing the irrigation system shall occur between October 1 through November 15. No testing shall be performed after November 15th. Winterizing and testing may be allowed outside these dates when approved in writing by the Project Engineer. The irrigation system shall be activated no earlier than March 15th, unless allowed otherwise by the Project Engineer. Testing may be resumed at that time.

1.9 PROJECT CONDITIONS

A. Underground utilities and elements: Locate all underground utilities and elements prior to digging and/or driving stakes. Take care to neither disturb nor damage any existing above ground or underground utilities or elements. Keep streets, sidewalks and site clean, free from debris and affected drains open and free flowing at all times.

B. Site inspection and layout: Before proceeding with any work, inspect the site, carefully check all grades and verify all dimensions and conditions affecting the work in order to proceed. Changes or alterations to the system to meet actual conditions shall be made at the Contractor's expense. Irrigation plan is diagrammatic and is not intended to show exact locations of existing or proposed piping or valves. Locate new items as closely as possible to related curbs, walls, fences or edges of paving. Pipelines shown parallel on drawing may be placed in a common trench but separated by at least 6 inches. Sprinkler heads are shown accurately and shall be installed as indicated by center of symbol.

1.10 DELIVERY, STORAGE, HANDLING AND PROTECTION

A. Protect work and materials from damage during construction and storage. PVC pipe and fittings shall be protected from extreme temperatures and other weather conditions and direct sunlight in accordance with manufacturer's written recommendations.

B. Assume all responsibility for damage to adjacent construction and restore to its original condition should damage occur as a result of this work.

1.11 WARRANTY

A. Guarantee system against defects of installation and material for a period of 1 year after Project Engineer's final acceptance of the irrigation system. Guarantee shall also cover repair or damage to any part of the premises resulting from leaks or other defects in material, equipment and workmanship to the satisfaction of the Project Engineer. During guarantee period, check and clean filters, manually flush each zone and otherwise insure adequate operation of system at maximum one-month intervals during the operational year. Guarantee shall also cover repair or damage to any part of the premises resulting from leaks or other defects in material, equipment, and workmanship. Repairs, if required, shall be done promptly upon notification at no additional cost.

B. As part of the warranty, deactivate and drain the system prior to the onset of the freezing season and reactivate the system at the onset of the spring growing season. Each event must be accomplished once during the warranty period. In the event the system is completed in a season when it will not be in use, winterize the system upon completion of testing (and approval by the Project Engineer) and reactivate the system in the spring. Submit a letter certifying that the system was winterized and drained and indicate the date such action was accomplished. The Contractor is responsible for any damage resulting from failure to comply.

1.12 SYSTEM FAMILIARIZATION

A. Before final acceptance of the system, provide the necessary keys and/or other tools required to operate, drain and activate the system. Provide two (2) complete sets of tools and keys to the Project Engineer (i.e.: water keys, quick coupler keys with hose swivel attachments, valve cover keys and controller keys).

B. Provide the following minimum standards of training with the Project Engineer's personnel before final acceptance of the system.

C. General system operation, maintenance and winterization—4 hours on site.

PART 2 - PRODUCTS

2.1 SUMMARY

A. All materials used throughout the system shall be new, unused, and in perfect condition except as noted. Refer to the irrigation materials legend, notes, detail drawings and these specifications for specific equipment to be used. Equipment or materials installed or furnished without prior approval of the Project Engineer may be rejected and the Contractor will be required to remove such materials from the site at their own expense.

2.2 PLASTIC PIPE AND ACCESSORIES

A. PVC Pipe:
   1. Marked with the manufacturer's name, class of pipe, NSF seal and date of manufacturing run. Pipe shall bear no evidence of interior or exterior extrusion marks. Conform to US Standard PS 22-70, ASTM D2241, ASTM D 1784, D3139, and D1869.
   2. Fittings: Schedule 40.
   3. Schedule 40 PVC pipe for mainlines except under boardwalk use Schedule 80 PVC pipe; Schedule 40 PVC for laterals.
   4. All PVC pipe must be delivered in at least twenty-foot (20') lengths.

B. Sleeves required for main and lateral lines located under paving shall be Schedule 40 PVC, with the inside diameter (I.D.) of sleeve to be twice the outside diameter (O.D.) of the insert pipe, maximum 1 insert pipe per sleeve. All wiring to be in separate sleeves from piping sleeves.

C. Sleeves under roadways (sidewalks, street rights-of-way, boulevards or parkways) where heavy vehicular traffic is anticipated shall be ductile iron pipe, with the inside diameter (I.D.) of the sleeve shall be at least 1 inch greater than the outside diameter (O.D.) of the total inserted pipes. All wiring shall be in separate gray conduit sleeve.

D. Fittings: PVC - ASTM D2464, D2466. Use Teflon tape on all threaded fittings.

2.3 CEMENT & SOLVENT

A. Cement: Weld On 705 or 711 cement (grey)

B. Primer: P-70 primer (purple).

2.4 AUTOMATIC VALVES

A. Automatic Valve: Size & type as indicated on drawings.

2.5 AUTOMATIC CONTROLLER

A. Type and size as shown on the Plans and Details.

B. Install per manufacturer's instructions.

C. Final location of automatic controller shall be approved by Project Engineer.

2.6 CONTROL WIRE FOR VALVES

A. Insulated, single strand copper designed for 24-50 volts and UL approved as UF (Underground Feeder). UL and UF designations clearly marked or embossed on the insulation jacket of the wire. Copper conductor must meet or exceed ASTM B-3 specifications. In no case shall wire be less that 14 gauge.

B. Control wire harness to be enclosed in Schedule 40 PVC conduit. Use existing conduit if possible.

C. No Multi Strand.

D. Separate "hot" (red or black) lead for each valve. Common wire (white) for each controller. Spare wire (Orange color). Identify wire color on As-Builts.

E. Looped wires shall be provided within four (4) feet of each wire connection to solenoid. Control wires shall also be snaked underneath mainlines to allow "slack" in the lines.

F. Copper conductors must meet or exceed ASTM B-3 requirements.

G. One spare wire (orange) for each 4 zones is required unless otherwise shown on the Drawings. For clarification; Zones 1 to 4 require one spare wire, Zones 5 to 8 require an additional spare wire, Zones 9 to 12 require an additional spare wire, etc. The spare wire(s) shall be installed to the farthest valve(s) location(s) from the controller. Loop the spare wires in each valve box.

2.7 QUICK COUPLING VALVES

A. Type, manufacture and size(s) shown on the drawings. Install all quick coupling valves in a 10" diameter valve box as shown in the Details

B. One inch (1"), all brass, and one or two-piece bodies, with locking brass tops and have galvanized steel swing joints as shown in the Details. Provide two (2) operating keys and hose swivels.

C. Quick coupler valve for use of compressed air for winterizing: 1", all brass, two piece bodies with locking brass tops. Provide one (1) operating key.

2.8 GATE VALVES

A. Gate valves: Types, manufacture and sizes as shown on the Plans and Details.

B. Gate Valves two inches (2") and smaller: All bronze construction with 'tee' handle, 175 psi water working pressure.

2.9 POP-UP SPRINKLER HEADS

A. Types, manufacture and sizes shown on the Plans and Details.

B. All heads shall have a built-in pressure-regulating device. The device shall regulate nozzle pressure to the design pressure. The pressure-regulating device shall be an internal part of the pop-up stem.

C. The heads shall have matched precipitation rate nozzles with adjusting screws.

D. The heads shall be equipped with check valves to prevent low head drainage. The check valves shall hold back pressures equivalent to 14 feet of head.

2.10 SWING JOINTS

A. Types, manufacture, and sizes shown on the Plans and Details.

B. Swing joints for quick couplers shall be installed in valve boxes, per the Details.

C. Pre-fabricated swing joints, for irrigation heads, shall be triple swing joints. Swing shall consist of street ells, ells, and nipples for full adjustability. Fittings shall have "O" ring seals.

