

# SHERWOOD SKATEPARK

SHERWOOD, OREGON

## **TECHNICAL SPECIFICATIONS**

For Sherwood Skatepark at 20300 SW Pacific Hwy. Sherwood, Oregon

December 12, 2018

## SUBMIT REQUESTS FOR INFORMATION TO:

Craig Sheldon, Public Works Director City of Sherwood 15527 SW Willamette Street Sherwood, OR 97140 Phone: (503) 925-2310 Email: <u>SheldonC@SherwoodOregon.gov</u>

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#### 1.1 BID INFORMATION

- A. Bidder:
- B. Project Name: Sherwood Skatepark
- C. Project Location: 20300 SW Pacific Hwy., Sherwood, OR.
- D. Owner: City of Sherwood
- E. Landscape Architect: Mears Design Group, LLC.
- F. Landscape Architect Project Number: 1736.
- G. Construction Project Manager/Owner's Representative: Craig Sheldon City of Sherwood Public Works Director.
- H. All work is to be governed by the current IBC.
- I. Submitted bids are to include current State of Oregon prevailing wage rates. By signing this form bidder certifies all sums include current State of Oregon prevailing wage rates.
- J. Bids submitted to:

DATE: TIME: MAIL TO:	<u>Thursday – January 3, 2019</u> . 2:00 P.M. Attn: Craig Sheldon 15527 SW Willamette Street Sherwood, OR 97140
CONTACT:	Attn: Craig Sheldon 15527 SW Willamette Street Sherwood, OR 97140
MANDATORY PRE BID MEETING	Wednesday - December 19, 2018 1:00 P.M. 15527 SW Willamette Street Sherwood, OR 97140

#### 1.2 BASE BID

A. Construction Documents (Sheets SP0 – SP14 and Technical Specifications) Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Mears Design Group, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:



1.3

Α.

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City of Sherwood is requiring base bid to be listed in separate bid sections as identified below for items 1 - 6:

1. Site demolition, excavation, grading, drainage and concrete preparation (including temporary fencing):

Dollars \$	).
	<i></i>

2. Skatepark miscellaneous metals (rebar, edging, steel coping and railings):

	Dollars \$).			
3.	Specialty concrete placement (all concrete within skatepark perimeter):			
	Dollars \$).			
4.	Water Quality Facility re-grading and rip rap placement (refer to plan sheet SP16 – SP18):			
	Dollars \$).			
5.	Landscape and Irrigation (refer to plan sheets SP16 – SP21 and Technical specifications):			
	Dollars \$).			
6.	Alternate No. 1 – Concrete flatwork and ADA curb ramps (outside of skatepark defined area as shown on plan sheet SP8):			
	Dollars \$).			
SUBCONTRACTORS AND SUPPLIERS				
The	following companies shall execute subcontracts for the portions of the Work indicated:			
1. 2.	Planting Work:			
	Irrigation Work:			
3.	Concrete Work:			
4.	Storm Drainage Work:			



5. Site Grading Work: \_\_\_\_\_

#### 1.4 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Owner and shall fully complete the Work within (**180**) one hundred eighty calendar days.

## 1.5 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
  - 1. Addendum No. 1, dated \_\_\_\_\_\_.
  - 2. Addendum No. 2, dated \_\_\_\_\_\_.
  - 3. Addendum No. 3, dated \_\_\_\_\_\_.
  - 4. Addendum No. 4, dated \_\_\_\_\_.

## 1.6 CONTRACTOR'S LICENSE/INSURANCE CERTIFICATES

- A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in the State of Oregon, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.
- B. The undersigned is required to supply owner with certificates of insurance.
  - 1. Workers' Compensation insurance provisions: statutory limits.
  - 2. Commercial General Liability insurance.

#### 1.7 SUBMISSION OF BID

Α.	Respectfully submitted this day of	, 2019.
В.	Submitted By	(Name of bidding firm or corporation).
C.	Authorized Signature:	(Handwritten signature).
D.	Signed By:	(Type or print name).
E.	Title:	(Owner/Partner/President/Vice President).
F.	Witness By:	(Handwritten signature).
G.	Attest:	(Handwritten signature).
Н.	Ву:	(Type or print name).

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## SECTION 00 4113 BID FORM

## END OF DOCUMENT 00 4113

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## PART I GENERAL

- 1.1 GENERAL SCOPE OF WORK
  - A. All work contained in this Section is considered specialty Skateboard Park construction. Only those contractors that meet the minimum experience requirements contained in the QUALITY ASSURANCE Section of this specification may perform this work as specified herein.
  - B. This section identifies the qualifications that the Bidder and/or Sub-contractors shall meet prior to the award of the contract.
  - C. Complete qualifications and this form must be turned in WITH THE BID.

#### 1.2 SPECIALTY CONCRETE CONTRACTOR MANDATORY QUALIFICATIONS

- A. Shall have been in business under the current name for a minimum of (7) seven years.
- B. Shall have constructed a minimum of (10) ten concrete cast-in-place skateparks within the past (10) ten years.
- C. Shall have experience in constructing skateparks in phases.
- D. Shall have ACI certified shotcrete nozzlemen for constructing ramps and transitions areas.
- E. All concrete finish of the skatepark must be hard troweled smooth in addition to the items as noted on plans.
- F. Shall have experience in skate-able concrete art features.

#### 1.3 RELATED WORK BY OTHERS

A. CITY OF SHERWOOD of Sherwood – Vegetated Corridor invasive and noxious weed removal.

#### 1.4 REGULATIONS

The work shall conform to requirements of the American Concrete Institute (ACI) and the State of Oregon Building Code and/or Uniform Statewide Building Code (USB) for concrete finishing, as supplemented and modified on drawings of herein.

- 1.5 REFERENCE STANDARDS: The Concrete Finishing shall conform to requirements of the following Reference Standards or as modified and supplemented on drawings hereinafter.
  - A. American Concrete Institute (ACI) Specifications for Structural Concrete for Buildings ACI 301
  - B. ACI Recommended Practice for Cold Weather Concreting, ACI 306
  - C. ACI Recommended Practice for Hot Weather Concreting, ACI 605
- 1.6 WORK SEQUENCE



#### SECTION 01 0000 GENERAL REQUIREMENTS

Sherwood Skatepark

- A. Work to begin Date: \_\_\_\_\_, weather permitting (approximate)
- B. Work to be substantially completed on Date: \_\_\_\_\_, weather permitting.

## 1.7 PRE-ORDERED PRODUCTS

A. Owner will provide all materials to complete project. Contractor must keep track of materials used and provide owner with checklist of materials at the time of payment submittals.

## 1.8 QUALITY ASSURANCE:

A. Skateboard Parks are not considered standard concrete flatwork. Where indicated to be exposed, Skateboard Park concrete is architecturally finished concrete represented in the form of complex and unique shapes. Typical Skateboard Park features will incorporate concave and convex transitioning between surfaces, which require the specified finishes to sculpturally blend along compound radius curves. It is critical that Skateboard Park concrete work be completed with a high level of precision for the skate facility to function properly and safely. Special care must be taken to provide the specified finished surfaces without gravel pockets, and other defects/defacements. The Landscape Architect shall inspect concrete after removal of forms and before concrete repair work begins. Concrete that does not meet the requirements of the specifications shall be rejected by the Landscape Architect and removed and replaced in its entirety by the Contractor at the Contractors expense.

#### 1.9 QUANTITY ALLOWENCES

A. Whenever in the Specifications, an article, device or pieces of equipment are referred to in singular number, such reference shall include as many such items as are shown on Drawings or required to complete installation

#### 1.10 MEASUREMENTS AND PAYMENTS

A. Quantities: As shown on Drawings. It is the responsibility of the Contractor to verify the quantity of each bid item prior to submission of bid.

#### 1.11 ALTERNATES

A. Alternate No. 1 – Sidewalk, curb ramps, landscape and irrigation along SW Woodhaven Road as called out on design plans.

#### 1.12 COORDINATION

A. Ordering Materials: Order and schedule materials in ample time to avoid delays in construction. If an item is found to be unavailable, notify the Landscape Architect immediately.

#### 1.13 FIELD ENGINEERING

A. Property lines and existing improvements are indicated on Drawings. Contractor shall establish primary construction control lines and be responsible for accuracy of the layout of his work. Verify all lines, levels and dimensions shown on Drawings. Report any errors or



discrepancies to Landscape Architect before proceeding with the work. Verify location of all underground utilities with local utility company.

## 1.14 REGULATORY REQUIREMENTS

- A. <u>Contractor is responsible for all permits and licenses required to complete work as specified</u> <u>and shown on the Drawings.</u> (The Contractor is also responsible for any required fees).
- B. <u>Work Hours:</u> 7:00 AM to 5:00 PM, (5) five days a week. (No work on Sundays).

## 1.15 REFERENCE STANDARDS

A. References in the Technical Specifications to Standard Specifications issued by the following organizations shall mean edition current on date of Advertisement for Bids, unless otherwise noted. Wherever referenced Standard Specifications contain provisions which conflict with the Contract Documents, the Contract Documents shall govern.

## 1.15 SUBMITTALS

- A. CONTRACTOR EXPERIENCE
  - 1. To be considered a qualified and responsible Bidder, the Bidder shall provide documentation establishing that the Bidder and /or subcontractor has satisfied the experience requirements listed below:
    - a. The Skateboard Park Contractor must have been an established business for at least 5 years and under the current name bidding and have long standing experience and understanding of construction building skateparks.
    - b. Experience completing at least 7 concrete poured in place skateparks of similar size 12,000 sq. ft. or larger under current bidder name.
    - c. Have at least 3 references for concrete skate-able art work.
    - d. Experience of completing at least one skatepark 13,000 sq or in the last 3 years selfperformed with the inclusion of a bowl and street features. The Park must have been open at least one year.
    - e. Installation of storm drainage systems in conjunction with Skateboard park components.
    - f. Shaping of earthwork to specified radius.
    - g. Experience creating the following in facilities specifically intended for skateboarding: cast in place concave and convex shaped concrete elements containing compound radius curves that must be precisely shaped in order to function as intended.
    - h. Experience in application of vertical and horizontal shotcrete work, including horizontal and vertical radius transitions that include compound radius curves and blends, formed concrete, grinding rails, and associated concrete reinforcement as needed.



- i. The Contractor shall be skilled with the installation of steel coping edges, smooth flowing seemless transition areas, and smooth trowel concrete finish work.
- j. Layout, fabrication, and construction of the steel coping.
- k. Installation of concrete flatwork between bowled areas.
- I. Certification: Nozzlemen certification shall be in accordance with ACI 506.3R (ACI Certified Shotcrete Nozzlemen)

#### 1.16 PROTECTION

A. Protect persons and adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations, including materials driven by wind.

#### 1.17 REPAIRS:

- A. Immediately after the removal of forms inspect all surfaces for defects.
- B. Repair or patch defects only after defects are inspected by the Landscape Architect and then only with the Landscape Architects permission. Do all cutting and repair within 48 hours after removal of forms; cure repairs same as the new concrete.

#### 1.18 FINISHES FOR FORMED SURFACES:

- A. Rough Form Finish: Provide for surface of walls and footings adjacent to grade or below grade. This is the concrete surface having texture impacted by form facing material use with tie holes and defective areas repairs and patched and fins and other projections exceeding ¼ inch in height rubbed down or chipped off
- B. Smooth Formed Finish: Provide a smooth formed finish on formed concrete surfaces exposed to view. This is a cast in place concrete surface obtained with selected form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch honeycombs and defective areas as directed by the Landscape Architect.
- C. Sacked Finish:
  - 1. On all inconsistent surfaces of the exposed concrete, provide a sacked finish by coating the concrete with sacking mortar. Sacking of patched or defective concrete surfaces may be required by the Landscape Architect for areas not otherwise already requiring this work.
  - 2. Repair and patch tie holes, honeycombs and defective areas and trowel to smooth finish. Remove fines and other projections completely.
  - 3. Thoroughly wet surface to prevent absorption.
  - 4. Coat entire surface with sacking mortar as soon as surface of the concrete approaches surface dryness.



- 5. Thoroughly and vigorously rub mortar over area with clean burlap pad to fill all voids.
- 6. While mortar is still plastic but partially set (so that it may not be pulled from the voids) sack-rub surface with dry mix of mortar on the concrete surface, except in the voids: all surfaces should be uniformly textured.
- 7. Immediately begin a continuous moist sure for 72 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated. Provide for face surface of walls adjacent to plaza area.

## 1.19 FINISHES FOR UNFORMED SURFACES:

- A. Screed all slabs, for whatever finishes, to true levels or slopes, work surfaces only to the degree required to produce the desired finish; do no finishing in areas where the water has accumulated until they have been drained and excess moisture has dried. Carefully finish all joints and edges with proper tools, unless otherwise specified.
- B. Rough Screed Finish: Consolidate, level, and screed all surfaces to obtain evenness and uniformity; remove all surplus concrete after consolidation by striking off with sawing motion against guide strips.
- C. Float Finish: Apply float finish to monolithic slabs to receive a trowel or other finish. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using floats appropriate to the surface contours only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power –driven floats, or both. Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to tolerances of floor flatness and floor levelness measured according to ASTM E 1155. Uniformly slope surfaces to drains. Cut down high spots and fill low spots immediately after leveling, re-float surface to a uniform, smooth, granular texture.
- D. Hard Trowel Finish: After floated surface is firm enough to receive steel trowels, trowel at least two complete passes, or until the last stage before blackening. Leave no trowel marks discernible to the touch. Do not use excessive water, especially on the last pass.

#### 1.20 CURING:

- A. Protect concrete surfaces against rapid drying. Apply clear spray on cure agent after final finish is achieved. Keep sealed with cure agent for necessary amount of time to reach concrete strength and inhibit moisture loss after placing per manufacturer's recommendation.
- B. During the Curing: In addition to the initial overnight curing, continue final curing operations until the cumulative number of days of fractions thereof (not necessarily consecutive) occurs, during which time the temperature of the air in contact with the concrete is above 50 degrees F, equals 7 days. Curing period considered done when compressive strength is reached. If



#### SECTION 01 0000 GENERAL REQUIREMENTS

high-early strength concrete has been used continue final curing operation for 3 days total time, calculated as before. Take care to prevent rapid drying at the end of the curing period. Early removal of forms will not be approved when forms are removed during the curing period.

## 1.21 INSPECTION:

A. Contractor shall notify LANDSCAPE ARCHITECT that they are starting concrete finish repair work at least 5 days prior to the beginning of work.

## 1.22 REJECTIONS:

- A. Defects in the concrete including lack of uniformity, exhibits segregation honeycombing, or lamination, or which contains any dry patches, slugs, voids, pockets or does not meet the radius requirements of the design shall be rejected by the LANDSCAPE ARCHITECT. The CONTRACTOR in charge of the specific scope of work shall remove and replace mock up for the LANDSCAPE ARCHITECT'S approval at no additional cost to the CITY OF SHERWOOD.
- 1.23 CLEANING: Leaving premises clean and free of residue from work in this section.
- 1.24 PROTECTION AND SITE SECURITY FROM VANDALISM: It shall be the contractor's responsibility to protect the site from theft and vandalism.

## 1.25 CONCRETE JOINTS

- A. Cleaning: The entire joint shall be thoroughly cleaned and wetted prior to the application of additional shotcrete.
- B. Reinforcement: Make joints perpendicular to the main reinforcement. Continue reinforcement across joints.
- 1.26 CONCRETE CURING AND PROTECTION
  - A. Curing Agent: Apply curing agent, blankets, or plastic after final finish is achieved. CONTRACTOR to remove cure agent at end of cure period and power wash all walls prior to final acceptance.

## 1.27 REJECTIONS

A. Mock-ups shall be completed to the satisfaction of the LANDSCAPE ARCHITECT including aggregates, texture, color, and finishes. If mock-ups are rejected by the LANDSCAPE ARCHITECT, the CONTRACTOR in charge of the specific scope of work shall remove and replace mock up for the LANDSCAPE ARCHITECT'S approval at no additional cost to the CITY OF SHERWOOD.



- B. If Mock-ups are damaged, removed, the CONTRACTOR in charge of the specific scope of work shall repair/replace in-kind immediately at no additional cost to the CITY OF SHERWOOD.
- C. Defects in the shotcrete including lack of uniformity, exhibits segregation honeycombing, or lamination or which contains any dry patches, slugs, voids or pockets shall be rejected by the LANDSCAPE ARCHITECT. The CONTRACTOR in charge of the specific scope of work shall remove and replace the mock up for the LANDSCAPE ARCHITECT'S approval at no additional cost to the CITY OF SHERWOOD.
- D. Radial wall finishes shall consist of smooth, hard, uniform surface of smooth trowel with a level tolerance of 1/10" within 10 feet when tested with a 10 foot steel straightedge placed on the surface horizontally and vertically. Grinding the surfaces will not be an acceptable means of achieving the intended radii and uniformity shall be approved by the LANDSCAPE ARCHITECT. If rejected, the CONTRACTOR in charge of the specific scope of work shall remove and replace mock up for the LANDSCAPE ARCHITECT'S approval at no additional cost to the CITY OF SHERWOOD.
- 1.27 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
  - A. General Reference Points: Before starting work, locate all general reference points. Take such steps as necessary to prevent their dislocation or destruction. If destroyed or disturbed, replace as directed.
  - B. Project Construction Limits: The contractor is to confine his activities to the Owner's property and to that portion of the project reasonably adjacent to the actual construction area. <u>Clean-up of work area is required at the end of each day's work</u>.
  - C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

#### 1.28 TEMPORARY UTILITIES

A. Contractor to provide own job trailer. Verify Trailer location with Owner's Representative.

#### 1.29 BARRIERS

A. Construct necessary barricades, fences, railings, signs, and temporary enclosures as required during construction period. Remove barriers prior to final completion and repair surfaces damaged by erection of barricades.

## 1.30 SECURITY

A. Protection of Work and Property: Protect utilities and all other public and private facilities and improvements which are to remain in place.

## 1.31 TEMPORARY CONTROLS



- A. Construction Cleaning: <u>Spillage resulting from hauling or other operations of the Contractor</u> along or across any public traveled way shall be removed at once by the Contractor at his <u>own expense.</u>
- B. Dispose of accumulation of rubbish and debris in satisfactory manner. Allow no excess accumulation of non-reusable material at job site.

#### 1.32 NOISE CONTROL

A. At all times during his work, the Contractor shall exercise care to prevent unnecessary noise from his operations and those of his employees and subcontractors and maintain such noise at a minimum level.

## 1.33 SUBSURFACE WATER CONTROL

A. Perform pumping, trenching, damming and underdraining necessary to keep site free from water during construction. Dispose of water in manor acceptable to the local regulation, taking care to ensure that no existing water disposal facilities are impeded, clogged, damaged, or interfered with.

## 1.34 TRAFFIC REGULATION

- A. Restrictions: The Contractor shall so conduct his operations as to cause the least possible obstruction and inconvenience to the Owner.
- B. Traffic control required to adhere to (MUTCD) Manual of Uniform Traffic Control Devices requirements. Review with Owner's Representative prior to starting work.
- 1.35 PROJECT IDENTIFICATION SIGNS
  - A. Project Signs: None Required
- 1.36 STORAGE AND PROTECTION
  - A. Storage: Contractor is responsible for storing materials as to ensure the preservation of their quality and fitness for work. Stored materials shall be located so as to facilitate prompt inspection.
  - B. Protection: Contractor is responsible for adequate protection of all materials to be used on project from damage and where applicable, intrusions of moisture.

#### 1.37 FINAL CLEAN-UP

- A. Upon completion of any portion of work, promptly remove temporary facilities generated by that portion of the work including surplus materials, equipment and machinery if so directed by the Landscape Architect, or the Owner; upon completion of the work, completely remove remaining temporary facilities. The Contractor shall also clean up street, and adjacent work areas.
- B. All work areas are to be cleaned up upon completion of each work day including all adjacent hard surfaces.



#### 1.38 PROJECT RECORD DRAWINGS

- A. Project Documents: Maintain at job site one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, Field Orders, other Contract modifications, and other approved documents submitted by Contractor in compliance with various sections of the Specifications.
- B. Project Record Drawings:
  - 1. Upon commencement of project, obtain and clearly mark one complete set of drawings "Record Drawings" to be maintained neat, clean, protected and marked clearly with red pencil showing all deviations from the drawings.
  - 2. Information given shall include, but not be limited to, the location of underground utilities and appurtenances, irrigation lines and equipment, provided under this contract, referenced to permanent surface improvements.
  - 3. Keep Project Record Document current. Do not permanently conceal any work until required information has been recorded and required inspections have taken place and been signed off and dated.

## 1.39 SUBMITTALS

- A. Upon completion of the Project and prior to final acceptance, submit to the Landscape Architect an original set of Project Record Drawings.
- 1.40 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS N/A
- 1.41 GUARANTEES
  - A. <u>Provide written certification</u> that all work has been completed in strict compliance with Drawings and Specifications before requesting final inspection. Irrigation system to be guaranteed for one year after final acceptance.
- 1.42 FINAL PUNCH LIST
  - A. CITY OF SHERWOOD Representative shall prepare punch list when notified by Contractor that work is completed. CITY OF SHERWOOD Representative will conduct one final inspection only. (Note: Failure of CITY OF SHERWOOD Representative to include any items on punch list does not alter responsibility of Contractor to complete work in accordance with Contract Documents.) Deliver all items called for herein under various specification sections to CITY OF SHERWOOD Representative at completion of work.

## END OF SECTION 01 0000



#### SECTION 03 1100 CONCRETE FORMING

## PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Forms for stair risers, stringers, and landing slabs.
  - 2. Forms for curbs, walks, ramps and gutters.
- B. Related Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 31 2200, Grading Skatepark: Excavation for concrete slab base aggregates.
  - 3. Section 31 2300, Excavating, Backfilling, and Compacting Skatepark: Excavating and compacting for footings and foundation and retaining walls.
  - 4. Section 03 3010, Portland Cement Concrete Skatepark.
  - 5. Section 03 2000, Concrete Reinforcing Skatepark: Steel reinforcing.
  - 6. Section 03 3000, Cast-In-Place Concrete Skatepark: Site cast concrete.
  - 7. Section 05 5000, Metal Fabrications Skatepark: Concrete anchor bolts and steel pipe sleeves.

#### 1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
  - 1. Design formwork to support structural loads and hold concrete to correct size, alignment, and shape.

## 1.3 SUBMITTALS

- A. Product Submittals:
  - 1. Submit product data for formwork accessories.
  - 2. Submit shop drawings for architectural concrete wall patterns and reveals.
- B. Quality Assurance Submittals:
  - 1. Submit design drawings for structural concrete formwork.

## PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Substitute Manufacturers:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

#### 2.2 COMPONENTS

- A. Smooth Vertical Concrete Forms:
  - 1. Smooth Plywood: Plyform, B-B, Class I.
  - 2. Cylindrical Forms: Smooth faced, wood fiber.
- B. Textured Vertical Concrete Forms:
  - 1. Textured Form Liners: Fiberglass reinforced polyester, 302 by Greenstreak, or matching texture by L.M. Scofield or Symens.

- 2. Disposable Textured Form Liners: Polystyrene by The Burke Company.
- C. Horizontal Concrete Forms:
  - 1. Pan Forms: 16 gage galvanized steel.
- D. Form Accessories:
  - 1. Recess Cones for Exposed Form Ties: 1 inch deep and 1 inch diameter.
  - 2. Concealed Form Ties: Adjustable metal ties.
  - 3. Chamfer Strip: 1 inch radius.
  - 4. Form Joint Tape: Closed cell PVC foam.
  - 5. Reglets: Galvanized steel.
  - 6. Expansion and Isolation Joint Fillers: Expanding cork, 1/2 inch thick, ASTM D 1752, Type III.
  - 7. Expansion Joint Filler Cap: 1/2 inch deep, 1/2 inch wide, 941 by JEF, Inc.
  - 8. Tongue and Groove Keyed Joint Fillers: Reinforced asphalt core between asphalt saturated felt liners, 1/4 inch thick with 1 inch deep and 2-1/2 inches at base of trapezoid, full depth of concrete slab, 10 feet long, with punched holes 24 inches on center for stakes and 30 inches on center for dowel bars.
  - 9. Construction Joints: 1 inch deep. 2-1/2 inch minimum at base of trapezoid, 24 gage galvanized steel or plastic keyway.
  - 10. Control Joint Forms: 1 inch deep, PVC, JEF Zip Joint by JEF Inc.
  - 11. Footing Waterstops: Bentonite clay strips.

## PART 3 EXECUTION

#### 3.1 PERFORMANCE

- A. Site Fabrication of Formwork:
  - 1. Comply with requirements in ACI 117, ACI 301, and ACI 347.
  - 2. Camber and reinforce forms to meet 1/4 inch in 10 feet maximum deflection.
  - 3. Install chamfer strip at vertical external corners of exposed concrete.
  - 4. Coat formwork with form release agent prior to placing reinforcing steel.
  - 5. Install anchor bolts to support other Work.
  - 6. Install sleeves for penetrating pipes.
- B. Installation of Joints:
  - 1. Install keyed joints at center of slabs on grade and anchor with steel stakes at 24 inches on center.
  - 2. Install keyed joints between footings and retaining and foundation walls.
  - 3. Install construction joints at locations which will not impair concrete strength or appearance.
  - 4. Install footing waterstops on footing concrete 3/4 inch inside the exterior wall formwork panels.
  - 5. Install wall waterstops at retaining and foundation wall cold joints.
  - 6. Install isolation joints in floor slabs at penetrating items.
  - 7. Install expansion and control joints in slabs on grade at spacing indicated on Drawings.
  - 8. Install exterior expansion joints at not more than 30 feet on center.
- C. Site Fabrication of Shoring:
  - 1. Fabricate shoring with wedges or adjustable jacks.
  - 2. Camber forms for anticipated deflections.

## **City of Sherwood Public Works**

15527 SW Willamette Street Sherwood, OR 97150 Phone: 503.625.5722



## 3.2 COMPLETION

- A. Adjusting and Cleaning Forms Prior to Placing Concrete:
  - 1. Verify dimensions and location of joints and adjust forms and joints as required to meet design tolerances.
  - 2. Clean interior form surfaces prior to placing concrete.
  - 3. Apply water to base aggregate prior to placing concrete.
- B. Adjusting Forms After Placing Concrete:
  - 1. Examine form dimensions and adjust forms to meet required tolerances.
- C. Formwork Removal:
  - 1. Remove forms and shores in conformance with Section 3.7 in ACI 347.
  - 2. Do not pry against concrete surface during removal of formwork.

## END OF SECTION 03 1100

City of Sherwood Public Works 15527 SW Willamette Street Sherwood, OR 97150 Phone: 503.625.5722



#### PART 1. GENERAL

- 1.1 RELATED WORK SPECIFIED ELSEWHERE
  - A. Concrete Forming: Section 03 1100
  - B. Cast-In-Place Concrete: Section 03 3000
  - C. Specialty Placed Concrete: Section 03 3700

#### 1.2 QUALITY ASSURANCE

- A. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
- B. Use only materials compatible with embedded concrete environment.

#### 1.3 SUBMITTALS

- A. Shop drawings for all anchors, inserts and embedded products (wall castings, pipes with seep rings, and special castings).
- 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING
  - A. Deliver and store all items to be embedded in a manner to prevent damage or contamination.

#### PART 2. PRODUCTS

#### 2.1 MATERIALS

- A. Anchor Bolts: ASTM A307, Steel unless otherwise noted.
- B. Threaded or Slotted Inserts: Galvanized malleable iron or stainless steel size and type as specified.

#### PART 3. EXECUTION

#### 3.1 INSTALLATION

- A. Coordinate the location and placement of all items to be embedded in concrete.
- B. Coat any embedded aluminum with asphalt paint.
- 3.2 EMBEDDING
  - A. Set accurately and hold in position all embedded products during placement until the concrete is set.
- 3.3 DRILLED IN GROUTED ANCHORS



#### SECTION 03 1519 CAST-IN-CONCRETE ANCHOR

**Sherwood Skatepark** 

A. In lieu of embedding anchor bolts and when approved, drill holes in hardened concrete and install the anchor bolts and other items with special mortars. Drill with diamond boring or coring bits. Bonding mortar shall be epoxy grout type. Blow holes clean and dry before installation of embedded items. Before insertion, coat both hole and the item to be embedded with bonding compound. Studs of equal size and length may be substituted for anchor bolts if nut fasteners are used. Drilled in studs or anchors utilizing mechanical expansion locking in any process areas shall not be used.

## END OF SECTION 03 1519

#### City of Sherwood Public Works 15527 SW Willamette Street Sherwood, OR 97150

Phone: 503.625.5722



## PART 1 GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Reinforcing bars for cast-in-place concrete.
  - 2. Welded wire fabric for cast-in-place concrete.
  - 3. Spiral reinforcing for concrete columns.
  - 4. Tie wire and reinforcing supports.
  - 5. Polypropylene fiber reinforcing for concrete slabs.
- B. Related Sections:
  - 1. Section 03 1100, Concrete Forming: Formwork for site cast concrete.
  - 2. Section 03 3000, Cast-In-Place Concrete Skatepark: Site cast concrete.

## 1.2 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit shop drawings for reinforcing steel.
  - 3. Submit mill test reports for Grade 60 reinforcing bars.

## PART 2 PRODUCTS

#### 2.1 COMPONENTS

- A. Steel Reinforcing:
  - 1. Standard Bars: ASTM A 615, Grade 60, except Grade 40 for ties and stirrups.
  - 2. Weldable Bars: ASTM A 706, Grade 60.
  - 3. Column Spiral Bars: ASTM A 616, Grade 50, plain.
  - 4. Wire Fabric: ASTM A 185 and UBC Standard No. 26-6, 6" x 6" W1.4/W1.4 in flat sheets.
- B. Reinforcing Accessories:
  - 1. Tie Wire: 16 gage, double annealed iron.
  - 2. Reinforcing Couplers: Capable of developing 125 percent of the specified yield strength of reinforcing, as manufactured by Lenton or Fox-Howlett.
  - 3. Chairs, Spacers, and Hangers: Galvanized steel for interior concrete and plastic coated steel for exterior concrete.
  - 4. Dowels: Smooth steel bars in diameter and length as indicated on Drawings.
  - 5. Dowel Caps: Crimp or welded type, 5 inches minimum length, F46 by JEF, Inc.

#### 2.2 FABRICATION

- A. Shop Fabrication:
  - 1. Comply with CRSI Manual of Standard Practice, MSP-1, ACI 301, ACI 315, and ACI 318.
  - 2. Attach identification tag to each bent reinforcing bar.
  - 3. Shop bend reinforcing around small openings not more than 1 in 10.



#### SECTION 03 2000 CONCRETE REINFORCING

## PART 3 EXECUTION

- 3.1 PERFORMANCE
  - A. Installation of Reinforcing Steel:
    - 1. Comply with CRSI Manual of Standard Practice, MSP-1.
    - 2. Comply with UBC and ACI 318, Chapter 7 for minimum concrete cover over reinforcing steel.
    - 3. Stagger reinforcing bar splices 48 inches minimum at alternate bars.
    - 4. Lap continuous deformed bars 36 diameters and not less than 24 inches.
    - 5. Reinforce corners and intersections with 24 inch by 24 inch corner bars.
    - 6. Install two Number 5 bars around wall openings larger than 30 by 30 inches.
  - B. Installation of Fibrous Reinforcing:
    - 1. Add fibrous reinforcing to interior concrete floor slabs on grade as recommended by fiber manufacturer.
  - C. Installation of Reinforcing Accessories:
    - 1. Wire tie reinforcing as indicated in CRSI Manual of Standard Practice.
    - 2. Install reinforcing couplers and splices in reinforcing.
    - 3. Locate and support reinforcing with metal chairs, bolsters, spacers, and hangers as required.

#### 3.2 COMPLETION

- A. Adjusting and Cleaning:
  - 1. Replace damaged and defective reinforcing steel.
  - 2. Remove dust from reinforcing prior to placing concrete.

#### END OF SECTION 03 2000



#### SECTION 03 3000 CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Site cast concrete for footings, foundation walls, retaining walls, load bearing walls, columns, floor slabs on grade, composite floor slabs, composite roof slabs, stair treads, and stair landing slabs.
    - 2. Finishing, hardening, and curing site cast concrete.
  - B. Related Sections:
    - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications Volume 1 and Volume 2.
    - 2. Section 32 1124, Aggregate Base Course Skatepark: Aggregate base, vapor retarder, and filter fabric for concrete slabs on grade.
    - 3. Section 03 3010, Portland Cement Concrete Skatepark.
    - 4. Section 03 1100, Concrete Forming: Concrete formwork and formwork accessories.
    - 5. Section 03 2000, Concrete Reinforcing Skatepark: Reinforcing bars, welded wire fabric, and fiber reinforcing.

## 1.2 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications Volume 1 and Volume 2.
  - 2. Submit product data for concrete accessory materials.
  - 3. Submit shop drawings for architectural concrete wall patterns and reveals.
- B. Quality Assurance Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit mix design at least 10 days prior to delivery of concrete.
  - 3. Submit copies of test reports for concrete.
  - 4. Submit batch tickets from concrete supplier.

## 1.3 QUALITY ASSURANCE

- A. Field Samples:
  - 1. Provide 100 square foot field sample of textured and sand blasted concrete walls.
- B. Mock-Ups:
  - 1. Provide 20 square foot mock-up panel of textured and sand blasted concrete.

#### 1.4 SITE CONDITIONS

- A. Environmental Requirements:
  - 1. Maximum Wind Velocity for Unprotected Concrete: 15 mph.
  - 2. Temperature Range for Ambient Air During Concrete Placement: 40 to 80 degrees F.
  - 3. Temperature Range for Ambient Air During Epoxy Bonding Grouts: 40 to 85 degrees F.
  - 4. Precipitation: None forecast for 8 hours after placing unprotected concrete.
- B. Substrate Conditions:



1. Maintain concrete substrates free of excessively dry, soft, muddy, or frozen subgrade soils.

## PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Substitute Manufacturers:
  - 1. Submit substitution requests prior to Bid Date.
  - 2. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

## 2.2 COMPONENTS

- A. Concrete Materials:
  - 1. Portland Cement: ASTM C 150, Type I or II and IA or IIA.
  - 2. Standard Aggregates: ASTM C 33.
  - 3. Lightweight Aggregates: ASTM C 330.
  - 4. Seeding Aggregates: 3/8 inch to 5/8 inch diameter round.
  - 5. Small Aggregates for Colored Hardener: 3/8 inch diameter.
  - 6. Air-Entraining Admixture: ASTM C 260.
  - 7. Chemical Admixtures: ASTM C 494, Type A, water reducing or Type D, water reducing and retarding.
  - 8. Mineral Admixture: ASTM C 618, Class F or Class C.
- B. Concrete Accessories:
  - 1. Exterior Curing Compounds: Solvent based acrylic, ASTM C 309, Type 1, Clear, Spartan-Cote by The Burke Company, J-21 Acrylic Cure, Seal & Dustproofer 19 by Dayton Superior, Clear Seal 150 by A.C. Horn, Master Seal by Master Builders, Kure-N-Seal by Sonneborn.
  - 2. Clear Acrylic Sealers: Aggre Glaze by The Burke Company, Traz by Chem-Masters, J-25 Acrylic Sealer Gloss 25 by Dayton Superior, Horntraz by A.C. Horn, TIAH by W.R. Meadows, Sono-Glaze or White Roc-9 by Sonneborn, Thoroglaze H by Thoro System Products.
  - 3. Nonmetallic Dust-On Floor Hardeners: Quartz sand hardeners, Nonmetallic Quartz Sand by The Burke Company, Floorcron Natural color by Gifford-Hill, Colorundum, Type 2, Natural color by A.C. Horn, Mastercron Ready-mixed by Master Builders, Harcol Redi-Mixed, Natural color by Sonneborn, Hydroment Nonmetallic Floor Hardener.
  - 4. Emery Corundum Hardeners: Minimum 58 percent aluminum oxide, 24 percent iron oxide, and not more than 4 percent silica, Moh hardness 9/8, ACI Class 5, minimum compressive strength 12,000 psi in 28 days, Emery Tuff by Dayton Superior Corporation as distributed by JASCO, Portland, OR.
  - 5. Exterior Nonslip Aggregate: Not less than 95 percent pure aluminum oxide, Nonslip aggregate by Gifford-Hill, Alundum by Norton Company, Frictex N.S. by Sonneborn.
  - Acrylic Bonding Agent: ASTM C 932, Burke Acrylic Bondcrete by The Burke Company, J-40 Bonding Agent by Dayton Superior, Hornweld by A.C. Horn, Weld Crete by Larsen, Intralock by W.R. Meadows, Latex Bonding Agent by Sika, Sonocrete PB by Sonneborn, Thorobond and Acryl 60 by Thoro System Products.
  - 7. Epoxy Bonding Agent, Concrete to Concrete: ASTM C 881, 100 percent solids, epoxy resin and hardener, 881 LPL Epoxy by The Burke Company, Concressive 1001 LPL by Adhesive Engineering.
  - 8. Epoxy Bonding Agent, Concrete to Reinforcing Steel: ASTM C 881, 100 percent solids, epoxy resin and hardener, Concressive 1441 by Adhesive Engineering.
  - 9. Patching Compound: Two component cement base and acrylic polymer compound, 5,000 psi in 28 days minimum compressive strength, Burke Acrylic Patch by The Burke Company,



#### SECTION 03 3000 CAST-IN-PLACE CONCRETE

Epolith Patcher or Sonopatch by Sonneborn.