2.11 IMPACT SPRINKLER HEADS

A. Types, manufacture and sizes shown on the Plans and Details.

B. Install on risers per detail.

2.12 VALVE BOXES

A. Type, manufacture and size shown on the Plans and Details and/or the following:

B. NDS 10-inch diameter round box (for drain valves, quick couplers and gate valves), green color.

C. NDS 1220-12 with bolt down locking lid and extensions as required (for single valve only) green color.

D. NDS 1730-18 with bolt down locking lid and extensions as required (use for two valves), green color.

E. Use 10" round box for isolation valves and flush manifolds. 6" pit box for air/vacuum relief valves and flush valves.

F. Lids to be labeled: Automatic control valves - ACV, master valve boxes - MV, gate valves - GV, etc.

2.13 IDENTIFICATION

A. Detectable marking tape: Christy's 3" detectable marking tape consists of a minimum 5 mil overall thickness; five ply composition; ultra-high molecular weight; 100% virgin polyethylene; acid, alkaline and corrosion resistant. The tape shall have a 20-gauge solid aluminum foil core, encapsulated within 2.55 mil polyethylene backing. Tape tensile strength shall be in accordance with ASTM D882-80A and be not less than 7,800 psi. Tape legend—Caution Irrigation Line Below. TA-DT-3-GI.

B. Valve Markers: Christy's Identification Tags manufactured from polyurethane Behr Desopan, incorporating an integral attachment neck and reinforced attachment hole and will be capable of withstanding 180 lbs. pull force. Tag shall be approximately 2.25" x 2.75" in size. All lettering will be hot stamped in black and capable of withstanding outdoor usage.

C. Valve Number Markers: The standard alphanumeric designations shall incorporate lettering 1 1/8" in height. Tag color will be yellow. Marking tag will be double side stamped with zone valve number.

D. Non-Potable Water Markers: Purple Christy's marker with Suffix #009, 'Warning Recycled Water Do Not Drink, Aviso Auga Impurano Tomar' with non-potable water graphics.

2.14 BACKFILL MATERIAL

A. Backfill around all irrigation heads: planting soil per planting specification.

B. Bedding material for use around all pipes and equipment as shown on the Details: native topsoil with no rocks or other debris more than 1-inch diameter or common builder's sand.

C. Backfill around at surface pipe: mulch per planting specification.

D. 3/8" washed rock for valve box sump.

2.15 ACCESSORIES

A. Vinyl Insulated Wire Connectors: Scotch-Lok #3570 or 3M-DBY, Direct Bury Splice Kit.

B. Stainless Steel Clamps: 304 AISI stainless steel, one "ear" type. The "ear" shall be capable of being pinched with a pinching tool to secure the tubing around the insert barbed fitting. Interior clamp wall shall be smooth to prevent crimping or pinching of tubing.

C. Pressure Gauge: Fluid filled pressure gauge; dial pressure registered from 0 to 200 psi. Ashcroft 1009 AL with one quarter inch (1/4") gage cock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, schedule pre-construction meeting with Project Engineer. In addition, carefully inspect the preparatory work of other trades, and verify that such work is acceptable for the installation of the work of this Section. Report all unacceptable conditions to the Project Engineer. Do not begin work until unacceptable conditions have been resolved. Beginning of work constitutes Contractor acceptance of conditions.

3.2 LAYOUT

A. Layout in accordance with plans and details as shown on the drawings. Locate apparatus and equipment in planting areas where there is easy access for maintenance.

B. If minor changes in location of irrigation equipment are required, or are directed by the Project Engineer, work shall be accomplished by the Contractor at no additional cost to the Owner provided such changes are ordered before items or work directly connected to the same area are installed and provided no additional materials are required.

3.3 TRENCHING

A. Refer to plans. Irrigation mainline to be hung under boardwalk as indicated on plans. Temporary irrigation zones will have their pipe placed on the surface and covered with 3” of mulch.

B. Trenches: Wide enough to allow a minimum of 6 inches between parallel PVC pipe lines. Prior to installation, trenches must be adequately tamped to prevent component separation due to settling. Pipe lines depths to provide the minimum cover from finished grade as follows:
   1. 18” cover from top of main lines.
   2. 12” cover from top of lateral lines.

C. Exercise care when excavating trenches near existing trees. Where roots are one and a half inches (1-1/2") and greater in diameter are encountered hand excavate and tunnel. When large roots are exposed, wrap with heavy burlap for protection and prevent excessive drying. Trenches dug by machines adjacent to trees having roots one and a half inches (1-1/2") and less in diameter shall have the sides hand trimmed making a clean cut of the roots. Trenches having exposed tree roots shall be back-filled within twenty-four (24) hours unless adequately protected with moist burlap or canvas.

D. The top six inches (6") of soil shall be kept separate from subsoil and shall be replaced as the top layer when backfill is made.

E. Excavate trenches with vertical sides and no wider at any point than is necessary to lay the pipe or install equipment. Locate outside of paved areas wherever possible.

F. Materials unsuitable for bedding of pipe to be removed to a depth 4" below trench bottom, and replaced with suitable bedding.

G. All trenches must be straight, with appropriate pipe-fittings used to allow pipe to be laid without undue bending and not have abrupt changes in grade.

H. The trench bottom must be free of rocks or sharp-edged objects.

3.4 PIPE AND FITTINGS

A. Cut PVC pipe ends at 90 degrees to the pipe length and clean all cutting burrs prior to cementing. Use of a deburring tool is highly recommended. Wipe pipe ends clean. Apply primer to both fitting and pipe end. Apply a light coat of cement on the inside of the fitting and a heavier coat on the outside of the pipe. Insert pipe into the fitting and given a quarter turn to seat the cement. Wipe excess cement from the outside of the pipe. Test pipe as indicated elsewhere in these specifications. Backfill the center of the pipe lengths until the pressure test is complete.

B. Cure all welded joints at least 15 minutes before moving and 24 hours before water is permitted in the pipe.

C. Ensure that the inside of the pipe is absolutely clean. Protect any pipe ends not being worked on. Cleaning of cutting burrs is MANDATORY.

D. Where possible install PVC lines and valves adjacent to planter bed edges.

E. Provide pipe sleeves double the diameter of the enclosed irrigation line(s). Use Schedule 40 PVC pipe for sleeves. Install “link-seal” around interior pipe in sleeves to prevent soil erosion from planter bed.

F. Exercise care in handling, loading, unloading and storing to avoid damage. The pipe and fittings shall be stored under cover, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat, so as not to be subject to undue bending or concentrated external load at any point. Any pipe that has been dented or damaged shall be discarded until such damage has been cut out and the pipe is rejoined with a coupling.

G. Appropriate primer shall be used with solvent glue. Solvent welded joints shall be given at least fifteen (15) minutes set-up time before moving or handling. Pipe shall be partially center loaded to prevent arching and slipping. No water shall be permitted in pipe until a period of at least 24 hours has elapsed for solvent weld setting and curing.

H. No PVC pipe may be threaded or connected to a threaded fitting without an adapter. Use Teflon tape on all male threads.

I. Great care must be taken to ensure the inside of the pipe is absolutely clean. Any pipe ends not being worked on must be protected and not left open.

3.5 PIPE SLEEVES

A. Place Schedule 40 main line in PVC Schedule 40 sleeves at least 2x larger than the pipe diameter under paved areas. Under drives and roads use ductile iron pipe sleeves at least 2x larger than the insert pipe diameter under paved areas.

B. Place Schedule 40 lateral lines in PVC Schedule 40 sleeves at least 2x larger than the pipe diameter under paved areas. Under drives and roads use ductile iron pipe sleeves at least 2x larger than the insert pipe diameter under paved areas.

C. Sleeve trenches shall be back-filled with approved backfill material (6 inches minimum above and 4 inches below the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in firm unyielding condition. All trenches shall be left flush with the adjoining grade.

D. Extend sleeves twelve inches (12”) minimum beyond back edge of curbs and pavement. Provide temporary seal for pipe ends and mark locations at grade with wood stakes.

3.6 RISERS AND SWING JOINTS

A. All pop-up sprinkler heads and quick coupler swing joints must be constructed according to the Details.

B. Minimum riser size shall be the pipe size of the sprinkler head.

C. All threaded joints are to have Teflon tape (approved for PVC pipe) applied to male threads only.

D. Risers are to be capped after installation in preparation for pressure testing.

E. All pop-up sprinkler heads and quick couplers shall have swing joints that allow the head to be set perpendicular and flush with finish grades.