- 10 Polyethylene Moisture Retaining Membrane: ASTM D 2103, Clear or white, 6 mils thick.
- 12. Reinforced Laminated Paper Moisture Retaining Membrane for Pedestrian Traffic Areas: ASTM C 171, Orange Label Sisalkraft by Fortifiber Corp.
- 13. Reinforced Laminated Paper Moisture Retaining Membrane for Non-Traffic Areas: ASTM C 171, Sisalkraft SK-10 by Fortifiber Corp.
- C. Proportion Adjustments:
  - 1. Mix designs may be adjusted when material characteristics, site conditions, weather, test results, or other circumstances warrant a revised mix design.
  - 2. Submit revised concrete mix design to Owner's Representative.
- D. Mixing Procedures:
  - 1. Comply with ASTM C 94.
  - 2. Mix full load of concrete for 3 minutes at high speed upon arrival at site.
  - 3. Mix concrete for an additional 5 minutes after adding water.
- E. Concrete Mix Requirements:
  - 1. Maximum Aggregate Size: 3/4 inch.
  - 2. Maximum Slump for Footings, Walks, Curbs, Exterior Slabs, and Floor Slabs: 4 inches + 1/2 to 1 inch.
  - 3. Maximum Slump for Walls, Columns: 3 inches + 1/2 to 1 inch.
  - 4. Entrained Air for Exterior Horizontal Surfaces: 6 percent + or 1 percent.
  - 5. Minimum Compressive Strength: f'c = 4,000 PSI (3,500 psi in 28 days).
  - 6. Water Reducing Admixtures: Type A or D.

## PART 3 EXECUTION

#### 3.1 PERFORMANCE

- A. Preparation:
  - 1. Notify Owner's Representative 24 hours prior to placing concrete.
  - 2. Remove ice and standing water from formed surfaces.
  - 3. Remove soft soils from subgrade and footing trenches.
- B. Cleaning for Epoxy Bonding of Structural Topping Slabs:
  - 1. Remove grease, wax, and oil contaminants with detergent or degreasing compound and follow with mechanical cleaning.
  - 2. Remove weak or deteriorated concrete by grit or water blasting.
  - 3. Remove dirt, dust, latent material, and curing compounds by grit blasting or as recommended by manufacturer.
  - 4. Finish concrete with vacuum cleaning.
- C. Cleaning for Epoxy Grouted Dowels:
  - 1. Blow holes out with oil free compressed air.
  - 2. Remove moisture, rust, dirt, oil, grease, protective coatings, and galvanizing from dowels in accordance with grout manufacturer's instructions.
- D. Concrete Placement:
  - 1. Consolidate concrete with hand rodding and mechanical vibrating.
  - 2. Level slabs to Class B, 1/4 inch in 10 feet.



- 3. Tool radius exterior slab and curb edges.
- 4. Tool form or saw form slab control joints.

## 3.2 FINISHING VERTICAL CONCRETE

- A. Rough Form Finishing Concealed Vertical Concrete Surfaces:
  - 1. Comply with ACI 301, paragraph 10.2.1, remove fins and projections exceeding 1/4 inch in height and patch tie holes and surface defects.
- B. Smooth Form Finishing Exposed Vertical Concrete Surfaces:
  - 1. Comply with ACI 301, paragraph 10.2.2, remove fins and projections and patch tie holes and surface defects.
- C. Smooth Rubbed Finish for Exposed Curbs, Walls, Soffits, and Columns:
  - 1. Comply with ACI 301, paragraph 10.3.1, within 24 hours after form removal, wet and rub exposed surfaces with carborundum brick or other abrasive until uniform color and texture are produced.
- D. Grout Cleaned Finish for Exposed Curbs, Walls, Soffits, and Columns:
  - 1. Comply with ACI 301, paragraph 10.3.2, mixing 1 part portland cement and 1-1/2 parts fine sand with sufficient water to provide grout with consistency of thick paint and mix white cement with gray cement until grout matches color of surrounding concrete.
  - 2. Wet concrete surfaces, spray or brush apply grout, and immediately scrub the surface with cork float or stone.
  - 3. Remove excess grout, while plastic, with rubber float or burlap sack and after surface whitens from drying, rub concrete surface vigorously with clean burlap.
  - 4. Keep concrete surface damp for 36 hours after rubbing.
- E. Sandblasting Wall and Column Concrete Surfaces:
  - 1. Provide a smooth rubbed finish as specified in subparagraph 3.2.C. above and sandblast to match finish on mock-up or field samples.

#### 3.3 FINISHING HORIZONTAL AND INCLINED CONCRETE

- A. Floated Slab Surface to Receive a Troweled, Broomed, Seeded, Dry Shake, Colored hardener, and Washed Aggregate Finish:
  - 1. Comply with ACI 301, paragraph 11.7.2, begin floating when concrete surface has stiffened sufficiently to permit float finishing.
  - 2. Check planeness of surface with a 10 foot straightedge at two angles during the first floating, level concrete to Class B, 1/4 inch in 10 feet, and refloat immediately to a uniform sandy texture.
- B. Slab Finishing:
  - 1. Trowel to Class A, 1/8 inch in 10 feet, for slabs on grade and to Class B, 1/4 inch in 10 feet, for slabs on steel deck and steel stair landings.
  - 2. Provide a broom finish for exterior walks and ramps complying with ACI 301, paragraph 11.7.4, by drawing a broom or burlap belt across the surface to give the slab a course transverse scored texture.
  - 3. Provide a troweled nonslip double coat dry shake finish for skate park loading docks in areas indicated on Drawings, complying with ACI 301, paragraph 11.7.7.
  - 4. A chemical retarder may be sprayed on floated concrete surface to extend the working time for exposure of seeding aggregate.



#### SECTION 03 3000 CAST-IN-PLACE CONCRETE

- 5. Hand trowel around score lines at textured colored hardener finished concrete to provide smooth score lines after removal of metal forms.
- E. Curing Procedures:
  - 1. Špray apply exterior curing compound on exterior horizontal concrete surfaces at manufacturer's recommended rate.
  - 2. Apply sheet covering over interior concrete slabs scheduled to be covered with resilient and carpet flooring.
  - 3. Apply interior concrete curing and hardening compound at manufacturer's recommended rate on interior concrete slabs scheduled to remain exposed.
  - 4. Apply 3 coats of interior fluosilicate hardener to dry concrete in diluted proportions recommended by manufacturer for porosity and finish of concrete, 14 to 28 days after concrete pour, and remove dried surplus hardener by scrubbing and mopping with water.
  - 5. Apply 60 pounds of dust-on hardener per 100 square feet on loading dock slabs and workshop slabs.

#### 3.4 COMPLETION

- A. Field Quality Control:
  - 1. Test cured cylinders prior to removing shoring under structural concrete.
- B. Surface Repairs for Exposed Concrete Vertical Surfaces:
  - 1. Clean, dampen with water, and brush the patch substrate with bonding agent.
  - 2. Fill voids and rock pockets with patching compound and compact in place and screed as recommended by patching compound manufacturer.
  - 3. Finish exposed concrete surfaces to match adjoining surfaces.
  - 4. Remove and replace the concrete if defects in color and texture of surface cannot be repaired.
- C. Surface Repairs for Interior Concrete Floor Slabs:
  - 1. Grind or fill interior floor slab surfaces to remove defects of sufficient magnitude to show through the intended floor covering.
- D. Protection:
  - 1. Protect new uncured horizontal concrete with barricades.
  - 2. Protect concrete from frost damage until protected by soil backfill or until cured for 28 days.
  - 3. Protect concrete from physical damage or reduced strength caused by air temperatures below 35 degrees F. and above 75 degrees F. during curing period, complying with recommendations in ACI 306R and 305R respectively.
  - 4. Protect concrete from shrinkage crack damage until protected by curing procedure.

## END OF SECTION 03 3000



#### SECTION 03 3010 PORTLAND CEMENT CONCRETE

## PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Concrete curbs, ramps, stairs, slabs, ledges and walks.
- B. Related Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 03 1100, Concrete Forming Skatepark: Formwork for cast-in-place concrete.
  - 3. Section 03 2000, Concrete Reinforcing Skatepark: Reinforcing for building concrete.
  - 4. Section 03 3000, Cast-In-Place Concrete Skatepark: Site cast building concrete.

#### 1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Design formwork to support structural loads, hold concrete to correct size and alignment, and meet tolerances indicated in ACI 347 and ACI 301.
  - 3. Finish concrete curbs and walks with Class B tolerance, 1/4 inch in 10 feet maximum variation.

## 1.3 SUBMITTALS

- A. Product Submittals:
  - 1. Submit product data for concrete curing and hardening materials.
- B. Quality Assurance Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit laboratory and field test reports for concrete work.
  - 3. Submit batch tickets from concrete supplier to Owner's Representative complying with requirements of Article 16 in ASTM C 94.

## 1.4 SITE CONDITIONS

- A. Temperature and Weather Requirements:
  - 1. Do not place concrete when temperature or weather will affect performance or appearance of concrete.
  - 2. Minimum Ambient Temperature: 35 Degrees F.
- B. Substrate Requirements:
  - 1. Do not place concrete on muddy or frozen substrate.
  - 2. Remove mud, dirt, and ice from formwork surfaces.

## PART 2 PRODUCTS

2.1 MANUFACTURERS



- A. Substitute Manufacturers:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

## 2.2 MATERIALS

- A. Forms and Formwork Accessories:
  - 1. Exposed Plywood Forms: Plyform, Class I or II.
  - 2. Lumber and Steel Forms: Smooth face lumber or steel.
  - 3. Chamfer Strip: 1 inch radius.
  - 4. Steel Pipe Sleeves: ASTM A 53.
  - 5. Expansion and Isolation Joint Fillers: Self-expanding cork, 1/2 inch thick, ASTM D 1752, Type III.
  - 6. Form Joint Tape: Closed cell PVC foam with pressure sensitive adhesive on one side.
- B. Concrete Reinforcing:
  - 1. Steel Reinforcing Bars: ASTM A 615, Grade 60, except where indicated grade 40 on Drawings.
  - 2. Welded Wire Fabric: ASTM A 185, size as indicated on Drawings.
- C. Concrete Materials:
  - 1. Portland Cement: ASTM C 150, Type I or II.
  - 2. Aggregates: ASTM C 33.
  - 3. Water: Clean, free of oils, acids, organic material.
  - 4. Air-Entraining Admixture: ASTM C 260.
  - 5. Water-Reducing Admixture: ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding.
  - 6. Mineral Admixture: ASTM C 618, Class F or Class C.
- D. Solvent Based Acrylic Curing Compound:
  - 1. Industry Standard: ASTM C 309, Type 1, Clear.
  - Acceptable Compounds: Spartan-Cote by Burke, J-21 Acrylic Cure, Seal & Dustproofer 19 by Dayton Superior, Clear Seal 150 by A.C. Horn, Master Seal by Master Builders, Kure-N-Seal by Sonneborn.
- E. Nonslip Aggregate:
  - 1. Product Data: Not less than 95 percent pure aluminum oxide.
  - 2. Acceptable Oxide Aggregates: Nonslip aggregate by Gifford-Hill, Alundum by Norton Company, Frictex N.S. by Sonneborn.
- F. Bonding and Patching Compounds:
  - 1. Acrylic Bonding Agents: ASTM C 932.
  - 2. Epoxy Bonding Agents: ASTM C 881.
  - 3. Patching Compounds: Two component cement base and acrylic polymer, with minimum compressive strength of 5,000 psi in 28 days.
- G. Concrete Curing Membranes:
  - 1. Polyethylene: ASTM D 2103, clear or white, minimum 6 mils thick.
  - 2. Reinforced Laminated Paper for Pedestrian Traffic Areas: ASTM C 171, Orange Label Sisalkraft by Fortifiber Corp.
  - 3. Reinforced Laminated Paper for Non-Traffic Areas: ASTM C 171, Sisalkraft SK-10 by Fortifiber Corp.



#### SECTION 03 3010 PORTLAND CEMENT CONCRETE

## 2.3 MIXES (SKATEPARK)

- A. Proportioning:
  - 1. Comply with ACI 211.1 and UBC Section 2604.
  - 2. Proportion concrete in accordance with ACI 301, Article 3.8.
  - 3. When using Method 3, proportion concrete with a maximum water/cement ratio of 0.46.
  - 4. Maximum Pozzolan Weight: 18 percent of cement weight.
- B. Proportion Adjustments:
  - 1. Adjust concrete mix designs when material characteristics, site conditions, weather, test results, or other circumstances warrant a revised mix design.
  - 2. Do not use revised mix design until accepted by Owner's Representative.
- C. Mixing Procedures:
  - 1. Comply with ASTM C 94.
  - 2. Mix full load for 3 minutes at high speed upon arrival at site.
  - 3. Mix additional 5 minutes after adding water.
- D. Mix Requirements:
  - 1. Maximum Course Aggregate Size: 3/4 inch.
  - 2. Maximum Slump: 5 inches + 1/2 to 1 inch.
  - 3. Entrained Air: 6 percent + or 1 percent.
  - Minimum Compressive Strength: f'c = 4,000 psi (3,500 psi in 28 days) REFER TO DRAWINGS
  - 5. Minimum Cement Plus Pozzolan Content: 550 pounds per cubic yard.
  - 6. Water Reducing Admixture: Type A or D.

## PART 3 EXECUTION

- 3.1 PERFORMANCE
  - A. Notification:
    - 1. Notify Owner's Representative 48 hours prior to placing concrete.
    - 2. Do not place concrete until Owner's Representative has examined formwork and reinforcing steel.
  - B. Protection:
    - 1. Coat aluminum conduit embedded in concrete with protective material or prime paint prior to concrete placement.
  - C. Surface Preparation:
    - 1. Clean and adjust forms, joints, and embedded items.
    - 2. Check reinforcing placement and reinforcing support items and adjust reinforcing prior to placing concrete.
  - D. Site Fabrication of Formwork:
    - 1. Comply with requirements in ACI 301 and ACI 347.
    - 2. Fabricate corners and intersections flush without visible offsets.
    - 3. Fabricate, camber, and reinforce forms to meet 3/16 inch in 8 feet maximum deflection.



#### SECTION 03 3010 PORTLAND CEMENT CONCRETE

- 4. Fabricate solid blocking behind formwork panel joints.
- E. Installation of Formwork and Joint Materials:
  - 1. Install expansion joints between existing and new concrete and as indicated on Drawings.
  - 2. Install chamfer strip at exposed external vertical corners.
  - 3. Install isolation joints where items penetrate concrete slabs.
  - 4. Apply form coatings and release agents to concrete contact surfaces of removable formwork.
- F. Installation of Reinforcing:
  - 1. Lap continuous grade 60 bars 30 or 36 diameters and not less than 24 inches, except where indicated otherwise on Structural Drawings.
  - 2. Lap continuous grade 40 bars 24 diameters and not less than 24 inches.
  - 3. Stagger reinforcing splices 36 inches minimum.
  - 4. Cover reinforcing with concrete to comply with building code.
- G. Concrete Placement:
  - 1. Comply with ACI 301 and 304, placing concrete in a continuous operation within planned sections.
  - 2. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping.
  - 3. Work concrete around reinforcement, embedded items, and forms.
- H. Installation of Anchor Bolts:
  - 1. Set anchor bolts for structural plates with anchor bolts double nutted to CDX plywood or oriented strand board templates.
  - 2. Set anchor bolts for equipment with anchor bolts double nutted to templates furnished by equipment manufacturer.
- I. Adjusting, Removing, and Reusing Forms:
  - 1. Adjust formwork after pouring concrete, to eliminate excessive deflection.
  - 2. Remove forms when concrete has attained its required strength.
  - 3. Clean concrete contact surfaces and reapply form release agents prior to reusing forms.

## 3.2 FINISHING VERTICAL SURFACES

- A. Finishing Concealed Vertical Concrete Surfaces:
  - 1. Provide rough form finish, complying with ACI 301, paragraph 10.2.1.
  - 2. Remove fins and projections exceeding 1/4 inch in height and patch tie holes and surface defects.
- B. Finishing Exposed Vertical Concrete Surfaces:
  - 1. Provide smooth form finish complying with ACI 301, paragraph 10.2.2.
  - 2. Remove fins and projections and patch tie holes and surface defects.
  - 3. Provide smooth rubbed finish for exposed curb and walk edges, complying with ACI 301, paragraph 10.3.1.
  - 4. Within 24 hours after form removal, wet and rub exposed curb and walk edges with carborundum brick or other abrasive until uniform color and texture are produced.
- 3.3 FINISHING HORIZONTAL AND INCLINED CONCRETE SURFACES



- A. Floated Slab Surface:
  - 1. Provide floated slab surface to receive a hard troweled finish, complying with ACI 301, paragraph 11.7.2.
  - 2. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit float finishing.
  - 3. Check planeness of surface with a 10 foot straightedge at two or more angles during or after first floating.
  - 4. Cut high spots and fill low spots during floating to level concrete to 3/16 inch in 8 feet tolerance.
  - 5. Refloat immediately to a uniform sandy texture.
- B. Skate Park Finishing:
  - 1. Provide a broom finish for exterior walks, stair treads, slabs, ramps, and curbs complying with ACI 301, paragraph 11.7.4.
  - 2. Provide a hard troweled dry shake finish for skatepark complying with ACI 301, paragraph 11.7.6.
  - 3. Provide a hard troweled dry shake finish for exterior slabs, ramps and curbs in areas indicated on Drawings, complying with ACI 301, paragraph 11.7.7.
  - 4. Provide smooth or textured colored hardener finished slabs for exterior walking surfaces as indicated on Drawings.
- C. Horizontal Concrete Finishing Requirements:
  - 1. Tool radius exterior [slab, walk, ramp, and curb] exposed edges.
  - 2. Saw cut, strip form or tool form crack control joints.
  - 3. Finish concrete horizontal surfaces to tolerances specified in Articles 11.7, 11.8, and 11.9 in ACI 301.
- D. Curing Procedures:
  - 1. Cover exposed surfaces with concrete curing membrane and keep concrete and form surfaces wet for 48 hours minimum, complying with recommendations in ACI 308.
  - 2. As soon as finished concrete is free of surface water, apply curing compound at manufacturer's recommended rate, on exterior concrete surface.

## 3.4 COMPLETION

- A. Tests:
  - 1. When required by Building Code, Section 306, Special Inspection Requirements, Owner will employ an Independent Testing Laboratory to evaluate site cast concrete curbs, ramps, and walks.
  - 2. Concrete strength tests for quantities less than 50 cubic yards will not be required when waived by Building Official or Owner's Representative.
  - 3. Comply with Building Code, Section 2604(h) for evaluation and acceptance of concrete.
- B. Repairing Exposed Vertical Concrete Surfaces:
  - 1. Clean, dampen, and brush-coat concrete patch areas with acrylic or epoxy bonding agents.
  - 2. Fill honeycomb voids and rock pockets with patching compound.
  - 3. Compact and screed patching compound in place as recommended by patching compound manufacturer.
  - 4. Finish exposed concrete patches to match adjacent surfaces.
  - 5. Strike off excess patching compound at exposed surface.
  - 6. If defects in color and texture of concrete surface cannot be repaired, remove and



replace the defective concrete.

- C. Adjusting and Cleaning:
  - 1. Remove and replace damaged and defective concrete.
  - 2. Broom clean exposed horizontal surfaces prior to Substantial Completion.
- D. Protection:
  - 1. Barricade area containing fresh concrete slabs, stairs, ramps, curbs, and walks for 24 hours minimum.
  - 2. Cover fresh concrete with 1/2 inch thick, plywood or oriented strand board for 48 hours minimum where exposed to public, pedestrian, and animal traffic.
  - 3. Protect concrete from shrinkage crack damage until protected by curing procedure.
  - 4. Protect concrete from physical damage or reduced strength caused by air temperatures below 35 degrees F. during curing period, as recommended in ACI 306R.
  - 5. Protect concrete from physical damage or reduced strength caused by air temperatures above 75 degrees F. during curing period, as recommended in ACI 305R.

## END OF SECTION 03 3010



#### PART 1. GENERAL

- 1.1 RELATED WORK SPECIFIED ELSEWHERE
  - A. Cast-in-Place Concrete: Section 03 3000

#### PART 2. PRODUCTS

- 2.1 MATERIALS
  - A. Non-Shrink Grout:
    - Non-shrink grout shall be Sika 212, Euco N-S, Five-Star, or approved equivalent nonmetallic cementious commercial grout exhibiting zero shrinkage per ASTM C-287 and CRD-C-621. Grout shall not be amended with sand or cement and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.
  - B. Cast-in-Place Concrete:
    - 1. Concrete shall be supplied from a central ready-mix plant regularly engaged in the production of concrete, and delivered by rotating drum truck.
    - 2. Concrete mix for cast-in-place concrete shall be 3,500 psi design strength at 28 days, 570 pounds of cement per cubic yard. Maximum aggregate size is 3/4-inch. Concrete shall be air-entrained with admixture to 5 to 7 percent air. Slump shall be between 3" and 5".
    - 3. Reinforcing steel shall be new billet steel conforming to ASTM A615, Grade 60.
    - 4. Tie wire shall be 16 gauge conforming to ASTM A-82.
    - 5. Curing compound shall be of the white liquid membrane forming type and conform to ASTM C309, for exterior concrete.

#### 2.2 CONSTRUCTION

- A. Concrete Float System:
  - 1. Materials delivered and stored at either the manufacturing facility, staging area, or jobsite shall be properly stored on dunnage or by other appropriate means to prevent direct contact with the ground and unnecessary damage.
  - 2. The manufacturing facility shall be designed to provide the proper environment and physical conditions necessary for float casting. The facility shall provide adequate work space, equipment, level casting surfaces, and protection from direct sunlight, wind, moisture and freezing.
  - 3. Forms:
    - a. Floats shall be cast in steel forms, with a smooth, true surface.
    - b. Forms shall be designed in such a way to prevent unsightly finished surfaces or definite lines that could result in crack planes. Any rough edges, form marks, or defects shall be cleaned, ground smooth, or patched.
    - c. Float forms shall have a tolerance of not more than 1/8-inch from the dimensions shown on the shop drawings.



#### SECTION 03 3700 SPECIALTY PLACED CONCRETE

- d. Concrete shall be vibrated internally and/or externally to assure a smooth dense finish. The placement will be such that the concrete float is monolithic with no cold joints in any part of the finished float.
- 4. Concrete Reinforcement:
  - a. Galvanized welded wire fabrication used as concrete reinforcement shall be 2"x2" -14/14. Welded wire fabric is required in the deck and the bottom sections with a minimum of a two (2) inch return to the sides and ends. Where splicing occurs, the overlap will be a minimum of four (4) inches. Galvanized wire mesh shall meet ASTM A-185.
  - b. Rebar shall be grade 40 or 60, conform to ASTM 615, and shall be epoxy coated after bending in accordance with ASTM A-775.
- 5. Concrete Mix Design:
  - a. Prior to the manufacturing of any flotation units, the concrete mix design shall be approved by the Owner.
  - b. Concrete shall have a minimum twenty-eight (28) day compressive strength of 3,500 psi, per ASTM C-94. Floats made of concrete with less than specified strength may be rejected by the Owner.
  - c. The mix shall contain a minimum of 564 pounds (six sacks) of Portland Cement per cubic yard, either Type I or Type II modified, and low alkali. Type III cement may be used if the Tri-Calcium Aluminate of the cement is certified by the manufacturer to be between five (5) and eight (8) percent, and alkali content (Na<sub>2</sub>0) and (K<sub>2</sub>0) is less than 0.6 percent.
  - d. The theoretical concrete unit weight shall not be more than 120 pounds per cubic foot.
  - e. Coarse and fine aggregates shall conform to ASTM C-33-88, ASTM C-330 lightweight aggregates for structural concrete.
  - f. All concrete shall be air-entrained from five (5) to seven (7) percent and shall be tested in accordance with ASTM C-138, C-173, or C-231.
  - g. Water/cement ratio shall not exceed 0.45 for lightweight concrete.
  - h. Slump range shall be three (3) inches to six (6) inches when tested in accordance with ASTM C-143-78.
- 6. Through-Rod Connections:
  - a. The minimum dimension for all through-rods for structural attachment is 3/4-inch thread diameter.
  - b. All through-rods shall be placed within PVC sleeves cast in the float units. The inside diameter of PVC shall be 7/8-inch.
  - c. All cast in inserts will be galvanized steel, 3/4-inch diameter, with a welded loop or horizontal restraining bar.
  - d. Walers shall be securely fastened to the concrete floats using galvanized through-rods, plate washers, spur locker washers, and nuts.
  - e. A minimum of four (4) through-rods per float unit are required, with a minimum average of one (1) through-rod per two (2) lineal feet of float length.
  - f. Through-rods shall be placed through each float unit within six (6) inches of each end of that unit, within six (6) inches of each lumber splice and through all four holes of each pile hoop.
  - g. No connecting device shall protrude beyond the fascia into the berth area. Any connecting device protruding above the surface of the deck shall have a low, rounded profile.
- 7. Deck Finish:



#### SECTION 03 3700 SPECIALTY PLACED CONCRETE

- a. The float deck surface shall be trowel finished with a steel trowel and a slip-resistant finish applied transversely to the walking surface.
- b. Contractor shall establish finishing methods and procedures to insure an even and consistent troweled finish on all transition and deck surfaces.
- c. All top edges shall have a 3/8-inch tooled radius with a minimum 1-1/2 inch wide smooth hard steel finished face.
- d. Outside top edges and corners shall be filed smooth.
- 8. Curing, Handling and Storage:
  - a. Except as otherwise approved, floats shall be cured for a minimum of seven (7) days before transporting or assembling.
  - b. The Contractor shall select his own method of curing and be responsible for the result, except that all curing shall be under cover and with complete protection from direct sunlight, wind, and freezing for a period of three (3) days.
  - c. Contractor shall take care in establishing handling methods to avoid damage to floats during form removal, storage, assembly and installation.
  - d. Storage of flotation units shall be on level surfaces, and it shall be the responsibility of the Contractor to determine how high to stack units to avoid damage. Care shall be taken to avoid damage caused by overstacking.
  - e. Floats shall be protected against damage from any cause.
  - f. Any damaged units shall be rejected and removed from the assigned job.
- 9. Cracks:
  - a. Cracks located below the structural deck that do not indicate migration to the deck surface may be repaired with the approval of the Owner's Representative.
  - b. Cracks which are open or which exceed two (2) feet in length shall be V-cut out and patched with a non-shrink patching compound approved by the Owner.
  - c. Excessive cracking in a single flotation unit shall be cause for rejecting that unit. Any frequently recurring pattern of cracking shall be considered indicative of inadequate design or improper handling. It shall be corrected by replacement and appropriate changes in design or procedures.
  - d. Rock pockets exceeding one (1) inch in diameter and/or 3/8-inch in depth and/or honeycombing, shall be patched with an approved non-shrink grout of a color similar to the cured concrete. Any pockets which expose mesh or rebar shall be chipped out, cleaned, filled with an approved epoxy patching compound.
- 10. Float Weight:
  - a. The weight of the complete flotation units shall not vary from the theoretical weight or mean weight of all similar units by more than six (6) percent.
  - b. Submit program to verify actual float weights, quantity to be weighed, and method of recordkeeping.
- 11. Float Identification:
  - a. All floats are to be clearly identified on one side and one end between the bottom of the waler and the waterline with the date of manufacture, specific float type, and job number.
- 12. Lumber:
  - a. All timber walers and bullrails shall be of Coast Region Douglas Fir; "No. 1" or better per West Coast Lumber Inspection Bureau (WCLIB) grading rules no. 16, paragraph 123 or paragraph 124 as applicable.
  - b. Lumber shall be fabricated accurately to provide uniform gaps and butt joint connections. Lumber splices shall not exceed 1/2-inch between adjoining ends.


### SECTION 03 3700 SPECIALTY PLACED CONCRETE

- c. All walers, fascia, spacers, plywood, or any other member which is subject to foot traffic, shall be flush with the concrete walking surface.
- 13. Lumber Treatment:
  - a. All lumber shall be pressure preservative treated with ACZA to .6 pound retention.
  - b. All lumber will be cut to length and bolt holes drilled prior to pressure treatment as far as is possible.
  - c. Tie bands used for delivery must have plates between the bands and the wood to prevent crushing. Bundle identification shall be done so as not to stain lumber surfaces.
  - d. All field cuts and bored holes exposed after pressure treatment shall be brush coated with the preservative solution.
  - e. Incise wood members prior to treatment.
- 14. Steel:
  - a. All structural steel channels, angles, and plates shall be fabricated from mild steel conforming to ASTM A-36.
- 15. Hardware:
  - a. Bolts, nuts, washers, and through-rods shall be mild steel, in accordance with ASTM A-307, and have a minimum of 1-1/2 inch of thread.
  - b. All hardware shall be hot dipped galvanized in accordance with ASTM A-123-78.

## 2.3 SPECIALTY MATERIAL

- A. Expanded Polystyrene Core (EPS)
  - 1. The closed cell expanded polystyrene core used inside the concrete unit shall meet Federal Specification C-578-85 which superseded Federal Specification HH-I-524C.
  - 2. The foam shall weigh between .95 and 1.10 pounds per cubic foot.
  - 3. EPS to have a maximum absorption of three (3) percent by volume as tested by ASTM Method C-272.
  - 4. The foam core shall be held in a true position during the casting operation with an allowable variation of 1/8-inch from the dimensions shown on the shop drawings.
  - 5. Foam billets will have a dimensional tolerance of plus 0.125 inch and minus 0.125 inch.
  - 6. Foam core may not have more than ten (10) percent reground EPS foam material. Reground foam pieces shall not exceed 3/8-inch in diameter.
  - 7. Foam core shall be made up of not more than four (4) laminated sections.
  - 8. The laminated foam core shall be glued with a low solvent glue, and shall be strapped to prevent delamination during transportation and handling.
  - 9. No horizontal lamination may occur in the upper ten (10) inches of the foam core.

## PART 3. EXECUTION

- 3.1 INSTALLATION
  - A. Deliver to project site and install configuration as shown on the drawings.
  - B. Protect from damage before and during installation.
- 3.2 CAST-IN-PLACE CONCRETE



- A. Consolidate concrete during and immediately after depositing, with mechanical high frequency internal vibrators.
- B. All concrete shall be in final position in the forms within <u>140 minutes</u> after the addition of the cement to the aggregate. Concrete mix which exceeds this time limit shall be immediately rejected by the Owner and shall not be placed in the forms.
- C. Protect concrete from rain during finishing and sealing operations.
- D. Finish slab with steel trowel smooth finish.
- E. Finish exterior concrete slabs with broom for non-skid finish.
- F. Cure concrete by using curing compound of the white liquid forming type and conform to ASTM C309. Wet burlap, canvas or other additional protection acceptable to the Owner may be needed to keep the concrete moist for a minimum of seven (7) calendar days.
- G. Protect concrete from freezing for a seven (7) day minimum curing period.

## END OF SECTION 03 3700



### PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Non-shrink non-metallic grout.
  - 2. Non-shrink metallic grout.
  - 3. Anchoring cement.
  - 4. Epoxy grout.
- B. Related Sections:
  - 1. Section 05 5000, Metal Fabrications Skatepark: Grout and anchoring cement for metal fabrications.

## 1.2 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit product data for grout materials.
- B. Quality Assurance Submittals:
  - 1. Comply with requirements in Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit building code required compression test reports for structural grout.
  - 3. Submit manufacturer's installation instructions for structural grout.

## 1.3 SITE CONDITIONS

- A. Environmental Requirements:
  - 1. Do not place grout when temperature or humidity will affect the performance or appearance of the grout.
  - 2. Do not place grout on dirty, wet, or frozen substrates.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Substitute Manufacturers:
  - 1. Submit substitution requests prior to Bid Date.
  - 2. Comply with requirements in Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

### 2.2 MATERIALS

- A. Nonmetallic Nonshrink Grout.
  - 1. Industry Standard: ASTM C 1107.
  - 2. Type: Shrink resistant, nonstaining, noncorrosive.
  - 3. Minimum Compressive Strength: f'c = 5,000 psi in 28 days.
  - 4. Acceptable Grouts: Upcon by Bostik Construction Products, Nonmetallic Grout by Burke, Euco N-S Grout or Euco Dry Pack Grout by Euclid Chemical, Conbextra S by Fosroc Preco,

City of Sherwood Public Works 15527 SW Willamette Street Sherwood, OR 97150 Phone: 503.625.5722



Sealtight 588 by W.R. Meadows, Masterflow 713 by Master Builders, SikaGrout 212 by Sika, Sonogrout and Sonogrout G.P. by Sonneborn, Five Star Grout by U.S. Grout.

- B. Anchoring Cement:
  - 1. Type: Premixed, packaged, shrink resistant.
  - 2. Minimum Compressive Strength: f 'c = 4,000 psi in 28 days.
  - 3. Acceptable Anchoring Cements: Burke Stone by Burke, K-Ment by Euclid Chemical, Embeco 153 by Master Builders, Thorogrip by Thoro System Products.
- C. Epoxy Grout:
  - 1. Industry Standard: ASTM C 881.
  - 2. Type: Premixed, packaged, two component, epoxy resin.
  - 3. Minimum Compressive Strength: f'c = 6,000 psi in 28 days.
  - 4. Acceptable Grouts to Bond Plastic Concrete to Existing Concrete: Concressive 1001 LPL by Adhesive Engineering, Upcon Epoxy Grout by Bostik Construction Products, Medium Viscosity 881 LPL Patch and Bond Epoxy by Burke, High Strength Grout by Euclid Chemical, Probond 812 medium viscosity by ProKrete Industries, Sikadur 32 Hi-Mod by Sika, Sonobond by Sonneborn, Five Star Epoxy Grout by U.S. Grout.
  - 5. Acceptable Grouts to Bond Concrete to Reinforcing Steel: Concressive 1441 by Adhesive Engineering, 881 LPL Topping and Crack Grouting Epoxy by Burke.