3.7 QUICK COUPLING VALVE

A. Install in 10” diameter valve box as shown in the Details.

3.8 AUTOMATIC VALVES

A. Flush supply lines before installing automatic valves. Install one union upstream of valve in manifold. Use valve box extensions to ensure that box extends a minimum of 5 inches below the bottom of the box valve. Leave valve pit with a clean layer of gravel in the bottom with 4 inch clearance (min.) between gravel and bottom of valve.

3.9 CONTROL WIRES

A. Install in accordance with local code.

B. Control wires shall be taped together at five (5) foot intervals with black electrical tape; then this bundle shall be snaked along the bottom of the supply lines to allow for slack in the line for repairs.

C. All splices must be contained within the valve box where a valve is installed. Allow 36” minimum expansion coils for each connection so that the valve bonnet may be removed and placed outside the box for maintenance. All splice to be made with vinyl insulated connectors and sealed in epoxy resin, Scotchlock No. 3570 or DBY connectors.

D. Place control wires in trench prior to placing pipe. Cover control wires with minimum 2” of approved backfill.

E. Tie a loose 36-inch-long loop in all wiring at changes of direction greater than 30 degrees. Untie all loops after all connections have been made.

F. One unconnected spare orange control wire (one spare wire for each 4 valves) is to be run from the controller through each intermediate control valve box. Provide a thirty-six inch (36") long, loop in each box. Where control valves run in opposite directions from the controller, run a separate spare wire in each direction.

G. Minimum size of wire is to be determined strictly by the following chart:

No. of	Maximum Length of Common Wire			
Valves	500'	1000'	2000'	3000'
1	14	14	14	14
2	14	14	14	10
3	14	14	10	8
4	14	14	10	8
5	14	10	8	6
6	14	10	6	6
7	14	8	6	4
8	14	8	6	4
9	14	8	4	4
10	10	6	4	2
11	10	6	4	-

H. The control wires shall be color coded as follows: Neutral or common wire – White, Lead-in wire – Black, Extra wire – Orange.

I. Control wires shall be installed in 2-inch minimum gray PVC schedule 80 sleeve under all paved areas.

J. All wires shall be brought to the irrigation controller. Bring wires into the box through the conduit.

3.10 AUTOMATIC CONTROLLERS

A. Final location of controller approved by Project Engineer. The 120-volt electrical power to the controller is existing. Irrigation Contractor is responsible for the low voltage valve electrical hookup.

B. Install irrigation controller & cabinet per manufacturer's specifications and details.

C. A diagram of schedule shall be posted in the controller to facilitate the selection of the valves to be operated.

D. Install all control equipment in controller cabinet per manufacturer's specifications.

3.11 SYSTEM FLUSHING

A. Flush entire system prior to the installation of valves and sprinkler heads components.

3.12 SPRINKLER HEADS

A. Install per details. Spacing of heads shall not exceed spacing shown on the Plans for any reason.

B. Heads along curbs, walks, paving, etc. shall be placed 1/2 inch above finish grade and no closer than 4 inches from paving edge.

C. All heads shall be set perpendicular to finish grade unless otherwise designated on the Plans.

D. Backfill around heads per the Details.

3.13 BACKFILLING

A. Back-filling shall be done when pipe is not in an expanded condition due to heat or pressure. Cooling of the pipe can be accomplished by operating the system for a short time before back-fill, or by back-filling in the early part of the morning before the heat of the day.

B. In refilling the trenches, the fill around, 4 inches below, and 6 inches above the pipe and fittings shall be suitable bedding material or sand, as required, and tamped. The remainder of the backfill shall contain no lumps or rocks larger than three inches. A three-inch separation is required between all pipes when more than one pipe occupies the trench.

C. All roots, rocks and surplus excavation shall be removed from the site unless otherwise directed. Any turf areas buried under ditch excavation shall be raked clean of any excavated material.

D. Trenches under roads or paved areas shall be back-filled and tamped with a mechanical tamper in successive six-inch (6") lifts. Paving shall be replaced to the satisfaction of the Project Engineer.

E. Prior to completing backfill, place detectable marking tape directly above the installed lateral and supply mains and secure to pipe with tape for future line detection. Provide extra length to clearly expose ends in the valve boxes.

F. If, for any reason, any part of the sprinkler system is back-filled before approved location, testing, or inspection is authorized, it must be completely uncovered and exposed until approved for back-filling by the Project Engineer.

3.14 PRESSURE TEST

A. Notify the Project Engineer at least 72 hours prior to the test.

B. Valves do not need to be installed for pressure test. Valve manifolds, quick couplers and drain valve swing joints may be capped. Purge all air from the mainline prior to testing.

C. Hydrostatically test the mainline at a pressure of 150 psi. To be valid, all tests must be performed under the direction and supervision of the Project Engineer. Maximum allowable drop is 0 (zero) psi in a one-hour test.

D. Hydro-static pressure test Lateral lines at test at existing static water pressure. To be valid, all tests must be performed under the direction and supervision of the Project Engineer. Maximum allowable drop is 0 (zero) psi in a one-hour test.

3.15 CLEANING AND REPAIRS

A. Repair or replace any damaged materials, surfaces, and finishes caused by Work of this Section to the satisfaction of the Project Engineer at no additional cost to the Owner.

B. Clean up as each portion as Work progresses. Remove refuse and excess dirt from the site and legally dispose of it off-site. All walks and paving shall be swept down.

3.16 PERFORMANCE TEST

A. Request Project Engineer's attendance at each test. Give a minimum of one-week prior notice. Testing will be rescheduled if sustained wind speeds on site exceed 5mph and air temperature is below 40 degrees Fahrenheit.

B. Prior to performance test, adjust valves, check heads, check for leaks and coverage.

C. Perform a system coverage test for each zone, in the presence of the Project Engineer. Repair any clogged or damaged irrigation components. Correct all deficiencies, without additional cost, until the system is approved by the Project Engineer. Test system for both manual and fully automatic operation.

3.17 BALANCE AND ADJUSTMENT

A. Balance and adjust the various components of the sprinkler system so the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to pressure regulations, pressure relief valves, part circle sprinkler heads, drip emitters and individual station adjustments on the controller.

3.18 MAINTENANCE TRAINING

A. Schedule a training session for the Project Engineer's maintenance personnel for the operation of the system. Furnish sufficient training to the Project Engineer's personnel in the operation, maintenance, and winterization of the system. The Project Engineer will be notified of this session at least 72 hours in advance and may be part of the training session. The Contractor shall be liable for all damages or losses resulting from failure to comply with the provisions of this paragraph.

B. Performance test will be rescheduled if sustained wind speeds on site exceed 5mph and air temperature is below 40 degrees Fahrenheit.

3.19 WINTERIZATION

A. Deactivate and drain the system prior to the onset of the freezing season and reactivate at the onset of the spring season. Accomplish each at least once during the warranty period. If construction is completed when the system is not in use, winterize after testing. Certify by letter the dates of winterization/activation. Repair damage from failure to comply.

B. When using compressed air to winterize the system, do so in short cycles at no more than 40-psi air pressure. Do not allow pipe close to the compressor to get hot to the touch.

3.20 FINAL APPROVAL

A. Upon completion of all tests, final approval for the system will be contingent upon Contractor providing reproducible "as-built" drawings and three-ring binders of all catalog cuts/manufacturer's instruction/maintenance and operation information as well as complete sets of all tools and keys required.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation and finish grading of planting areas and planters.
   2. Planting area and planter drainage.
   3. Trees, shrubs, and groundcover.
   4. Staking and Guying.
   5. Cleanup.
   6. Maintenance.

B. Related Sections:
   1. Section 31 20 00 - Earthwork
   2. Section 32 84 00 - Irrigation
   3. Section 32 91 13 – Soil Preparation
   4. Section 32 92 19 - Hydroseeding

C. Drawings, the provisions of Division 1 apply to all work of this Section.

1.2 REFERENCES

A. Plant Grading:
   1. American National Standards Institute (ANSI): ANSI-Z 60.l, 2014 Edition American Standard for Nursery Stock (ASNS).
   2. Washington State Department of Agriculture (WSDA): Washington State Standards for Nursery Stock, Order No. 1627.