## PART 3 EXECUTION

### 3.1 PERFORMANCE

- A. Surface Preparation:
  - 1. Remove loose aggregate and coating materials from substrate surfaces prior to placing grout and anchoring cement.
  - 2. Support bearing plates above cleaned bearing surfaces with double nutted anchor bolts and wedges.
  - 3. Position and plumb supporting steel members then tighten double nutted anchor bolts.
  - 4. Cut off part of wedges and shims which protrude beyond the edge of base and bearing plates.
- B. Installation of Cementitious Grout Below Bases and Bearing Plates:
  - 1. Pack space below base and bearing plates supporting structural members and stationary equipment with nonmetallic nonshrink grout until no voids remain.
  - 2. Pack space below bearing plates supporting vibrating equipment with metallic nonshrink non-catalyzed grout until no voids remain.
  - 3. Trowel exposed grout surfaces to smooth finish.
  - 4. Cure grout to comply with manufacturer's printed instructions.
- C. Installation of Cementitious Grout in Steel Door and Relite Frames:
  - 1. Install nonshrink nonmetallic grout inside steel door and relite frames in concrete walls.
- D. Installation of Anchor Bolts with Anchoring Cement:
  - 1. Set anchor bolts for structural plates with anchor bolts double nutted to CDX plywood or oriented strand board templates.
  - 2. Set anchor bolts for equipment with anchor bolts double nutted to templates furnished by equipment manufacturer.



- 3. Fill space around anchor bolts in drilled concrete and masonry with anchoring cement as recommended by anchoring cement manufacturer.
- E. Installation of Epoxy Grout:
  - 1. Coat existing concrete contact surfaces with epoxy grout at spalled concrete areas prior to filling with plastic cement.
  - 2. Fill space between existing drilled and dowel sleeved concrete and new reinforcing bars and dowels with epoxy grout.
- 3.2 COMPLETION
  - A. Grout Testing:
    - 1. When required by the Building Code, Section 306, Special Inspection Requirements, Owner will employ an independent testing laboratory to evaluate grout supporting structural members.
    - 2. Comply with procedures in Comply with requirements in LFUCG and Kentucky Standard Specifications.
    - 3. Test nonmetallic nonshrink grout in accordance with ASTM C 109.
    - 4. Test epoxy grout in accordance with ASTM C 579, Method B.
  - B. Manufacturer's Field Service:
    - 1. Grout and anchoring cement manufacturer's representative shall provide technical assistance and two project site visits to ensure that grout and anchoring cement work is performed in accordance with manufacturer's instructions.
  - C. Adjusting and Cleaning:
    - 1. Replace damaged and defective grout and anchoring cement work.
    - 2. Remove excess materials from the site.
  - D. Physical Barrier Protection:
    - 1. Cover fresh grout and anchoring cement for 24 hours minimum.
    - 2. Cover fresh grout and anchoring cement with plywood or oriented strand board where exposed to public, pedestrian, and animal traffic.

## END OF SECTION 03 6000



#### SECTION 05 5000 METAL FABRICATIONS

### PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes Factory Fabricated Items:1. Fittings for handrails and railings.
- B. Section Includes Custom Fabricated Steel Framing:1. Threshold and seismic joint angles.
- C. Related Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 03 3000, Cast-In-Place Concrete Skatepark: Inserts and anchors for concrete substrates.
  - 3. Section 05 5200, Handrails and Railings Skatepark: Handrails and railings.

## PART 2 PRODUCTS

#### 2.1 COMPONENTS

- A. Steel Framing Materials:
  - 1. Steel Plates, Shapes, Bars: ASTM A 36 and UBC Standard 27-1.
  - 2. Round Steel Tubing: ASTM A 500, Grade B, Fy = 42 KSI, welded at concealed locations, and seamless at exposed locations.
  - 3. Steel Pipe: ASTM A 53, Grade B, Fy = 35 KSI, Schedule 40, Type S, seamless at exposed locations, Type E at concealed locations, except where indicated otherwise on Drawings.
  - 4. Checker Plate Steel: Minimum 3/16 inch thick, four way steel plate.
- B. Bolts and Electrodes:
  - 1. Standard Bolts: ASTM A 307, Grade A.
  - 2. High Strength Bolts: ASTM A 325.
  - 3. Electrodes: AWS A5.1, E60XX or AWS A5.1 or A5.5, E70XX.
  - 4. Concrete Expansion Anchors: ICBO approved, zinc plated in accordance with ASTM B 633, hot-dipped galvanized in accordance with ASTM A 153, or A151 304 stainless steel FS FF-S-325, Group II, Type 4, Class 1, Sup-R-Stud by Diamond, Inc., Kwik-Bolt II or Sleeve Anchor by Hilti Fastening Systems, Inc., Red Head Wedge Anchors by ITW Ramset, Rawl-Stud by Rawlplug Co., Inc.
  - 5. Masonry Anchors: Sleeve Anchor by Hilti, Red Head Sleeve Anchors by ITW Ramset.
  - 6. Anchor Bolts: Galvanize exterior bolts and bolts exposed to moisture in accordance with ASTM A 563, Class C.
  - 7. Nuts: ASTM A 563, Class 2A fit before galvanizing.
  - 8. Plain Washers: Round steel FS FF-W-92.
- C. Malleable Iron Set Screw Pipe Fittings:
  - 1. Industry Standard: ASTM A 47, Grade 32510.
  - 2. Factory Finish: ASTM A 153, hot-dip galvanized, with 2 ounces of zinc per square foot.
  - 3. Set Screws: Zinc plated.
  - 4. Acceptable Fittings: Kee Klamp by Kee Industrial.
- D. Handrail Fittings for Schedule 40 Steel Pipe:
  - 1. Acceptable Fittings: Cast or Malleable iron fittings by Julius Blum, Braun, or Wagner.
  - 2. Pipe Diameter: 1-1/2 inches inside, 1.90 inches outside.



### 2.2 SHOP FABRICATION PROCESS

- A. Fabrication Requirements:
  - 1. Comply with UBC Standard 27.2, AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, and AISC Specifications for Architecturally Exposed Structural Steel.
  - 2. Fabricate items to dimensions required by field measurements and shop drawings.
  - 3. Use welds for shop connections and bolts for field connections, except where indicated otherwise on Drawings.
  - 4. Preassemble items in shop and disassemble units only as required for shipping and handling.
  - 5. Mark assembled components for field assembly and coordinated installation.
  - 6. Use materials of size and thickness indicated or, if not indicated, as required to meet structural requirements.
- B. Welded Steel Connections:
  - 1. Form exposed connections with flush hairline joints.
  - 2. Comply with AWS Structural Welding Code D1.1.
  - 3. Fabricate assemblies to meet UBC Standard 27-6 with welded joints using shielded metalarc process (SMAW).
  - 4. Shop weld joints with 3/16 inch minimum welds, unless indicated otherwise on shop drawings.
  - 5. Grind exposed welds smooth.
- C. Bolted Connections:
  - 1. Provide anchor bolts for connecting to other work.
  - 2. Drill and tap steel as required to receive bolted connections.
  - 3. Make bolt holes 1/16 inch larger than nominal bolt diameter.
  - 4. Do not furnish bolts with threads within sheer plane of the bolt.
  - 5. Furnish beveled washers for bolt heads and nuts bearing on sloped flanges.

#### 2.3 SHOP FABRICATED ASSEMBLIES

- A. Fabrication of Structural Framing:
  - 1. Fabricate custom fabricated bolts, plates, tie rods, anchors, dowels, and welded steel shapes for framing, supporting, and anchoring wood framing.
- B. Fabrication of Bearing Plates:
  - 1. Fabricate loose bearing plates for steel items and equipment bearing on concrete or masonry.
  - 2. Drill bearing plates to receive anchor bolts.

### 2.4 SOURCE QUALITY CONTROL

- A. Shop Weld Inspections:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

### PART 3 EXECUTION

3.1 PERFORMANCE

A. Preparation:



### SECTION 05 5000 METAL FABRICATIONS

- 1. Furnish inserts, anchors, setting drawings, templates, and instructions for items to be embedded in concrete and masonry substrates.
- B. Field Fabrication:
  - 1. Perform required cutting, drilling, and fitting.
  - 2. Fit components to form tight hairline joints.
  - 3. Apply prime paint to damaged galvanized and prime painted steel surfaces.
  - 4. Field weld where required by shipping size limitations as indicated on shop drawings.
  - 5. Field weld joints using shielded metal-arc process (SMAW) complying with UBC Standard 27-6.
  - 6. Grind exposed field welds smooth.
  - 7. Install bolted connections as detailed on shop drawings.
  - 8. Comply with UBC Standard 27-7 for high strength bolts.
- C. Installation Requirements:
  - 1. Comply with AISC Manual of Steel Construction and UBC Standard 27-2.
  - 2. Set work accurately in location, alignment and elevation, measured from established lines and levels.
  - 3. Align members to tolerance as indicated in AISC Specifications for Structural Steel.
  - 4. Install temporary bracing to support fabrications indicated to be supported by concrete and masonry structures.
  - 5. Anchor fabrications to substrates with threaded fasteners.
- D. Installation of Bearing Plates:
  - 1. Set bearing plates on cleaned bearing surfaces, using wedges and anchor bolts as required.
  - 2. Secure bearing plates and anchor bolts complying with requirements in Section 03 6000, Grouting Skatepark.

### 3.2 COMPLETION

- A. Field Weld Inspections:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
- B. Adjusting and Cleaning:
  - 1. Replace damaged and defective members.
  - 2. Adjust alignment when members are installed more than 1/4 inch from design dimension.
  - 3. Remove pits, bumps, and irregular weld grinds from exposed surfaces.
  - 4. Touch up damaged shop primer on exposed steel after installation.
  - 5. Clean field welds, bolted connections, and abraded areas, and apply same type primer paint as used in shop.
  - 6. Remove dirt and oil from metal items scheduled for field finishing.
- C. Metal Protection:
  - 1. Apply protecting material to face of metal in areas of potential galvanic activity between contacting dissimilar metal materials.
  - 2. Maintain factory applied cover to protect abrasive stair nosings until Substantial Completion.

# END OF SECTION 05 5000



### PART 1 GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior steel stair handrails and railings.
- B. Related Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 03 6000, Grouting Skatepark: Anchoring cement for railing standards.
  - 3. Section 05 5000, Metal Fabrications Skatepark: Steel structural supports.

### 1.2 SYSTEM DESCRIPTION

- A. Structural Requirements:
  - 1. Design handrails and railings to resist design load of 200 pounds in any direction at any point on the railing or 50 pounds per lineal foot whichever is greater without deflection in excess of L/180 and without permanent member deformation.
  - 2. Use AISC Manual of Steel Construction, Eighth Edition for steel railing structural requirements.

## PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Steel Materials:
  - 1. Structural Steel Plates, Shapes, and Bars: ASTM A 36.
  - 2. Steel Bars: ASTM A 108, Grade 1045.
  - 3. Cold-Formed Steel Tubing: Round, square and rectangular, ASTM A 500, Fy=42 KSI, Grade B, Seamless.
  - 4. Hot-Formed Steel Tubing: Round, square and rectangular, ASTM A 501, Fy=36 KSI, Seamless.
  - 5. Steel Pipe: ASTM A 53, Type E, Electric Resistance Welded, Fy=30 KSI, Grade A. Standard Schedule 40, 1-1/4 inch inside diameter, 1.66 inches outside diameter, except where indicated otherwise on Drawings.
- B. Connecting Materials:
  - 1. Standard Bolts: ASTM A 307, Grade A.
  - 2. Steel Welding Electrodes: AWS A5.1, E60XX.
  - 3. Aluminum Welding Electrodes: Aluminum alloy as recommended by pipe manufacturer.
  - 4. Concrete Anchors: ICBO approved FS FF-S-325, Group II, Type 4, Class I, Sup-R-Stud by Diamond, Inc., Kwik-Bolt II by Hilti Fastening Systems, Inc., Red Head Wedge Anchors by ITW Ramset, Rawl-Stud by Rawlplug Company, Inc.
  - 5. Masonry Anchors: Sleeve anchor by Hilti, Red Head Sleeve Anchor by Phillips.
  - 6. Epoxy Adhesive for Drilled Anchors: Concresive Epoxy Cartridge by Master Builders, Inc. or HV by Hilti Fastening Systems.
  - 7. Brass Adhesive: Brass Lock.
  - 8. Concealed Fasteners: As furnished by aluminum handrail manufacturer.
- C. Finishing Materials:
  - 1. Shop Primer for Painted Exterior Steel: Polyamide epoxy.
- D. Fittings for Steel Pipe:



#### SECTION 05 5213 PIPE AND TUBE RAILINGS

- 1. Fitting Material: Cast or Malleable iron.
- 2. Acceptable Fittings: Schedule 40 steel pipe fittings by Braun, Tsco International, or Wagner.
- E. Anchoring Cement:
  - 1. Type: Premixed, packaged, shrink resistant.
  - 2. Minimum Compressive Strength: f'c = 4,000 psi in 28 days.
  - 3. Acceptable Anchoring Cements: Burke Stone by Burke, K-Ment by Euclid Chemical, Embeco 153 by Master Builders, Thorogrip by Thoro System Products.

## 2.2 FABRICATION

- A. Fabrication Requirements:
  - 1. Drill and tap railings as required to receive hardware.
  - 2. Finish required anchors for connecting to other work.
  - 3. Install closer plate or hemisphere cap on railing ends.
  - 4. Provide for thermal expansion of exterior handrails and railings.
  - 5. Form exposed connections with flush hairline joints.
  - 6. Preheat ASTM A 108 steel to not less than 400 degrees F prior to welding.
  - 7. Form railing post sleeves from PVC or hot-dip galvanized steel pipe.
- B. Shop Finishing:
  - 1. Commercial blast clean railing surfaces to meet SSPC SP-6 requirements.
  - 2. Heat railings to 400 degrees F. as recommended by coating manufacturer.
  - 3. Pretreat surfaces with iron phosphate as recommended by coating manufacturer.
  - 4. Apply zincrich gray colored TGIC polyester coat to 3.5 mils thick.
  - 5. Apply TGIC polyester finish coat to 3.5 mils thick as recommended by coating manufacturer.

## PART 3 EXECUTION

### 3.1 PERFORMANCE

- A. Substrate Preparation:
  - 1. Perform cutting, drilling, blocking and shimming of substrate as required for installation.
  - 2. Verify location of solid blocking and structural framing to support wall and floor mounted handrails and railings.
- B. Installation Procedures:
  - 1. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels.
  - 2. Secure handrails and railings with concealed anchors and set screws except where exposed screws or bolts are indicated on Drawings.
  - 3. Anchor handrails and railings to structural members, solid wood blocking, concrete, and steel plate blocking.
- C. Installation of Railing Standards:
  - 1. Set railing standard in concrete opening not less than 1/2 inch diameter greater than outside diameter of railing standard.
  - 2. Set railing standard in anchoring cement.
  - 3. Comply with requirements in Section 03 6000, Grouting Skatepark.
- D. Installation of Handrail Brackets:

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### SECTION 05 5213 PIPE AND TUBE RAILINGS

- 1. Drill 1 inch diameter hole in solid grouted masonry or concrete wall.
- 2. Set 3/8 inch diameter threaded anchor bolt in anchoring cement.
- 3. Allow anchoring cement to set 2 hours minimum prior to installing handrail bracket.
- 4. Set 3/8 inch diameter bolt in solid wood blocking or 3/16 inch thick steel plate blocking or cold rolled channel blocking with thread toward handrail bracket.
- 5. Anchor brackets as recommended by manufacturer.
- E. Installation of Handrail and Railing to Wall Brackets:
  - 1. Drill and tap railing and secure to brackets with two flat head machine screws.

### 3.2 COMPLETION

- A. Adjusting and Cleaning:
  - 1. Replace damaged and defective members and adjust alignment of railings.
  - 2. Remove pits, bumps, and irregular weld grinds from exposed surfaces.
  - 3. Touch up shop primer on exposed steel handrails and railings.
  - 4. Clean field welds, bolted connections and abraded areas, and apply type primer paint as used in shop.
  - 5. Touch up shop finished steel and aluminum with same coating as used in fabricating shop.
  - 6. Remove dirt and oil from handrails and railings prior to Substantial Completion.

# END OF SECTION 05 5213



## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cutting, filling, compacting, rough grading, and finish grading to contour the existing subgrade and fill soils for subgrade support of planting berms, site structures, building pads, paving areas, and planting areas.
- B. Related Documents and Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 31 1000, Site Preparation/Clearing: Topsoil removal and stockpiling.
  - 3. Section 31 2300, Excavating, Backfilling, and Compacting Skatepark: Excavating, backfilling, and compacting of soils and aggregates for building, paving, and planting.
  - 4. Section 32 1124, Aggregate Base Course Skatepark: Aggregate base for building pads, paving bases, and curb, gutter, and walk bases.
  - 5. Section 33 4600, Subdrainage Systems Skatepark: Foundation, roof, and under slab drains.
- C. Allowances:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

### 1.2 SYSTEM DESCRIPTION

- A. Density Test Requirements:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

### 1.3 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- B. Quality Assurance Submittals:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

### 1.4 QUALITY ASSURANCE

- A. Grading Conference:
  - 1. Prior to cutting, filling, compacting, rough grading, and finish grading to contour site soils, meet at the site with Owner's Representative and independent testing laboratory representative to review location of utility and site drainage lines and procedures for protecting site improvements and inspecting and testing soils during grading.
- B. Temperature and Moisture Requirements:
  - 1. Do not cut, fill, and grade soils unless ambient air temperature is above 34 degrees F. and soils are within moisture limits.
- 1.5 SITE CONDITIONS

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- A. Existing Utilities:
  - 1. Consult with Owner's Representative and utility company representative if uncharted or incorrectly charted subgrade utility lines are encountered during cutting.
  - 2. Do not interrupt existing active utility and drainage lines serving facilities to remain, except when permitted in writing by Owner's Representative and when temporary alternative utility services are provided.
  - 3. Provide temporary utility services for occupied buildings when permanent utility lines are interrupted.
- B. Scheduling:
  - 1. Do not cover site improvements with soil and aggregate materials prior to acceptance of required inspections and tests.
  - 2. Remove soil and aggregate materials covering damaged, defective, uninspected, and untested subgrade site improvements.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Substitute Manufacturers:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

### 2.2 MATERIALS

- A. Soil Materials:
  - 1. Imported Subsoils, S1: Selected local borrow, free of debris, clay lumps larger than 3 inches, rocks larger than 2 inches, and sample test reports conform to ASTM D 2487, Group Classification Symbols CL, ML, or OL.
  - 2. Imported Subsoils, S2: Selected local borrow, free of debris, clay lumps larger than 3 inches, rocks larger than 2 inches, and not classified.
  - 3. On-Site Subsoils, S3: Existing subgrade soils, reasonably free of debris, clay lumps larger than 4 inches, rocks larger than 3 inches, and less than 50 percent retained on a Number 200 Sieve (washed analysis) with moisture content within 3 percent of optimum at maximum dry density, and sample test reports conform to ASTM D 2487, Group Classification Symbols CL, ML, or OL.
  - 4. On-Site Subsoils, S4: Existing subgrade soils, reasonably free of debris, clay lumps larger than 6 inches, rocks larger than 6 inches, and not Classified or moisture tested.
- B. Aggregate Materials:
  - 1. Coarse Aggregate, A1: Selected structural course aggregate, conforming to Oregon State Highway Standard Specifications, with 3 inch maximum aggregate size and not more than 5 percent passing a 200 sieve (washed analysis).
  - 2. Coarse Aggregate, A2: Selected structural course aggregate, crushed rock, conforming to City of Livingstons Standard Construction Inspection Manual; Concrete Constuction.
  - 3. Coarse Aggregate, A3: Course aggregate, washed angular crushed rock, free of debris and friable material, ASTM D 2487, Group Symbol GW, GP, GM, or GC, 3 inch maximum aggregate size and not more than 5 percent passing a 200 sieve (washed analysis).
  - 4. Coarse Drainage Gravel, A4: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 5. Coarse Retaining Wall Gravel, A5: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 6. Medium Aggregate, A6: As indicated in Section 32 1124, Aggregate Base Course Skatepark.



- 7. Medium Aggregate, A7: As indicated in Section 32 1124, Aggregate Base Course Skatepark.
- 8. Medium Aggregate, A8: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- 9. Medium Aggregate, A9: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- C. Fabric Materials:
  - 1. Erosion Control Fabric: 19 mils thick, 6.5 ounces per square yard, nonwoven continuous filament polypropylene, Propex 1199, 1325, 2006 by Amoco or 700X by Mirafi.

## 2.3 EQUIPMENT

- A. Excavating and Compacting Equipment:
  - 1. As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- B. Imported Soil and Aggregate Source Tests:1. As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

## PART 3 EXECUTION

### 3.1 PERFORMANCE

- A. Verification of Conditions:
  - 1. Examine subsoil and existing site conditions.
  - 2. Verify location of existing below grade utility lines and underground structures.
  - 3. Owner's Representative will examine imported fill materials prior to site placement.
- B. Protection:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- C. Preparation:
  - 1. Establish and maintain property, building, and paving lines and elevations.
  - 2. Set and maintain stakes at building corners and paving edges.
  - 3. Remove surface water from exposed soils and transport water to site drainage systems acceptable to Owner's Representative.
  - 4. Remove and replace or air dry subgrade soil which exceeds optimum moisture content by more than 3 percent.
  - 5. After removing excess moisture, grade and compact subgrade soil.
  - 6. Slope soils to prevent surface and subsurface water from flowing into excavations and from flooding surface soils at the site and surrounding areas.
  - 7. Apply water to moisten soils or aerate soils to dry substrate and fill materials to achieve a moisture content within plus or minus 3 percent of the optimum moisture content at relative dry density as determined by Modified Proctor Test, ASTM D 1557.
  - 8. Do not place fill on substrate soils which yield more than 1/2 inch under pressure from Substrate Compaction Test Equipment.
- D. Soil Removal:
  - I. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- E. Temporary Bracing:



- 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- F. Trenching:
  - 1. Trench subsoils for footings, drainage, and utility lines as indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- G. Placing and Spreading Backfill:
  - 1. Place and spread backfill as indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- H. Placing Imported Structural Fill:
  - 1. Place imported structural fill below interior concrete slabs on grade, paving surfaces, walking surfaces, and where required to supplement on-site fill.
  - 2. Place imported structural fill below footings where required to supplement on-site fill.
  - 3. Place imported structural fill during presence of Owner's Representative.
- I. Placing Site Soil Fill:
  - 1. Place site soil fill below paving and walk surfaces more than 10 feet from the building during dry weather.
  - 2. Place site soil fill below landscape areas more than 2 feet from the building during dry weather.
  - 3. Place site soil fill during presence of Owner's Representative.
- J. Placing Drainage Gravel Backfill:
  - 1. Place drainage gravel, A4 backfill as indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 2. Place coarse drainage gravel, A4 backfill around perimeter foundation drains as specified in Section 33 4600, Subdrainage Systems Skatepark.
  - 3. Place drainage gravel, A4 backfill in underfloor slab trench drains as specified in Section 33 4600, Subdrainage Systems Skatepark.
- K. Installation of Geotextile Erosion Control Fabrics:
  - 1. Install geotextile erosion control fabric to control erosion on grades sloping more than 2 horizontal to 1 vertical.
  - 2. Lap edges and ends of geotextile fabrics not less than 4 inches.
  - 3. Anchor geotextile fabric as recommended by fabric manufacturer.
- L. Grading:
  - 1. Grade soils to levels indicated, with uniform slopes between the indicated elevations.
  - 2. Rough grade subsoil below aggregate base course to plus or minus 1-1/2 inches above or below elevations indicated on Drawings.
  - 3. Finish grade subsoil below aggregate base course to plus or minus 1 inch above or below elevations indicated on Drawings.
  - 4. Do not finish grade soils to slope more than 2 feet horizontal in 1 foot vertical.

# 3.2 COMPLETION

- A. Site Tests and Inspections:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Proof roll subgrade with substrate compaction test equipment in presence of Owner's Representative.
  - 3. If soil areas compress more than 1/2 inch under load of substrate compaction test

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equipment, remove loose soil and backfill as directed by Owner's Representative.

- B. Maintenance of Moisture Content and Density:
  - 1. Repair compacted soil materials and adjust finish grades where subgrade, fill, and backfill settles or becomes damaged by construction traffic, excess moisture, or freezing temperatures.
  - 2. When directed by Owner's Representative excavate unsuitable substrate soils in footing excavations and replace with granular backfill over full width of the excavation and compact in layers not exceeding 6 inches in loose thickness with Light Compactors.
  - 3. During wet weather, place 4 inch lift of imported structural backfill aggregate at bottom of footing excavations and compact to 90 percent of maximum density at optimum moisture content in accordance with Modified proctor test, ASTM D 1557.
  - 4. Recompact or remove and replace soils not meeting required density.
  - 5. Soils removed because of excess moisture may be stockpiled or spread for air drying.
- C. Disposal:
  - 1. Remove waste material from the site.
  - 2. Remove unusable excess excavated subsoil material from the site.
- D. Daily Cleaning:
  - 1. Remove soil material spills from existing roads, walks, and paving NOT INSIDE DESIGNATED WORK AREA.
  - 2. Remove soil materials from existing surface water drainage trenches.

## END OF SECTION 31 2200



## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Excavating, backfilling, and compacting of soils for building, paving, and planting soils and aggregates.
- B. Related Documents and Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 31 2200, Grading Skatepark: Cutting, filling, compacting, rough grading, and finish grading to contour the existing subgrade and fill soils for subgrade support of planting berms, site structures, paving areas, and planting areas.
  - 3. Section 32 1124, Aggregate Base Course Skatepark: Aggregate base for building pads, paving bases, and curb, gutter, and walk bases.
  - 4. Section 33 4600, Subdrainage Systems Skatepark: Foundation, roof, and under slab drains.
- C. Allowances:
  - I. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - If additional excavation is required by existing conditions and not a result of the Contractor's negligence, measure additional Work for additional excavation as directed by Owner's Representative.
  - 3. Pay for additional excavation and related backfill on a unit price basis.
- D. Definition of Rock Excavation:
  - 1. Removal of rock by systematic and continuous drilling and blasting or equipment of a larger size than standard power excavation equipment.

## 1.2 REFERENCES

- A. Definition of Rock:
  - 1. Material which, by actual demonstration, cannot be reasonably excavated with standard power excavation equipment.
  - 2. Owner's Representative may waive the required demonstration if material is well defined rock.
  - 3. Rock is a method of removal and not a geological formation.
- B. Definition of Standard Power Excavation Equipment:
  - 1. Trench Excavator: Track mounted hydraulic excavator from 52,800 to 72,500 pound class equipped with a single shank ripper for excavating trenches.
  - 2. Mass Excavator: Caterpillar D-8 dozer with single tooth ripper or equivalent equipment.
- C. Definition of Boulders:
  - 1. Floater rock fragments exceeding 3/4 cubic yard in volume and cannot be reasonably removed, broken, and loaded into standard haul units (dump trucks).
  - 2. Materials excavated under rock excavation shall not be considered boulders.

## 1.3 SITE CONDITIONS

- A. Temperature and Moisture Requirements:
  - 1. Do not excavate, backfill, or compact soils unless ambient air temperature is above 40 degrees F. and soils are within moisture limits indicated in Geotechnical Report.



- B. Existing Utilities:
  - 1. Consult with Owner's Representative and utility company representative if uncharted or incorrectly charted subgrade utility lines are encountered during excavating.
  - 2. Do not interrupt existing active utility and drainage lines serving facilities to remain, except when permitted in writing by Owner's Representative and when temporary alternative utility services are provided.
  - 3. Provide temporary utility services for occupied buildings when permanent utility lines are interrupted.
- C. Scheduling:
  - 1. Do not cover site improvements with soil and aggregate materials prior to acceptance of required inspections and tests.
  - 2. Remove soil and aggregate materials covering damaged, defective, uninspected, and untested subgrade site improvements.

### PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Substitute Manufacturers:
    - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

### 2.2 MATERIALS

- A. Soil Materials:
  - 1. Imported Subsoils, S1: As indicated in Section 31 2200, Grading Skatepark.
  - 2. Imported Subsoils, S2: As indicated in Section 31 2200, Grading Skatepark.
  - 3. On-Site Subsoils, S3: As indicated in Section 31 2200, Grading Skatepark.
  - 4. On-Site Subsoils, S4: As indicated in Section 31 2200, Grading Skatepark.
- B. Aggregate Materials:
  - 1. Coarse Aggregate: As indicated in Section 31 2200, Grading Skatepark.
  - 2. Coarse Aggregate, A2: As indicated in Section 31 2200, Grading Skatepark.
  - 3. Coarse Aggregate, A3: As indicated in Section 31 2200, Grading Skatepark.
  - 4. Coarse Drainage Gravel, A4: 1-1/2 to 1/2 inch, clean washed drain gravel with not more than 2 percent passing a 200 sieve (washed analysis).
  - 5. Coarse Retaining Wall Gravel, A5: Clean washed drainable gravel and sand mixture with 1-1/2 inch maximum aggregate size and not more than 5 percent passing a 200 sieve (washed analysis).
  - 6. Medium Aggregate, A6: As indicated in Section 32 1124, Aggregate Base Course Skatepark.
  - 7. Medium Aggregate, A7: As indicated in Section 32 1124, Aggregate Base Course Skatepark.
  - 8. Medium Aggregate, A8: Washed angular crushed rock, 100 percent passing a 3/4 inch sieve, and not more than 12 percent passing a 200 sieve (washed analysis).
  - 9. Medium Aggregate, A9: 3/4 or 5/8 to 1/4 inch, clean washed medium sized drain gravel with not more than 5 percent passing a 200 sieve (washed analysis).
  - 10. Fine Aggregate, A9: Clean sand, 100 percent passing a No. 4 sieve, with not more than 5 percent passing a 200 sieve (washed analysis).
- C. Sheet and Fabric Materials:
  - 1. Vapor Retarders: As indicated in Section 32 1124, Aggregate Base Course Skatepark.



- Drainage Filter Fabric: 60 mils thick, 4.5 ounces per square yard, nonwoven continuous filament polypropylene with minimum average grab tensile strength of 120 pounds with 55 percent maximum average elongation, Propex 4545 by Amoco, 200 Grade Fibretex by Crown Zellerbach, PO511 by Exxon, 140N by Mirafi.
- 3. Erosion Control Fabric: As indicated in Section 31 2200, Grading Skatepark.

## 2.3 EQUIPMENT

- A. Excavating Equipment:
  - 1. Wet Weather and Trench Excavators: Track mounted hydraulic excavator from 52,800 to 72,500 pound class equipped with a single shank ripper for excavating trenches.
  - 2. Dry Weather Mass Excavators: Caterpillar D-8 dozer with single tooth ripper or equivalent scraper and dozer equipment.
- B. Compacting Equipment:
  - 1. Heavy Weight Compactors: Self propelled or tractor towed compactors including steel wheeled, segmented, vibrating rollers.
  - 2. Medium Weight Compactors: 48 inch diameter drum, smooth steel wheeled vibrating rollers.
  - 3. Light Weight Compactors: Manually guided vibrating plate compactors.
  - 4. Substrate Compaction Test Equipment: 10 cubic yard rubber tired haul unit (dump truck), filled with soil or aggregate.
- C. Trenching Equipment:
  - 1. Self propelled 50 HP (gross) Class or larger ride on trencher with rock boom and anti back flex chain with rock and frost teeth or mixed rock and frost cupped teeth.

### 2.4 SOURCE QUALITY CONTROL

- A. Imported Soil and Aggregate Source Tests:
  - 1. When required by Owner's Representative, Owner will employ an independent testing laboratory to perform moisture content and density of soil tests in accordance with ASTM D 1557, Modified Proctor.
  - 2. When required by Owner's Representative, Owner will employ an independent testing laboratory to perform moisture content and density of aggregate tests in accordance with ASTM D 698, Standard Proctor.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verification of Conditions:
  - 1. Examine subsoil and existing site conditions.
  - 2. Verify location of existing below grade utility lines and underground structures by reviewing utility locate markings on soil, curb, and paving surfaces.
  - 3. Owner's Representative will examine imported backfill materials prior to site placement.
- B. Protection:
  - 1. Protect existing streets, walks, and curbs from wheel and track damage by covering with heavy timber dunnage and temporary soil materials.
  - 2. During extended wet weather, cover exposed soil materials sloping steeper than 2 horizontal to 1 vertical with vapor retarding sheets.
  - 3. Protect excavations and trenches from erosion by freezing temperatures and water drainage.
  - 4. Protect stockpiled soil materials from contamination with adjacent soils.

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- 5. Surround open excavations and trenches with portable folding barricades and connect barricades with reflective barrier tape.
- 6. Provide amber flashing warning lights at 20 feet on center and mount on portable folding barricades around open excavations and trenches.
- 7. Protect site improvements, utility lines, and building foundations from damage caused by excavating, trenching, backfilling, and compacting adjacent soils.
- C. Preparation of Subgrade and Soils:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.
  - 2. Remove ground water from bottom of excavations and trenches with dewatering system and transport water to site drainage systems acceptable to Owner's Representative.
  - 3. Apply water to moisten soils or aerate soils to dry backfill materials to achieve a moisture content within plus or minus 3 percent of the optimum moisture content at maximum dry density as determined by Modified Proctor Test, ASTM D 1557.
  - 4. Do not place backfill on substrate soils which yield more than 1/2 inch under pressure from Substrate Compaction Test Equipment.

## 3.2 SOIL AND AGGREGATE REMOVAL

- A. Soil Removal:
  - 1. Remove excavated soils encountered to obtain required subgrade elevations.
  - 2. If unsatisfactory soil materials are encountered at design elevations, continue excavation until substrate conditions are satisfactory to Owner's Representative.
  - 3. Do not excavate closer than two horizontal to one vertical slope below existing footings.
  - 4. Do not excavate closer than two horizontal to one vertical slope without providing excavation supports complying with MI-OSHA Standards for Construction Industry, including site observations by a qualified person as defined in MI-OSHA.
  - 5. Slope sides of excavations and trenches as required by soil conditions to prevent settlement.
  - 6. Slope sides of temporary excavations not more than 1 horizontal to 1 vertical.
- B. Temporary Bracing:
  - 1. Provide temporary structural bracing to maintain excavations and protect adjacent property until excavations are backfilled.
  - 2. Shore and brace sides of excavations and trenches where adequate sloping of soils is not possible because of space restrictions.
  - 3. Contractor may use sheet piles, uprights, stringers, and cross braces as required to support excavation and trench side walls.
- C. Trenching for Footings:
  - 1. Trench for footings 18 inches minimum below original grade and 18 inches minimum below finished grade.
  - 2. Clean footing excavations of loose material by hand shovel prior to concrete placement.
  - 3. Provide firm, natural, undisturbed soil surface below footings.
  - 4. During wet weather backfill footing trenches with 4 inch layer of Medium Aggregate A8.
- D. Trenching and Bedding for Utility and Plumbing Lines:
  - 1. Remove and stockpile soil materials to obtain required subgrade depth and width to install utility and plumbing lines.
  - 2. If trench is over excavated, restore grade by placing, spreading and compacting Medium Aggregate A8 bedding in layers not exceeding 9 inches.
  - 3. Place 4 inch minimum thick Medium Aggregate A8 bedding on leveled trench bottom before pipe and conduit lines are installed.
  - 4. Spread and level bedding aggregate so pipe and conduit is uniformly supported along the barrel before compaction.