B. Plant Material Identification:
   1. Sunset Western Garden Book, 2007.
   2. The Southern Living Garden Book, 1998, Oxmoor House
   3. Hortus Third, 1976, L.H. Bailey.

C. Organic Landscape Materials:
   1. OMRI Standards Manual, Organic Material Review Institute (OMRI), 2007 edition.

D. Federal Specifications:
   1. (FS) O-F-214D: Fertilizer, Mixed, Commercial
   2. (FS) Q-P-166E: Peat Moss, Peat Humus and Reed-Sedge Peat

E. Compost:
   1. USDA and US Composting Council, Test Methods for the Examination of Composting and Compost 2002

F. American Society for Testing and Materials (ASTM) ÷
   1. D75: Standard Practice for Sampling Aggregates.
   2. D422: Standard Test Method for Particle-Size Analysis of Soils.
   3. D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
   4. D2729: Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   5. D5268: Standard Specification for Topsoil Used for Landscaping Purposes.

1.3 SUBMITTALS

A. Make submittals in accordance with Division 1

B. Samples: Submit samples and product data of all materials other than plants. Include a list of sources. Samples shall be unaltered and of quantity sufficient to allow for proper inspection and review by the Project Engineer. Submit bulk materials, such as mulch, in one-gallon zip-loc bags.

C. A maximum of 30 days after landscape subcontract is signed, and not less than 60 days prior to installation, submit a proposed schedule for the work. Indicate the dates for commencement and completion of each phase of landscaping work. Allow in the schedule adequate time for inspections specified, plant procurement, materials storage and delivery to the site.

D. Upon completion of the project submit a written description of all routine and special maintenance procedures to ensure the healthy maturation of the plant materials at the specific site location. The description shall include the time and duration of each procedure.

1.4 SUBSTITUTIONS

A. Substitutions will be considered during the bid process per Specification Section 012500.

1.5 QUALITY ASSURANCE

A. Qualifications of Landscaping Subcontractor: Landscaping firm shall be active and experienced in landscape work of the type specified, and able to show evidence of successful completion of projects of similar scope.

B. Plant Procurement Procedures:
   1. Not less than 60 days prior to installation, furnish photographs of plants with scale element and a written schedule of the location, root condition, and size of all plants on the plant list. Schedule shall indicate plants that must be reviewed, approved, and dug while dormant.
   2. Project Engineer may visit the location of the plants to be procured and verify that they meet Contract requirements. Replace all plants that do not meet Contract requirements.
   3. Upon approval, the Contractor may request payment of 10 percent of landscape contract amount. This money shall be used for deposit on approved plant materials, so that plants may be reserved or contract grown until time of delivery.

C. Comply with referenced standards for identification and grading of plant materials. All plants shall conform to the ASNS and Washington State Department of Agricultural highest grade as to:
   1. Health and vitality
   2. Condition of foliage
   3. Root system
   4. Freedom from pest or mechanical damage
   5. Plant form according to the accepted normal shape of the species.

D. Pre-Landscaping Conference: In conjunction with the procurement of plants specified herein, meet with the Project Engineer or his representative to discuss at a minimum:
   1. Contract requirements
   2. Schedule
   3. Submittals
   4. Local materials and planting methods
   5. Substantial Completion and Final Acceptance
   6. Maintenance Period
   7. Warranty/Guarantee.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store plant materials from time of approval until delivery to job site for installation.

B. Take adequate precautions to protect the plants during delivery, handling, and storage, and replace damaged plants at no additional cost to the Owner.

C. Maintain all stored plants until delivery to job site for installation.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate landscaping with work of other trades specified elsewhere.

B. Do not perform landscaping work in areas subject to the subsequent work of other sections, unless approved otherwise.

C. Perform work in accordance with the approved schedule specified in Submittals. If a schedule delay occurs, immediately notify the Project Engineer and revise and resubmit schedule.

1.8 SUBSTANTIAL COMPLETION

A. Upon completion of work and cleaning of work areas request a Punch List inspection.

B. If it is determined that the work is sufficiently completed for the inspection, a Punch List will be prepared and delivered to the Contractor. Delivery/Date of the Punch List will signify Substantial Completion of the project.

1.9 FINAL ACCEPTANCE

A. Final acceptance will be made upon completion of the following:
   1. Completion of Punch List items
   2. Submittal of Record Documents
   3. Submittal of Operating and Maintenance Manuals
   4. Submittal of warranties, bonds, final certifications and other similar documents.

1.10 SUBCONTRACTOR GUARANTEE

A. In accordance with Division 1, guaranty materials and workmanship for a period of one year following Substantial Completion/Final Acceptance.

B. During the guaranty period, the Subcontractor will not be held responsible for demise of or damage to properly installed plants resulting from excessive weather conditions, lack of maintenance, lack of irrigation, or other factors beyond the Subcontractor's control.

C. Replacement:
   1. Plants found in unsatisfactory condition, as determined by the Project Engineer, shall be removed from the site. All removed plants shall be replaced as soon as conditions permit within the normal planting season, at no additional cost to the Owner.
   2. Perform all corrective procedures in accordance with contract requirements.
   3. Tag replacement plants with green nursery tape at base of stalk.
   4. Replacement plants shall be of the same variety, size and root condition as existing adjacent plant materials and shall include new growth that may have occurred since planting, such that replacement plants match existing plants of the same variety.
   5. For plants requiring replacement, reinstate a one year guaranty beginning from the date of replacement.

1.11 MAINTENANCE

A. Maintain and protect planted areas following installation of each plant, through substantial completion, and for 1 year after substantial completion.

B. Maintenance of planted areas shall include but not be limited to protection from insects and disease, weeding, fertilizing, cultivating, tightening and repairing of stakes and guys, removal of dead material, resetting plants to proper grades or upright position, and replacement of any plants which appear to be stressed and other operations necessary to the proper implementation of the project.

C. After Substantial Completion coordinate irrigation system operation with Project Engineer to ensure adequate water to planting areas.

D. Minimum of one site visit every two weeks is required.

E. Lawn area maintenance work includes mowing, edging and cleanup of clippings on a weekly basis. Perform weed control and fertilization as needed during the maintenance period.

F. Maintenance Transfer Meeting:

1. Schedule a meeting immediately after the maintenance period with the Project Engineer's designated landscape maintenance personnel at the Project Site.
2. Contractor shall be liable for damages or losses resulting from failure to schedule the maintenance transfer meeting.
3. Agenda:
    a. Review maintenance procedures for each plant type and location using the submitted written plant maintenance description as a guide.
    b. Review watering requirements.
    c. Perform a site walk through to evaluate the condition of existing plantings. Tag plants which are immediately subject to guaranty replacement. Tag plants which appear weakened and which may be subject to replacement later during the guaranty period.

G. Quarterly Maintenance Walk-thru:
1. Schedule a meeting at the end of each quarter of the guaranty period with the Project Engineer's designated landscape maintenance personnel at the Project Site.
2. Agenda:
    a. Review the condition of planting areas and plant materials.
    b. Evaluate existing irrigation system timing and make recommendations for adjustment as necessary.
    c. Evaluate general health of plant material and make recommendations for adjustment of maintenance procedures as necessary.

PART 2 - PRODUCTS

2.1 PLANTS

A. Furnish all plants shown on the Contract Documents, as specified, and in quantities shown on the plans. Quantities listed on the PLANT LIST are provided for the Contractor's convenience. All plants shall be nursery grown unless specifically authorized to be collected as noted on the PLANT LIST and shall conform to ASNS and State Standards.

B. All plants shall be healthy, pest-free and disease-free, typical of their species or variety, have a normal habit of growth and be legibly tagged with the proper name. Only plant stock grown within Hardiness Zones 6-8b as established by the USDA Plant Hardiness Zone Map, latest edition, will be accepted.