- 5. Excavate bell holes at each joint to permit assembly and inspection of the entire joint.
- E. Removing Rock:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.

# 3.3 BACKFILLING AND COMPACTING

- A. Placing and Spreading Backfill:
  - 1. Contractor may use on-site subsoils for S3 structural and landscape subsoil backfill, when subsoils are applied in dry weather, and applied within 3 percent of optimum moisture content.
  - 2. Place and spread backfill materials to meet required elevations in uniform lifts not exceeding 9 inches in loose thickness for compaction by Heavy Compactors and not exceeding 6 inches in loose thickness for compaction by Light Compactors.
  - 3. Place and spread clayey silt and similar fine grained soil backfill materials to meet required elevations in uniform lifts not exceeding 9 inches in loose thickness for compaction by Heavy Compactors and not exceeding 6 inches in loose thickness for Light Compactors.
  - 4. Place backfill at trenches and retaining walls as soon as work permits.
  - 5. Place backfill adjacent to foundation walls on both sides simultaneously.
- B. Placing Initial Backfill Aggregate at Pipe and Conduit Lines:
  - 1. Test pipe and power conduit lines prior to installing haunching aggregate.
  - 2. Install haunching aggregate in lifts of not more than 6 inches in thickness, to spring line of pipe and conduit and compact on both sides using Light Compactors.
  - 3. Bring lifts up together on both sides of pipe and conduit and carefully work under pipe and conduit by slicing with a shovel or other approved procedure.
  - 4. Compact the bedding aggregate from flow line to horizontal centerline of pipe and conduit to ensure that firm support is obtained to prevent any lateral movement of the pipe and conduit during the final backfilling.
  - 5. After completion of testing and haunching, backfill uniformly around conduit and pipe lines to 6 inches above pipe and conduit with Medium Aggregate A8 bedding in 6 inch lifts and uniformly compact on both sides with Light Compactors.
  - 6. Place continuous colored tape markers on top of compacted bedding aggregate.
- C. Placing Imported Structural Backfill:
  - 1. Place imported structural backfill below interior concrete slabs on grade, paving surfaces, walking surfaces, and where required to backfill adjacent foundation and retaining walls.
  - 2. Place imported structural backfill below footings to fill areas of excess excavation in the subgrade.
  - 3. Place imported structural backfill during presence of Owner's Representative.
- D. Placing Site Soil Backfill:
  - 1. Place site soil backfill below paving and walk surfaces more than 10 feet from the building during dry weather.
  - 2. Place site soil backfill below landscape areas more than 2 feet from the building during dry weather.
  - 3. Place site soil backfill during presence of Owner's Representative.
- E. Placing Backfill Aggregates:
  - 1. Place course drainage gravel, A4 backfill around perimeter foundation drains as specified in Section 33 4600, Subdrainage Systems Skatepark.
  - 2. Place course drainage gravel, A4 backfill in underfloor slab trench drains as specified in Section 33 4600, Subdrainage Systems Skatepark.



#### SECTION 31 2300 EXCAVATING, BACKFILLING AND COMPACTING

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- 3. Place course drainage gravel, A4 backfill not less than 12 inches wide continuous adjacent to foundation and retaining walls more than 12 inches high where soil is exposed to surface or ground water.
- 4. Place course drainage gravel, A4 backfill behind foundation and retaining walls 24 inches wide minimum from top of drain line bedding aggregate or from base of wall footing to 12 inches below finished grade as specified in Section 33 4600, Subdrainage Systems Skatepark.
- F. Installation of Geotextile Fabrics:
  - 1. Separate aggregate backfill from clays, silts, sands and other fine grained soils with geotextile filter fabric.
  - 2. Install geotextile filter fabric over existing soils prior to placing coarse drainage gravel, A4 or medium aggregate, A9 to separate aggregates from fine grained soils.
  - 3. Wrap geotextile filter fabric over aggregate backfills and secure fabric edges and ends prior to covering with fine grained soil backfills.
  - 4. Lap edges and ends of geotextile fabrics not less than 4 inches.
  - 5. Install geotextile erosion control fabric as recommended by fabric manufacturer.
- G. Placing and Spreading Concrete Slab Base:
  - 1. Place concrete slab aggregate base as indicated in Section 32 1124, Aggregate Base Course Skatepark.
- H. Compaction of Fill and Backfill:
  - 1. Compact each layer of structural fill and backfill, disturbed subsoil and bedding aggregates below structural fill and backfill, and concrete slab base, and concrete slab leveling course aggregates to 90 percent of maximum density at optimum moisture content as determined by Modified proctor test, ASTM D 1557.
  - 2. Compact each layer of landscape fill and backfill, bedding aggregates below landscape fill and backfill within 3 feet of foundation and retaining walls to 90 percent of maximum density at optimum moisture content as determined by Modified proctor test, ASTM D 1557.
- J. Fill and Backfill Requiring 90 percent Compaction:
  - 1. Below foundations.
  - 2. Below interior floor slabs.
  - 3. Upper 3 feet below grade.
  - 4. Below pavements, within 3 feet below finish grade.
  - 5. Interior footing backfill.
  - 6. Utility trench backfill, upper 3 feet below pavements, walks, and interior floor slabs.
- K. Fill and Backfill Requiring 90 percent Compaction:
  - 1. Below pavements, more than 3 feet below finish grade.
  - 2. Retaining wall and basement wall backfill.
  - 3. Utility trench backfill, more than 3 feet below pavements, walks, and interior floor slabs.
  - 4. Utility trench backfill in landscape areas more than 6 inches above pipe or conduit.
- L. Fill and Backfill Requiring 85 percent Compaction:
  - 1. Landscape Fill.
- M. Backfill Requiring Use of Light Compactors:
  - 1. Utility trench backfill.
  - 2. Within 3 feet of embedded foundation walls and retaining walls.

# **City of Sherwood Public Works**

15527 SW Willamette Street Sherwood, OR 97150 Phone: 503.625.5722



- N. Grading:
  - 1. Grade soils as indicated in Section 31 2200, Grading Skatepark.

### 3.4 COMPLETION

- A. Site Tests and Inspections:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - Perform soil moisture content and density tests, continuous observation of backfill and compaction Work and proof roll subgrade as indicated in Section 31 2200, Grading -Skatepark.
- B. Maintenance of Moisture Content and Density:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.
- C. Disposal:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.
- D. Daily Cleaning:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.

## END OF SECTION 31 2300

Phone: 503.625.5722



#### SECTION 32 1124 AGGREGATE BASE COURSE

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Aggregate base for building pads, pavements, curbs, gutters, ramps, and walks.
- B. Related Documents and Sections:
  - 1. City of Sherwood and State of Oregon Standard Specifications.
  - 2. Section 31 1000, Site Preparation/Clearing: Topsoil removal and stockpiling.
  - 3. Section 31 2200, Grading Skatepark: Cutting, filling, compacting, rough grading, and finish grading to contour the existing subgrade and fill soils for subgrade support of planting berms, site structures, building pads, paving areas, and planting areas.
  - 4. Section 31 2300, Excavating, Backfilling, and Compacting Skatepark: Excavating, backfilling, and compacting of soils for building, paving, and planting soils and aggregates.
  - 5. Section 33 4600, Subdrainage Systems Skatepark: Foundation, roof, and under slab drains.
- C. Allowances:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

### 1.2 SYSTEM DESCRIPTION

- A. Density Test Requirements:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

## 1.3 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- B. Quality Assurance Submittals:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

### 1.4 QUALITY ASSURANCE

- A. Paving Base Conference:
  - 1. Prior to placing aggregate base course, meet at the site with Owner's Representative and/or independent testing laboratory representative to review limits of base course work and procedures for protecting site improvements and inspecting and testing aggregate base course during placement and final grading.

## 1.5 SITE CONDITIONS

- A. Temperature and Moisture Requirements:
  - 1. Do not place or grade aggregate base course unless ambient air temperature is above 35 degrees F. and subgrade soils are within moisture limits.
- B. Scheduling:

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- 1. Do not cover utility lines or subgrade soil and aggregate materials prior to acceptance of required inspections and tests.
- 2. Remove aggregate base and leveling course materials covering damaged, defective, uninspected, and untested subgrade soils, backfill aggregates, and below grade utility lines.

## PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Substitute Manufacturers:
    - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

### 2.2 MATERIALS

- A. Aggregate Materials:
  - 1. Coarse Aggregate, A1: As indicated in Section 31 2200, Grading Skatepark.
  - 2. Coarse Aggregate, A2: As indicated in Section 31 2200, Grading Skatepark.
  - 3. Coarse Aggregate, A3: As indicated in Section 31 2200, Grading Skatepark.
  - 4. Coarse Drainage Gravel, A4: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 5. Coarse Retaining Wall Gravel, A5: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 6. Medium Aggregate, A6: Selected structural course aggregate, conforming to Oregon State Highway Standard Specifications, with 3/4 inch maximum aggregate size and not more than 5 percent passing a 200 sieve (washed analysis).
  - 7. Medium Aggregate, A7: Selected structural course aggregate, crushed rock, conforming to City of Livingston Standard Construction Specifications, Sections for aggregates.
  - 8. Medium Aggregate, A8: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 9. Medium Aggregate, A9: As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- B. Sheet and Fabric Materials:
  - 1. Polyethylene Vapor Retarders: ASTM D 2103, 6 mils thick, black.
  - Laminated Sheet Vapor Retarders: Polyethylene and kraft paper with moisture vapor transmission of 0.10 perms or less in accordance with ASTM E 96, Procedure A, Moistop by Fortifiber Corporation, Ply-Bar Plus II by Glas-Kraft, Tu-Tuf 4 by Sto-Cote Products, Inc., Premoulded Membrane Vapor Seal by W.R. Meadows.
  - 3. Soil Stabilization Fabric: 23 mils thick, 4 ounces per square yard, polypropylene, Propex 2002 by Amoco or 500X by Mirafi.

### 2.3 EQUIPMENT

- A. Compacting Equipment:
  - 1. As indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- B. Aggregate Base Course Source Tests:
  - 1. As indicated in Section Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

## PART 3 EXECUTION



### 3.1 PERFORMANCE

- A. Verification of Conditions:
  - 1. Examine subgrade soil for moisture content, density, and existing site drainage conditions.
  - 2. Verify complete installation and inspection of required below grade utility lines and underground structures.
  - 3. Owner's Representative will examine imported aggregate base course materials prior to site placement.
- B. Protection:
  - 1. Comply with requirements in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- C. Preparation:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark and Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- D. Installation of Geotextile Soil Stabilization Fabrics:
  - 1. Install geotextile soil stabilization fabric over subsoils prior to placing concrete slab base aggregate and prior to placing base aggregates below asphaltic concrete paving.
  - 2. Lap edges and ends of soil stabilization fabrics not less than 4 inches.
  - 3. Anchor geotextile fabric as recommended by fabric manufacturer.
- E. Placing and Spreading Concrete Slab Base Course:
  - 1. Place Medium Aggregate, A7 base course on prepared substrate and geotextile soil stabilization fabric in a single layer to not less than 4 inch depth below new interior concrete slabs on grade.
  - 2. Place Medium Aggregate, A7 base course on prepared substrate to not less than 4 inches deep below new exterior concrete curbs, walks, stairs, and ramps on grade.
  - 3. Place Fine Aggregate, A9 leveling course to not less than 2 inches deep on top of vapor retarder below interior concrete slabs on grade.
  - 4. Place Fine Aggregate, A9 leveling course to not less than 2 inches deep on top of soil substrate below exterior concrete curbs, walks, stairs, and ramps on grade.
  - 5. When compacted base course is 6 inches thick or less, place base materials in a single layer.
  - 6. When compacted base course is indicated more than 6 inches thick, place material in equal layers, except no single layer more than 6 or less than 3 inches in thickness after compaction.
- G. Compacting and Grading of Aggregate Base Course:
  - Compact each layer of concrete slab base, course aggregates to 90 plus percent of maximum density at optimum moisture content as determined by Modified proctor test, ASTM D 1557.
  - 2. Grade aggregate base courses to levels indicated.
  - 3. Finish grade top of aggregate base courses below concrete slabs, curbs, footings, and walks to not more than plus 1/4 inch above or minus 1/2 inch below the elevations indicated on Drawings.
  - 4. Finish grade top of aggregate base courses below asphaltic concrete paving to not more than 0.05 feet above or below the elevations indicated on Drawings.

## 3.2 COMPLETION



- A. Site Tests and Inspections:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Proof roll subgrade with substrate compaction test equipment in presence of Owner's Representative.
  - 3. If subsoil compresses more than 1/2 inch under load of substrate compaction test equipment, remove loose soil and backfill as directed by Owner's Representative.
  - 4. Determine moisture density of aggregate base courses with nuclear testing equipment in accordance with City of Sherwood and State of Oregon Standard Specifications.
- B. Maintenance of Moisture Content and Density:
  - 1. Comply with requirements in Section 31 2200, Grading Skatepark.
- C. Disposal:
  - 1. Remove waste material from the site.
  - 2. Remove excess aggregate base course materials from the site.
- D. Daily Cleaning:
  - 1. Remove aggregate base course material spills from existing roads, walks, pavements, and surface water drainage trenches.

# END OF SECTION 32 1124



## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. The Contractor shall furnish all labor, supervision, and materials to install a complete irrigation system as described by and implied in the Contract Documents.
  - 2. The Contractor shall repair any settling of backfilled trenches that may occur during the guarantee period, and completely restore and repair all plantings, lawn, paving, and other site improvements disturbed by this construction.
  - 3. The Contractor is responsible for obtaining and paying for all required permits and fees associated with the work described in the Contract Documents.

## 1.2 RELATED WORK IN OTHER SECTIONS

- A. Division 01 Section 01 33 00: Submittal Procedures.
- B. Division 32 Section 32 93 00: Trees, Plants and Ground Covers.

## 1.3 SUBMITTALS

- A. Product Submittals:
  - 1. Products used shall not deviate from those indicated on drawings, specified herein or approved through the pre and post bid substitution request process. Product submittals are required for these items.
- B. Quality Assurance Submittals:
  - 1. Submit copies of manufacturer's installation instructions for irrigation equipment.
  - 2. Submit documentation that the installer is a licensed and bonded landscape or irrigation Contracting firm that specializes in and has experience in the successfully installing similar irrigation systems.
- C. Contract Closeout Submittals:
  - 1. Record Drawing Procedures shall include all approved variations or changes, indicating all main and lateral line locations, valves, quick-couplers, drains, wire runs, and irrigation heads, located by field dimensions to the nearest permanent landmark, as approved by the Owner's Representative.
  - 2. Furnish operating instructions for controllers, spare parts list, and local source for replacement parts.

# 1.4 SITE CONDITIONS

- A. Weather Requirements:
  - 1. Do not solvent weld polyvinyl chloride pipe when ambient temperature is below 40 degrees F and failing.
  - 2. Do not solvent weld polyvinyl chloride pipe in wet conditions, without adequate cover.
- B. Schedule for Installing Pipe Sleeves and Sprinkler Heads:
  - 1. Schedule installation of pipe sleeves below paving and walks to limit site pedestrian impact.
- C. Existing Tree Canopy areas;



1. The Contractor shall, at the discretion of the Owner's Representative and prior to trenching or installation, field stake proposed irrigation lines wherever they pass under existing tree canopies.

# 1.5 DAMAGES

- A. All structures or facilities damaged by work of this project shall be restored to equal or better than original condition at the Contractor's expense and to the satisfaction of the Owner's Representative.
- B. The Contractor shall be responsible for all damage caused by leaks or breaks in the equipment and materials furnished and/or installed in this contract for one year after the date of final acceptance.

## 1.6 EXISTING UTILITIES

- A. The Contractor shall contact the Utility Notification Center at (800) 332-2344 and Owner's Representative at least 48 hours in advance of any utility locate request. The Contractor shall verify, locate, and identify, with visible marking, all existing underground utilities in the areas of work and maintain such markings until all work in those areas is complete. If utility locate markings are not maintained by the Contractor the Contractor will be billed at the rate of \$60.00 per hour for relocating services. If utilities are to remain in place, the Contractor shall provide adequate means of protection during excavation operations.
- B. Should uncharted piping or other utilities be encountered during the execution of the work, the Contractor shall notify the Owner's Representative immediately and consult with the utility owner for instructions before proceeding with the work.
- C. The Contractor shall cooperate with the Owner and public or private utility companies in keeping their respective services and facilities in operation. If it becomes necessary to temporarily interrupt existing services or facilities, the Contractor must provide temporary utility services to the satisfaction of the Owner's Representative.

## 1.7 PERMITS AND REGULATIONS

A. All work detailed herein and, on the drawings, shall be accomplished in strict accordance with the applicable Local, State and Federal codes and regulations. The Contractor shall be responsible for obtaining and paying for all necessary permits to accomplish the work described herein.

### 1.8 RECORD DRAWINGS

- A. The Contractor shall maintain a current record of all pipe, wire, and equipment placement, and shall record all variations or changes approved by the Owner's Representative. Changes in layout of proposed work shall be recorded on the Record Drawing Set in <u>blue</u> pencil or ink. Additions to the proposed scope of work shall be recorded on the Record Drawing Set in <u>green</u> pencil or ink. Deletions either in the proposed scope of work or by a change in layout shall be recorded on the Record Drawing Set in <u>green</u> pencil or ink.
- B. Record drawings must be submitted to the Owner's Representative for review and approval on a weekly basis.



C. Complete Record drawings shall be included in the Maintenance Manual.

## 1.9 SUBSTITUTIONS

A. If materials other than those specified in the Contract Documents are proposed, the Owner's Representative shall determine whether such materials or methods are a suitable or equal substitute. The irrigation system described in the Contract Documents is based on specific GPM output, static and operating pressures. Approved substitutions may require partial or complete redesign of the system at the Contractor's expense. The Owner's Representative's decision will be final.