C. If, at any time during the performance of the Contract, any plant shows signs of graft incompatibility, as determined by the Project Engineer, then the tree or shrub and all other similarly grafted plants of the same Genus/Species/Variety shall be rejected and removed from the site. Visual symptoms of graft incompatibility as cause for rejection include:
1. Development of over-growths by rootstock or scion resulting in the development of shoulders or inverted shoulders.
2. Suckering of the rootstock combined with poor growth or dieback of scion.
3. Any mechanical weakness between scion and rootstock.
4. Any marked difference in bark pattern and structure between scion and rootstock from planting plans and details.

D. All deciduous trees shall meet the following standards:
1. Trees shall have a single, straight trunk, well formed, and sturdy. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety.
2. Trees with multiple leaders shall conform to all standards noted in this Section for single leader trees and shall be accepted only as noted on the PLANT LIST.
3. All pruning wounds shall show vigorous bark on all edges at the time of harvest. Trees shall be free from all signs of pest and disease damage. The trunk shall be free from sun scald, frost cracks, and wounds resulting from abrasions, fire, animal damage, or other causes.
4. Pruning scars within the crown of any tree shall be clean cut and shall leave no protrusion beyond the branch collar.

5. All trees shall have healthy, vigorous leaves or needles of normal size, color, shape, and texture for the particular species and variety.
6. Deciduous shade trees and deciduous flowering trees shall have fall color typical for their species and variety.
7. No deciduous tree shall be pruned after the Project Engineer has tagged the plant in the nursery except as directed by the Project Engineer.
8. Branching of all deciduous trees shall be best quality representatives of the species, cultivar or variety with lateral branching around the entire trunk to form a symmetrical tree for 80 percent to 100 percent of the tree's outer perimeter. All branches on deciduous trees shall meet the trunk at angles no less than 30 degrees and no greater than 90 degrees from the vertical.

E. Evergreen trees shall meet the following standards:
1. The height of the evergreen trees (measured from the trunk flair at the natural ground line of the tree to the midpoint of the terminal leader) shall be not less than the minimum size designated on the PLANT LIST.
2. No trees with double-leaders or twin-heads will be permitted.
3. Evergreen trees shall be of specified height with spread in proportion to height, as designated in ASNS Standards, and shall be well-branched to the ground.
4. All pruning wounds shall show vigorous bark on all edges at the time of harvest.
5. Terminal and top whorl buds of all evergreen trees shall be in healthy and whole condition at the time of harvest.
6. No evergreen tree shall be pruned after the Project Engineer has tagged the tree in the nursery except as directed by the Project Engineer.
7. All trees shall have healthy, vigorous leaves or needles of normal size, color, shape, and texture for the particular species and variety.

F. All shrubs shall meet the following standards:
1. All shrubs shall be healthy and vigorous plants which are very well shaped, heavily branched, densely foliated, and true to form for the variety and shall be not less than the minimum size designated on the PLANT LIST.
2. Canes or Trunk(s) and Branches:
    a. Well-formed and sturdy.
    b. Branching shall be uniformly distributed close to the ground.
    c. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
    d. Pruning scars shall be clean cut and shall leave little or no protrusion from the trunk or branch.
    e. Graft unions shall be completely healed.
    f. No suckers or water sprouts.
    g. Contain no dead wood.
    h. Free of cracks, splits, or cambium peeling.
3. No shrub with pest or mechanical damage will be accepted.
4. Shrubs shall show no signs of frost or winter damage to the foliage. Foliage shall not be in a state of drought stress. Leaves or needles shall show no signs of wilt or desiccation due to weather stress at any season of the year.

G. All ground cover plants shall meet the following standards:
1. Ground cover plants and vines shall be of size, pot size, age, and condition listed in the PLANT LIST. When indicated on the PLANT LIST, the number of runners and the lengths of the runners of vines shall be minimums.

H. Root Systems for all Plants:
1. Each plant shall have an extensive, symmetrically balanced fibrous root system. Any root ball which shows signs of asymmetry, girdling, injury, or damage to the root system shall be rejected.
2. Curling or spiraling of the roots along the walls of rigid containers or within balled and burlap wrapped material will not be accepted.

3. All parts of the fibrous root system of all plants shall be moist and fresh with a white color when washed of soil. When the plant is removed from the container, the visible root mass shall be healthy with white root tips. The root systems of all plants shall be free of disease, insect pests, eggs, or larvae.
4. All trees and all shrubs which are not grown in containers must be moved with the root systems as solid units with balls of earth firmly wrapped with untreated 8 ounce natural, biodegradable fabric burlap, firmly laced with stout, natural biodegradable cord or twine. The base of the tree trunks shall be wrapped with a protective burlap layer, surrounded by a cardboard trunk protector, and loosely tied with twine.
5. The diameter and depth of the balls of earth must encompass the fibrous and root feeding system necessary for the healthy recovery of the plant. Minimum root ball diameters and depths shall be in accordance with ASNS standards.
6. No plants shall be loose in the container.
7. Container grown plants which have roots growing out of the container will be rejected.

2.2 DRAIN GRAVEL

A. Gravel: 3/4 inch (19mm) minus washed gravel or "Pea Gravel," maximum 3 percent passing the U.S. No. 100 sieve. Coordinate gravel size with pipe perforations to prevent sloughing into pipe.

2.3 PIPE AND FITTINGS

A. Rigid Pipe: 4-inch (100mm) diameter perforated PVC pipe, ASTM D2729. Furnish drainage pipe complete with bends, reducers, adapters, couplings, collars and joint materials.

B. Corrugated/Perforated Pipe: Advanced Drainage Systems, Inc. (ADS) (Hilliard, OH; 800-821-6710, www.ads-pipe.com) “401 Perforated, Single Wall Pipe”.

2.4 FILTER FABRIC

A. Tencate Geosynthetics North America (Pendergrass, GA; 706-693-2226, www.spec@tencate.com) “Mirafi 140N Non-woven Polypropylene”.

2.5 DRAIN BOX AND GRATES

A. NDS Inc. (Woodland Hills, CA; 800-726-1994, www.ndspro.com) “6 inch (150 mm) Atrium Grate”, “12 inch (305mm) Square Catch Basin and Polyolefin Grate”.

2.6 MULCH

A. Composted material must be in compliance with WA Department of Ecology’s specifications, WAC chapter 173-350 Section 220.
   1. Suppliers
      a. Cedar Grove Summit Compost
      b.

B. Decomposed sawdust mixed with aged manure or compost (compost to meet requirements of paragraph 2.2.A above).
   1. Suppliers
      a. Cedar Grove Compost, Sawdust Supply Beauti-Bark, or approved alternative (See Paragraph 1.4 SUBSTITUTIONS).

C. Arborists Mulch:
   1. Material: Coarse ground wood chips (approximately 1/2” to 4” along the longest dimension) derived from the mechanical grinding or shredding of whole trees or portions of trees. It may contain wood, wood fiber, roots, bark, branches, and leaves, but may not contain visible amounts of soil. It shall be free of weeds and weed seeds, and may not contain more than 1% by weight of manufactured inert material (plastic, concrete, ceramics, metal, etc.).
   2. Subject to Project Engineer’s approval acceptable substitutes include chipped or shredded woody material meeting the above size and inert material requirements derived from composting operation

screening (“overs”) or derived from recycling of clean dimensioned lumber (e.g. pallets or framing lumber) that has passed through a metal removal process to meet the 1% manufactured inert standard above.

D. Gravel Mulch:
   1. 2”-3” washed river rock. Provide sample.
   2. 5”-6” washed river rock. Provide sample.

E. Submit sample and source for approval prior to installation

F. Mulch products must meet the following criteria:
   1. 100 percent shall pass through a 1-inch sieve when tested in accordance with WSDOT Test Method 602 and 603 (AASHTO T87 and T88).
   2. The pH range shall be between 5.5 and 8.5 when tested in accordance with WSDOT Test.
   3. Foreign material (plastic, mineral soils, concrete, metal etc.) shall be no more than 2 percent on a dry weight or volume basis, whichever provides for the least amount of foreign material.
   4. Compost material to a temperature adequate to kill weeds and weed seeds.

2.7 FERTILIZER

A. General: The following components are to be used for bid price only. Specific amendments and fertilizer formulation will be determined by soil laboratory from submitted soil samples. Adjustments to this formulation shall be at no cost to the Owner.

B. Planting Pit Tablets: The Scotts Company LLC (Marysville, OH; 800-492-8255) “Agriform 20-10-5”, 2-year tablets.

C. Top Dressing Fertilizer: The Scotts Company LLC (Marysville, OH; 800-492-8255) “Osmocote Classic”, 19-6-12.

2.8 ROOTING STIMULANT

A. Liquinox Company (Orange, CA; 800-621-6365) "Liquinox Start".

2.9 TREE STAKING AND GUYING MATERIALS

A. Stakes: 2” dia. Lodgepole Pine, 8’ length.

B. Ties and Anchors: ¾ inch, flat woven polypropylene, 600 lb test, polypropylene guy line; nylon tension bars; nylon arrowhead anchors. ArborGuy Pro40 or approved equal. www.arborguy.com.

C. Ties and Anchors: Tree Frog Environmental Products, LLC (Mount Dora, FL, (352) 735-7411,

D. Duckbill tree anchoring systems:
   1. Model D40 DTS Kit for up to 3-inch caliper trees.
   2. Model D68 DTS for up to 6-inch caliper trees.
   3. MPS Civil Products (Fort Mill, SC, (800) 325-5360, www.earthanchor.com.

2.10 LANDSCAPE EDGING

A. Cleanline XL, 3/16” X 6” X .116” with .25” exposed top lip, mill finish natural aluminum.

B. Permaloc Corporation, Holland, MI; (616)399-9600, www.permaloc.com.

C. Weathering Steel Edging

2.11 PLASTIC ROOT BARRIER

A. 30 mil Polyethylene (HPDE), 100% post-consumer recycled content. DeepRoot WB 24/30 or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the planting areas for the conditions specified below, and other conditions that would adversely affect the landscaping installation. Notify the Project Engineer if adverse conditions are discovered. Commencement of landscaping installation indicates acceptance of the surrounding conditions.
   1. Contaminants: Inspect planting areas for contaminants that may have been discarded during construction activities, such as paint, paint thinner, or plaster.
   2. Improper Drainage: Inspect for drainage conditions that would adversely affect plant growth.
   3. Subgrade: Inspect planting areas for condition and depth.
   4. Building Wall and Planter Waterproofing: Verify that waterproofing work has been completed, tested, and accepted, prior to installation of landscape materials.

3.2 PREPARATION

A. Protect surrounding construction from damage caused by the work of this section.

3.3 INSTALLATION

A. Drainage Gravel and Pipe:
   1. Cut subgrades to required dimensions.
   2. Place gravel to a compacted depth of 4 inches minimum.
   3. Lay pipe solidly bedded on gravel providing full bearing for pipe length true to grades and alignment. Slope in direction of flow 1/4 inch per foot minimum.
   4. Test drain lines for free flow prior to backfilling.
   5. Place additional gravel around top and sides of pipe with 4 inches minimum depth of cover.
   6. Provide capped cleanout at ends of runs, flush with finish grade of topsoil. Cover cap with mulch. Prevent debris, gravel, soil, and mulch from entering pipe.
   7. Locate clean-outs on Record Documents.

3.4 PLANTING PROCEDURES

A. Location:
   1. Plant Layout: Set all plants in the actual locations proposed for planting. For large blocks of groundcover material, the Contractor has the option of staking boundaries of planting rather than placing individual plants. For large planting areas, set outside row of plants parallel to adjacent edges at a distance from edges of 1/2 the on center spacing. Space inside plants as indicated on the Drawings or as specified.
   2. Layout Approval: Notify the Project Engineer a minimum of two weeks before the plant layout is to be complete. The Project Engineer will meet with the Contractor to inspect the layout and direct any placement changes which the Project Engineer deems necessary.

B. Planting: Upon approval of the plant layout by the Project Engineer, install as specified below.
   1. Dig pits for plants as indicated. Planting pits shall be rough not smooth.
   2. Set plants in center of planting pit approximately two inches above normal growing position on fully compacted pad and backfill approximately halfway. Tree pits shall allow 1/8 depth of rootball above grade.
   3. Place fertilizer tablets around rootball in accordance with manufacturer's printed instructions.
   4. Backfill to within 5 inches of finish grade, fill hole with water and allow to settle; backfill to subgrade depths (if mulch is to be applied) or to nursery grown depth with topsoil as specified herein. Construct watering basin per details.
   5. Apply top dressing fertilizer to the surface around the periphery of the plant's rootball.
   6. Provide positive drainage away from stalk or trunk at plant crowns, after planting and settling, at no greater than 1/2 inch per foot, unless otherwise indicated.
   7. Soak rootballs that have dried significantly before planting; broken roots 1/2 inch diameter or greater shall be pruned cleanly.

8. If container stock is rootbound, slash roots vertically with a sharp knife along outside of ball in three places, equally spaced, before planting; remove all string ties or straps holding rootball of plants upon completion of planting Remove untreated burlap from crown of rootball. Remove treated burlap completely.
9. Plant at any time that plant materials are available and weather conditions are consistent with local horticultural practice. Special planting techniques, defoliating, wiltproofing or spray-misting may be required by the Project Engineer for out-of-season planting, prolonged periods of drought, etc.

C. Pruning: Do no pruning prior to delivery or after installation without authorization of the Project Engineer.

D. Staking and Guying: Secure trees and shrubs which are, or may become, loosened or tipped from their proper position during the first growing season, as indicated in the details. When necessary secure shrubs with single 2x2 stake and nursery tape.

E. Mulching:
1. Before installation of mulch, contact the Project Engineer for a semifinal inspection of planting areas, grades, soil depth, and plant locations.
2. Cover planting areas with uniform (3) inch layer of mulch material over a properly cleaned and graded subsurface. Rake mulch to smooth and even finish grade with smooth straight line at the face of the building and at the edge of paving.
3. Should mulch be installed prior to inspection, it will be at Contractor's risk, and subject to removal.

F. Plant Establishment:
1. Make second application of top dressing fertilizer to all plantings 12 to 24 weeks after initial installation.
2. Where planting conditions or rootball sizes warrant, apply root stimulant in accordance with the manufacturer's recommendations.
3. Verify time of actual fertilizer application with the Project Engineer prior to installation.

3.5 CLEANUP

A. Daily Cleanup: Keep all areas clean, neat, and orderly at all times. Keep dirt and rubbish off both paved and planted areas during construction. Leave project clean and neat at the end of each working day.

B. Final Cleanup: Prior to final inspection and acceptance, remove all plant tags; remove deleterious materials and debris from planting areas and dispose of offsite; rake exposed topsoil and mulched areas neatly to an even fine grade; clean catch basins and drainage piping and remove soil and stains caused by work of this Section from adjacent hard surfaces.

3.6 PLANT PROTECTION

A. Properly protect all plantings from the harmful effects of wind, unusual weather, construction activities, and abuse until final acceptance.

3.7 FINAL INSPECTION/ACCEPTANCE OF LANDSCAPE CONSTRUCTION

A. Upon substantial completion of work in this Section, request Punch List inspection by the Project Engineer. Provide a Punch List itemizing incomplete work. Give notice a minimum of 2 weeks prior to the anticipated date for the inspection. The Project Engineer will determine from the letter of request whether sufficient work is completed for inspection.

B. Upon completion of Punch List work request Back Punch inspection. The site shall be thoroughly cleaned, and all work completed unless otherwise indicated in the accepted request for final inspection.

C. Final acceptance is determined based on completion of Punch List and Back Punch work and receipt of close out documents per Section 017800 and Paragraph 1.9 of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Subgrade preparation, soil amendment, soil installation and finish grading.

B. Related Sections
   1. Section 31 20 00 - Earthwork
   2. Section 32 84 00 - Irrigation
   3. Section 32 90 00 - Planting
   4. Section 32 92 19 - Hydroseeding

C. Drawings, the provisions of Division 1 apply to all work of this Section.

1.2 REFERENCES

A. Washington State Department of Ecology, Western Washington Stormwater Manual, BMP T5.13: Post-Construction Soil Quality and Depth.

B. WAC Chapter 173-350, Definitions and Section 220.

C. United States Department of Agriculture (USDA) Soil Texture System of Classification.

D. Organic Landscape Materials:
   1. OMRI Standards Manual, Organic Material Review Institute (OMRI), 2007 edition.

E. Federal Specifications:
   1. (FS) O-F-214D: Fertilizer, Mixed, Commercial
   2. (FS) Q-P-166E: Peat Moss, Peat Humus and Reed-Sedge Peat.

F. American Society for Testing and Materials (ASTM) :
   1. D5268: Standard Specification for Topsoil Used for Landscaping Purposes.

G. Compost:
   1. USDA and US Composting Council, Test Methods for the Examination of Composting and Compost 2002.

1.3 SUBMITTALS

A. General: Submit following items under provisions of the General Conditions.

B. Samples: Submit samples and product data of all materials including fertilizers, topsoil, compost, and mulch. Include a list of sources. Samples shall be unaltered and of quantity sufficient to allow for proper inspection and review by the Project Engineer. Submit bulk materials, such as soil and compost, in one-gallon containers (zip-loc bags).

C. A maximum of 30 days after landscape subcontract is signed, and not less than 60 days prior to installation, submit a proposed schedule for the work. Indicate the dates for commencement and completion of each phase of work. Allow in the schedule adequate time for inspections specified, materials procurement, storage and delivery to the site.

D. Soil Tests: Submit samples of existing site soil, imported topsoil mix and mulch samples to a certified soil testing laboratory for analysis and soil amendment recommendations. Submit lab test results to Project Engineer for review. Test all soil and soil components as follows:
   1. Provide a one cubic foot representative sample of each component from site and supplier stockpiles. All stockpile sampling shall be per ASTM D 75 and Appendixes for securing samples from stockpiles. Stockpiles shall be made sufficiently in advance of testing so that pH, organic content, and carbon/nitrogen ratio have stabilized.
   2. Deliver all samples to an approved testing laboratory. Perform all tests for particle gradation, organic content, soil chemistry and pH. Testing reports shall include the following tests and recommendations.
      a. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System. Sieve analysis shall be by combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D 422 after destruction of organic matter by H2O2. To facilitate review and approval of sieve analysis, provide a computer generated gradation curve from Laboratory
      b. Percent of organics shall be determined by the loss on ignition of oven-dried samples. Test samples minus #10 material shall be oven-dried to a constant weight at a temperature of 450 degrees Fahrenheit
      c. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, extractable Aluminum, Lead, Zinc, Cadmium, Copper, Soluble Salts, and pH and buffer pH. A Conductivity Meter shall be used to measure Soluble Salts in 1:2 soil/water (v/v). Except where otherwise noted, nutrient tests shall be for available nutrients.
   3. Soil analysis shall show recommendations for soil additives to correct soils deficiencies and enhance fertility to accomplish planting work as specified.

1.4 SUBSTITUTIONS

A. Substitutions will be considered during the bid process per Specification Section 012500.

1.5 QUALITY ASSURANCE

A. Qualifications of Landscaping Subcontractor: Landscaping firm shall be active and experienced in landscape work of the type specified, and able to show evidence of successful completion of projects of similar scope.

B. Regulatory Requirements: Obtain and pay for all permits and testing related to the work of this section.

C. Pre-Landscaping Conference: In conjunction with the procurement of plants specified herein, meet with the Project Engineer or his representative to discuss at a minimum:
   1. Contract requirements
   2. Schedule
   3. Submittals
   4. Local materials and planting methods
   5. Substantial Completion and Final Acceptance
   6. Maintenance Period
   7. Warranty/Guarantee.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with provisions of Section 3.04.4(1)

1.7 SEQUENCING AND SCHEDULING

A. Coordinate soil installation with work of other trades specified elsewhere.

B. Do not perform work in areas subject to the subsequent work of other sections, unless approved otherwise.

C. Perform work in accordance with the approved schedule specified in Submittals. If a schedule delay occurs, revise and resubmit schedule to reflect each schedule delay.

1.8 SUBSTANTIAL COMPLETION per the General Conditions.

A. Upon completion of work and cleaning of work areas request a Punch List inspection.

B. If it is determined that the work is sufficiently completed for the inspection, a Punch List will be prepared and delivered to the Contractor. Delivery/Date of the Punch List will signify Substantial Completion of the project.

1.9 FINAL ACCEPTANCE per the General Conditions

A. Final acceptance will be made upon completion of the following:
   1. Completion of Punch List items
   2. Submittal of Record Documents
   3. Submittal of Operating and Maintenance Manuals
   4. Submittal of warranties, bonds, final certifications and other similar documents.

1.10 SUBCONTRACTOR GUARANTY

A. Guarantee materials and workmanship for a period of one year following Final Acceptance.

1.11 CLEAN UP

A. Leave project clean and organized at end of each working day. Remove litter and rubbish from work areas and clean soil from paved areas. Remove all sediment and debris from catch basins and other drain bodies prior to final inspection.

PART 2 - MATERIALS / PRODUCTS

2.1 COMPOST

A. General:
   1. Composted material must be in compliance with WA Department of Ecology's specifications WAC chapter 173-350 Section 220.
   2. The product must meet all applicable USEPA CFR, Title 40, Part 503 Standards for Class A biosolids.
   3. Compost shall be mature, stable, weed free, and shall have a uniform dark, soil-like appearance produced by aerobic decomposition of organic matter for at least six months. Compost must meet a minimum temperature of 134 degrees farenheit for 4 days, and have gone through adequate stages of curing
   4. The product shall possess no objectionable odors and must not contain any visible refuse or other physical contaminants, substances toxic to plants, or over 5% sand, silt, clay or rock material by dry weight and shall contain no more than 2 percent on a dry weight or volume basis of foreign material (plastic, mineral soils, concrete, metal etc.)
   5. Compost shall have minimal weed seed present based on germination testing of representative samples.

6. Recommended Sources:
    a. Cedar Grove Compost Company, Maple Valley, WA
    b. Pacific Topsoils, Everett, WA
    c. Other approved equals:
        1) For other available sources, refer to the current edition of the "Directory of Recycled Content Building and Construction Products", as published by the Clean Washington Center, Department of Trade and Economic Development, 2001 Sixth Avenue, Suite 2700, Seattle, WA 98121. Phone (206) 464-7040.

2.2 IMPORTED TOPSOIL

A. A mixture of compost and sand or sandy loam per USDA soil texture classification. The mixture shall contain a minimum of approximately 5% organic matter for turf areas or a minimum of approximately 10% organic matter for planting beds. The sand or sandy loam shall be free of weeds, deleterious materials, rocks, and debris. 100% of the imported topsoil shall pass through a 3/4" screen, less than 10% shall pass through a #200 sieve. The components shall be mixed off site and be evenly distributed throughout the topsoil mix.
    1. Recommended Sources:
        a. Cedar Grove Two-way Topsoil (50% Compost, 50% sand). Cedar Grove Compost Company, Maple Valley, WA.
        b. Approved equal

2.3 FERTILIZER

A. General.
    1. Slow Release Organic Fertilizers: The following fertilizer specification is to be used for bid price only. Specific amendments and fertilizer specification will be determined by soil laboratory from submitted soil samples. Adjustments to this formulation shall be at no cost to the Owner.
    2. Soil amendments/Fertilizer:
        a. Evergreen Trees and Shrubs: 8-2-4 granulated.
        b. Deciduous Trees and Shrubs: 8-2-4 granulated.
        c. Perennials, grasses, groundcovers and vines: 8-2-4 granulated.
    3. Mix fertilizer and other amendments evenly throughout planting soil.

B. PH Adjusting Lime: 50% Agricultural grade finely ground dolomitic limestone and 50% calcium carbonate limestone with minimum 75 percent passing 100-mesh sieve, and 100 percent passing 20-mesh sieve.

2.4 SOIL AMENDMENTS

A. Soil Amendments/Fertilizer:
    1. Evergreen Trees and Shrubs: Hendrikus Organics Organobloom 5-2-4 (granulated), 0.33 lbs (1 cup) per one gallon container + 0.16lbs (½ cup) per foot of height or width, whichever is greater.
    2. Deciduous Trees and Shrubs: Hendrikus Organics Complete 6-4-4 (granulated), 0.16 lbs (½ cup) per foot of height or width, whichever is greater, + 0.33 lbs (1 cup) per cubic foot of soil in rootball
    3. Perennials, grasses, groundcovers and vines: Hendrikus Organics Complete 6-4-4 (granulated), 0.16 lbs (½ cup) per foot of height or width, whichever is greater, + 0.33 lbs(1 cup) per cubic foot of soil in rootball
    4. All planting beds to receive Montana rock phosphate 1 lb per 15 sq ft. and North Atlantic Kelp 10 lbs per 1,000 sq ft
    5. PH Adjusters Lime: 50% Agricultural grade finely ground dolomitic limestone and 50% calcium carbonate limestone with gradation as follows: minimum 75 percent passing 100-mesh sieve, and 100 percent passing 20-mesh sieve.

PART 3 - INSTALLATION

3.1 NOTIFICATION OF ADVERSE DRAINAGE CONDITIONS

A. Prior to commencement of installation, notify the Project Engineer of any observed adverse drainage conditions that may affect plant growth.

3.2 SOIL CONTAMINANTS

A. Prior to installation, review existing soil conditions for any contaminants that may have been discarded by other trades, such as thinner, paint, or plaster, and notify the Project Engineer immediately if any contaminants are suspected to be present.

3.3 SUBGRADES AND TOPSOIL DEPTHS

A. Planting Areas Over Grade:
   1. Subgrade for planting areas to be established at a minimum depth of 22” from finished grade as indicated on the drawings.
   2. Subgrade for lawn areas to be established at a minimum depth of 6” from fifnished grade as indicated on the drawings.
   3. Slope subgrade to drain at 2% minimum.
   4. Topsoil depth for planting to be 18” minimum, after compaction, to allow for installation of 4” of mulch.
   5. Topsoil depth for lawns to be 6” minimum, after compaction.
   6. Meadow areas receive tested and approved on site soil. Depth shall vary and is dependent on soil quantity stockpiled.

3.4 SUBGRADE PREPARATION

A. Excavate existing soil to required depths. Stockpile soil for re-use.

B. Planting, Lawn, and Meadow Areas: Rototill all compacted subgrades to a depth of 6-8” to promote a transition between subgrade material and prepared planting soil. Remove debris, roots greater than ½” diamenter, rocks greater than 2” and any other material which may interfere with soil preparation and/or plant growth. If soil is too dense for a rototiller use a soil ripper or trencher to break up heavily compacted sub soils. Distribute excess soil evenly throughout the site or haul off the site if required.

C. Do not rototill in areas of exposed root zones or within driplines of existing trees. Hand dig and scarify in these areas. Do not damage surface roots unless pre-authorized by Project Engineer.

3.5 PLANTING SOIL INSTALLATION

A. Prepare subgrades as outlined above.

B. Mix stockpiled soil and prepared imported topsoil in 50/50 ratio.

C. Place soil mix in lifts of no more than 8” depth. For on-grade planting areas rototill the first lift into the subgrade. Compact to each lift to 85% dry maximum density.

3.6 FINISHED CONDITIONS

A. Rake finished grade to a smooth uniform finish with positive drainage away from sturctures, hardscapes, and site amenities.

B. Finished grade (top of mulch when applicable) of planted areas at contact points with paving or curb shall be 1/2 inch below the top of adjacent paving or curb.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes;
   1. Furnish all materials, equipment, and labor necessary for preparation, seeding, fertilizing, mulching, and protection of hydroseeded areas.

1.2 Related Sections
   1. Section 32 91 13 – Soil Preparation
   2. Section 32 84 00 – Irrigation
   3. Section 32 90 00 – Planting

B. Drawings, the provisions of Division 1 apply to all work of this Section.

1.3 QUALITY ASSURANCE

A. Seed: Seed shall be furnished in containers that show the following information: seed name, lot number, net weight, percentage of purity, germination, weed seed and inert material. Seed which has become wet, moldy, or otherwise damaged will not be accepted. Seed shall conform to the requirements of the Washington State seed law and when applicable the Federal Seed Act, and shall be "certified" grade or better.

1.4 Submittals

A. Make submittals per Division 1.

B. Submit data for all specified products.

C. Submit seed vendor's certification for required grass seed mixture, indicating percentage by weight and percentages of purity, germination and weed seed for each grass species.

1.5 Substitutions

A. Make substitutions per Division 1.

1.6 FIELD QUALITY CONTROL

A. Grading Inspection
   1. Rough grading shall be inspected and approved by the Project Engineer prior to placing planting soil.
   2. Finish grading shall be inspected and approved by the Project Engineer prior to seed application.

B. Inspections
   1. The contractor shall request a provisional inspection upon completion of the work. Upon completion of punch list, provisional acceptance will be made in writing by the Project Engineer.
   2. Final acceptance will be at the end of the one-year guarantee period, and after all required repairs have been made.

1.7 GUARANTEE AND REPLACEMENT

A. Materials and workmanship are guaranteed for a period of one year following Substantial Completion/Final Acceptance.

B. Hydroseeded areas must have a relatively uniform stand of grass with no bare spots over 6" square at the time of provisional inspection. Reseed at the original rate and fertilize with 12-24-24 at the rate of 6 lbs. per 1,000 square feet. All areas failing to vigorously establish within 90 days after germination or a growing season whichever is longest for any reason whatsoever.

PART 2 - PRODUCTS

2.1 FERTILIZER AND SOIL AMENDMENTS

A. Fertilizer, 12-24-24.

2.2 MULCH

A. Mulch shall be wood cellulose fiber from Alder, containing no growth or germination inhibiting substances; a soil binding agent (tackifier) shall be used; mulch shall be dyed a suitable color to facilitate placement.

2.3 SOIL BINDING AGENT

A. Soil binding agent shall consist of non-toxic, biodegradable materials which are environmentally safe such as ESI - TAK or approved equal.

2.4 SEED

A. Seed shall be one or more of the following mixes as noted on the plans:
   1. Turf: Special Sun Seed Mixture, Country Green
   2. Meadow: Low Grow Seed Mixture
   3. Storm Pond: Wetland Seed Mixture

PART 3 - EXECUTION

3.1 Preparation: all areas shall be finish graded and cleared of debris.

3.2 Compaction: Compact with sheeps foot roller, cleated crawler tractor or equipment approved by Project Engineer. Equipment must produce 150-300 pounds per square inch of ground pressure. Compaction shall produce a uniform rough textured surface free of tire ruts, depressions, low spots and ready for seeding and mulching. A minimum of four passes are required. After compaction, finish grade shall be one inch below the top of curbs, catch basins and other structures.

3.3 Water: If required by the Project Engineer, water shall be provided to condition the soil for compaction or to provide dust control. Water shall be furnished and applied by contractor from on-site supply or by watering truck if necessary.

3.4 Hydroseeding: Fertilizer, seed and mulch shall be applied in one operation with approved hydraulic equipment.

A. Materials shall be applied at the following rates:
   1. Mulch - 50 lbs. per 1,000 square feet.
   2. Lawn Seed Mix, per manufacturer's recommendations.
   3. Meadow Mix, per manufacturer's recommendations.

4. Erosion Control Mix, per manufacturer's recommendations.
5. Fertilizer: 12-24-24 - 6 lbs. per 1,000 square feet.
6. Soil Binding Agent - 1 lb. per 1,000 square feet.

B. Seeding shall not be done during windy weather or when the ground is frozen. Contractor shall give the Project Engineer 24 hours notice of seeding operation. Seeding season will be March 15th to October 15th. No seeding shall be done before or after these dates without Project Engineer's written approval.

C. Equipment shall utilize water as carrying agent utilizing continuous built-in agitation system. Equipment with a gear pump is not acceptable.

D. Pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of material over designated areas.

3.5 Provisional Inspection and Acceptance

A. Acceptance of hydroseeded areas shall be based on a uniform stand of grass with no bare spots over 6" square at the time of provisional inspection.

B. All areas failing to vigorously establish within 90 days after germination or a growing season, whichever is longest, shall be re-seeded.

C. Reseed at the original rate and fertilize with 12-24-24 at the rate of 6 lbs. per 1,000 square feet.

D. Uniform stand of grass is required for final acceptance.

END OF SECTION