## 1.10 WARRANTIES

- A. Manufacturer's Warranty:
  - 1. Provide equipment manufacturer's standard Warranty for automatic controllers, control valves, quick couplers, and heads.
- B. Installer's Guarantee:
  - 1. Provide installer's "one year" guarantee for watertight pipe system to the Owner's Representative at the time of final acceptance, showing the date of completion, which shall be the beginning of the guarantee period.
  - 2. Guarantee shall include repair of trench back-fill that settles more than 1/2 inch or of plantings, lawns, paving, and walk materials damaged by settlement of trench backfill soils during the guarantee period.

## PART 2 - PRODUCTS

### 2.1 PIPE

A. All PVC MAIN LINE AND LATERAL PVC (Polyvinyl Chloride Plastic) pipe shall be PVC 1220, Type 1, normal impact, I.P.S., N.S.F. approved. With the exception of 1-1/2" dia. pipe, which is allowed, all diameters shall be measured in 1" increments only, starting with a minimum diameter of 1". Schedule 40 PVC pipe shall conform to ASTM D1784-69, ASTM D1785, and PS22-70. Class 200 PVC pipe shall conform to ASTM D1784-69, ASTM D2241, AND PS22-70. All PVC pipe shall be new, defect free, and continuously and permanently marked with the manufacturer's name or trademark, size, schedule and type of pipe. All pipe shall be minimum of 200 PSI rated and with SDR 21 walls.

## 2.2 PVC PIPE FITTINGS

- A. All PVC fittings shall be PVC 1220, schedule 40, type 1, normal impact, I.P.S., N.S.F. shall meet the requirements of ASTM D-2466 unless otherwise noted.
- B. All PVC nipples shall be standard weight schedule 80, with molded threads.

### 2.3 PVC CLEANER AND PRIMER

A. "Weld-On P-75" or approved equal. All approved equals for "Weld-On P-75" shall meet the requirements of ASTM F-656.

## 2.4 PVC SOLVENT CEMENT



A. In all circumstances use "Weld-On 725" or approved equal. All approved equals for "Weld-On 725" shall meet N.S.F. approval for Type I and II PVC through three (3) inch and meeting requirements of ASTM D-2564.

### 2.5 PVC SLEEVES

A. All sleeves shall be Class 200 PVC and shall be sized to provide sufficient clearance to accommodate all pipes and wire required to pass through the sleeve, plus room for an additional Class 200 PVC pipe of minimum 2.5" diameter, unless otherwise specified on the drawings.

## 2.6 GALVANIZED STEEL PIPE AND FITTINGS

A. All steel pipe shall be schedule 40, hot-dipped galvanized, conforming to ASTM A120-76. Fittings shall be hot-dipped galvanized, malleable iron. Diameters shall be measured in 1" increments only, starting with a minimum diameter of 1".

## 2.7 IRRIGATION HEADS

- A. Spray Heads: Hunter Industries: PROS-06-PRS40-CV
- B. Rotor Heads: N/A.

## 2.8 VALVES

- A. Control Valves:
  - 1. Automatic (Master) Control Valves: Hunter Industries ICV series. Size as noted on plans.
  - 2. Automatic Control Valves: Hunter Industries PGV series. Size as noted on plans.
  - Manual Control Valves: Heavy duty Brass body control valves, straight or angle configuration, 150 PSI min. rating for valves less than 1-1/2" 200 PSI rating for valves 1-1/2" or larger, conforming to ASTM B-62, with 'cross' or 'hub' style handle. Size as indicated on plans.
- B. Isolation Valves:
  - 1. Mainline isolation valves; Matco-Norca or approved equal. Shall be Cast Iron bodied Gate Valves with screwed joints, resilient seating, non-rising stem, screwed bonnet, solid wedge and 2-inch square operating nut.
  - 2. Zone isolation valves; shall be Brass Gate valves as indicated on plans, 150 PSI min., rated, with standard seat and threaded ports. Valve shall be same size as line on which it is installed, unless otherwise indicated on drawings. Valves shall have brass or stainless steel wheel handle.
- C. Quick-Coupling Valves; Hunter Industries model HQ-33DLRC.
- D. Back-flow Prevention Device; N/A.
- E. Manual Drain Valves; "Buckner" 2200 series; bronze angle valve or approved equal. Valves shall be one (1") inch size.



## 2.9 VALVE BOXES AND VALVE COVERS

- A. Valve Boxes for Control, Isolation, Pressure Relief and Ball Valves; for single valves, "Carson-Brooks Model #1419" or approved equal, with locking top and with six (6") inch extensions as needed to facilitate required installation. Where multiple valves are placed, the boxes shall be no closer than four (4') feet on center. Boxes shall be "CARSON/BROOKS" brand, molded of a single piece of structural foam polyethylene or approved equal. Locking lids and extensions shall be of same manufacture as box.
- B. Backflow Prevention/ Point of Connection Assembly Vault; Vault shall be sized to allow installation of backflow prevention device and isolation valve. (See Backflow Device Assembly schematic) Contractor shall maintain a minimum clearance zone, on all sides, between any device and vault sides or other device or pipe. This zone shall extend from the center of any device to a distance equal to either the height or width of the device, whichever is greater, plus one-inch. "CARSON VAULT" size and type as specified on plans; or approved equal.
- C. Bolts for Locking Valve Box Lids: where locking or bolt-down lids are required the contractor shall provide stainless steel "penta" bolts (five-sided) and stainless steel washers. Bolts shall be of appropriate size and length for the specified valve box lid.

## 2.10 SWING JOINT ASSEMBLIES

- A. Prefabricated assemblies: "LASCO" with ten (10") inch lay length, for irrigation heads only, MIPT by spigot, schedule 80, or approved equal: for Quick-Coupling Valve swing joint assemblies use "LASCO" fittings with appropriate 'lay length' as required by details. Verify use with Owner prior to installation. Pre-fabricated swing-joint assemblies must be a minimum three quarter (3/4") inch size and properly sized for associated irrigation heads and not increase water velocity through fittings above five (5) feet per second allowable industry standard.
- C. SPIRAL BARB FITTINGS FOR POLYETHYLENE SWING JOINT ASSEMBLIES: All fittings shall be constructed specifically for use in constructing "poly-pipe" swing assemblies. The fittings shall have a maximum operating water pressure of 80 PSI. All fittings shall be constructed of UV resistant, thermoplastic material and be so designed to permit 'twist-in' insertion eliminating the need for glue and/or clamps.

### 2.11 IRRIGATION CONTROLLER(S), MONITORING AND SENSING DEVICES

A. Controllers: "CALSENSE (ET2000e-16-EN-RRe W/ SSE-R Enclocure). Refer to plans for controller model specification).

### 2.12 WIRE AND ELECTRICAL CONNECTORS

- A. Irrigation control wire shall be single strand insulated copper wire designed for 24 volts or greater, Type UF, UL approved for direct burial in NEC Class II circuits. Size of wire shall be in accordance with manufacturer's recommendation, but in no case smaller than number fourteen (14) gauge. Common wire shall be white and control wires shall be red. If more than one Common wire is required, additional Common wires shall be white with colored stripe(s).
- B. Hardwire Communication Wire: N/A.



- C. Electrical Connectors; water tight electrical connectors "3-M DBY/DBR" or approved equal.
- D. Locate Wire; all water main lines must be marked with continuous #14-gauge, single strand locate wire, with black color coating.

### 2.13 OTHER MATERIALS

- A. Concrete for Thrust-Blocking; N/A
- B. Pipe Joint Tape; pipe joint tape shall be a minimum of one-half inch (1/2") Teflon tape intended for use in wrapping threaded PVC and/or galvanized pipe fittings and joints, as required.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Do not allow any work to be covered or enclosed until it has been inspected, pressure tested, and approved by the Owner's Representative. At end of each work day all holes and trenches shall be covered and/or barricaded.
- B. Installation of all materials and equipment shall be in strict accordance with the manufacturer's written specifications and recommendations and with local and state codes whether indicated on the drawings or not. The Contractor is responsible for calling to the immediate attention of the Owner's Representative any conflicts between the manufacturer's written specifications and recommendations; local and state codes; and the Contract Documents. The Owner's Representative may require the Contractor, at no additional cost, to correct to the Owner's satisfaction any work installed that results in such conflicts.
- C. The location of pipe, sprinkler heads, valves, and other equipment shall be as shown on the plans and shall be the size and type indicated. No changes shall be made without prior approval by the Owner's Representative. Minor changes necessary to conform to ground conditions may be made by the Contractor without the Owner's Representative's prior consent in order to ensure the smooth progress of the work. However, all such changes are subject to approval by the Owner's Representative and must be recorded on Record Drawings.
- D. Permission to shut off any water lines must be obtained in writing from the Owner's Representative prior to the beginning of any work. Disruptions in service shall be kept to a minimum.
- E. The Contractor shall be responsible for maintaining the system and protecting it from all damage, including damage caused by vandalism or adverse weather conditions, until date of final acceptance. The Contractor shall be responsible for repairing such damage at no additional cost to the Owner.
- E. The Contractor shall maintain at the site a clean copy of the drawings for recording all changes to the project in accordance with the Records Drawings Procedure. All changes shall be recorded within twenty-four (24) hours of occurrence. FAILURE TO KEEP RECORD DRAWINGS CURRENT SHALL RESULT IN A REDUCTION OF PAYMENT TO



CONTRACTOR. THE RATE OF PAYMENT SHALL BE BASED ON THE PERCENTAGE OF COMPLETION OF THE RECORD DRAWINGS.

## 3.2 INSTALLATION PROCEDURE

- A. No work shall be covered or enclosed until it has been inspected, tested, approved and signed off on the checklist. A 24-hour notice for approval shall be given. The Landscape Architect/consultant will maintain the inspection checklist with review by the maintenance department.
  - 1. Layout: Stake, flag and/or paint the location of all heads, valves and piping according to the schematic design shown on the drawings. The layout is then to be approved.
  - 2. Trenching shall proceed after layout approval. If during excavation, a large amount of unknown material (asphalt, concrete, wire, steel, etc.) is uncovered, the debris shall be removed from site, at contractor expense. Bottom of trench shall be free of rocks, asphalt, concrete, wire, steel and any other debris. Trenching is the preferred method for pipe installation. Pipe pulling is only allowed when
    - a. The job site is at a park where open holes should be kept to a minimum.
    - b. The soils are known to be clean and free of debris. Hand trench around existing tree roots of 2" and larger are encountered.

Pipe shall have firm and uniform bearing on all pipe runs to prevent uneven settlement. Wedging or blocking of pipe is not permitted.

- 3. Mainline, thrust blocks and isolation valves shall be installed according to the specifications. The mainline installation is then to be approved.
- 4. The mainline is to be flushed before the installation of the automatic remote control valves. Soil may be placed in trenches between fittings to insure the stability of the line under pressure. Thoroughly flush all mainline pipe. The flushing is then to be approved.
- 5. The mainline is then to be pressure tested, after valve installation, with the pipe filled with water and all air expelled. Minimum pressure test shall be 100 PSI without losing three (3) PSI over a two (2) hour period. Pressure can be achieved with a pump, but shall not be maintained with a pump. Supply certified pressure gauge during testing. Detect and repair all leaks and retest until approval is granted.
- 6. The lateral lines, swing joints and flexible pipe joints shall then be installed and then approved.
- 7. The lateral lines shall be thoroughly flushed to remove all debris and expel all air from the piping. The flushing is then to be approved.
- 8. Delay complete backfilling until pressure tests have been accepted. Backfill, settle with water and compact trenches in 6" lifts with material free of rocks and debris. Backfilling will then be approved.



- 9. Trench restoration will be completed by the contractor with seeding of trenches with a certified blue tag Alliance Perennial Ryegrass Blend. Provide submittal before seeding for approval by owner representative.
- 10. The installation of valve boxes and heads shall then be inspected and approved.
- 11. The installation of all wiring at valves and controller shall then be inspected and approved.
- 12. The installation of the ground rod will have a Megger test performed. The rod will then be inspected and approved.
- 13. Valve pressures will then be adjusted. The contractor will then adjust all heads. The head adjustment shall then be inspected and approved.
- 15. A walk through with the contractor, Landscape Architect/consultant and Portland Public Schools staff to establish a final punch list. All items on the punch list will then be corrected.
- 16. The final walk through will then take place with final acceptance and the signing of the warranty.

## 3.3 TRENCHING

- A. A minimum depth of cover to the top of irrigation piping shall be as follows:
  - 1. All lateral lines shall be a minimum of twelve inches (12") deep.
  - 2. All main lines shall be a minimum of eighteen inches (24") deep.
  - 3. Where multiple pipes are laid in common trench the contractor must maintain a minimum separation of 6" in any direction between all pipe.
- B. Backfill in the cool part of the day whenever possible to minimize expansion and contraction of the PVC pipe.
- C. Remove all lumber, rubbish, and rocks from irrigation trenches. Irrigation lines shall have a firm, uniform bearing surface for the entire length of each line. Wedging or blocking of pipe other than specified thrust-blocking is not permitted.
- D. Pipe shall be flushed clear and clean of all dirt and foreign material prior to back-filling trenches. (See 3.14 FLUSHING AND TESTING)
- E. Backfill trenches in layers of not more than six inches (6") in depth and compact each layer. Fill trenches to finish grade with native or imported topsoil keeping the top three inches (3") free of all rock. Restore surface to original or better than original condition.
- F. Any materials or equipment damaged or destroyed while back-filling shall be repaired or replaced by the Contractor at no additional cost to the Owner.
- G. "Pulling" of pipe with a vibratory plow may be accepted as an alternate installation method for specific portions of the work. The Contractor shall request in writing of the Owner's Representative permission to use this method of installation. Requests shall include a complete description of the type of equipment to be used, the experience of the equipment operator and the areas in which pipe will be pulled.



## 3.4 PIPE

- A. Exercise care in handling and storing all pipe and fittings. Store materials under cover before using. Transport materials in a vehicle of adequate size and capacity to prevent bending or the concentration of an external load at any point on the materials. Any materials or portions of materials that show such damage shall be discarded and replaced.
- B. Remove all foreign matter and dirt from inside pipe or fittings before lowering into the trench.
- C. Install all pipe and fittings per the manufacturer's specifications. Use the specified primer and cement on all glue joints. Use Teflon tape on all threaded joints.
- D. Install the specified locator wire on the top side of all pipe. Tape locator wire to the all pipe at no less than twenty-foot (20') intervals. All sections of locator wire shall be spliced together with water-tight splice connectors, to provide a continuous run.
- E. Install concrete thrust blocks at all changes of direction for mainline pipe two and one-half inches (2-1/2") or greater in diameter. Place a minimum of one 60 pound sack of pre-mixed concrete against the pipe and firm undisturbed soil, in accordance with the pipe manufacturer's recommendations.
- F. Snake pipe in trenches to allow for expansion and contraction as recommended by the manufacturer.
- G. Cut pipe ends square and remove burrs at all joints.

### 3.5 CONTROL VALVES

- A. Install complete as detailed. All valve boxes shall be installed so that the top of the box is flush with finish paving grade or 1" above planting area grade.
- B. Verify locations with Owner's Representative prior to installation.

### 3.6 QUICK-COUPLING VALVES

A. Install complete with fittings and covers as detailed on plans.

### 3.7 ISOLATION/MANUAL VALVES

A. Install complete with fittings, valve boxes and extension(s), as detailed on plans.

#### a. DRAIN VALVES (N/A)

A. Install complete with fittings, valve boxes and extension(s), as detailed. Install a minimum of one cubic foot (1 c.f.) drain rock at each drain valve location.

### 3.9 IRRIGATION HEADS

A. Install irrigation heads of types, sizes and coverage called for in the Irrigation Legend/Key at the locations shown on the plans. Minor changes in head location may be necessary to achieve the required coverage at no additional expense to the Owner. Notify the Owner's


Representative for approval prior to making any changes. Document all changes on project record drawings as they occur.

B. Locate no head closer than three inches (3") from any adjacent walk (gravel, concrete, or otherwise).

## 3.10 IRRIGATION SLEEVES

- A. Install sleeves for irrigation lines and/or control wire under pavement prior to placing pavement materials. Extend sleeves beyond pavement edge a minimum of twelve inches (12"). All sleeves shall be installed with a minimum depth of cover to the top of the pipe of twenty inches (20"). If length of required sleeve is greater than the length of the unit of pipe, solvent weld all joints required. Otherwise all sleeves shall be of one continuous length of pipe.
- B. Tape ends of sleeve closed to keep soil out of the sleeve until irrigation lines and/or control wire are installed.
- C. Permanently attach a single length of fourteen (14) gauge trace wire above the entire length of the sleeve.
- D. Stake both ends of sleeves with a readily visible stake extending twelve inches (12") above grade and below grade to the bottom of the sleeve. Mark the above grade portion of the stake with the words "Irrig. Sleeve". Remove stakes after sleeves are recorded on as-built drawings and after irrigation lines and/or control wires are installed and inspected.
- E. Place a minimum of four inches (4") of sand backfill over the top of all sleeves, in areas of new paving, before back-filling with soil or other sub-grade materials.

## 3.11 IRRIGATION CONTROL/PHONE/COMMUNICATION WIRING

- A. Lay control wire in trench under mainline and/or lateral lines whenever they occur in the same trench. Place control wires in sleeves/conduit under all paving and when not in common trench with mainline and/or lateral lines.
- B. Make all wire splices moisture proof using specified electrical connectors. Splices shall only be made in valve boxes. Provide a minimum of two foot (2') of coiled slack between all wire splices. All Communication control wire (section 2.12) splices shall be soldered and encased in water-proof jackets and be approved by the Owner prior to covering.
- C. Control wires shall be bundled together and wrapped with electrical tape at intervals of no more than ten (10) feet. Wires shall be placed below mainline and/or laterals when in same trench.
- D. Clearly mark both ends of all wiring, on a permanent tag, with the number of the corresponding valve and controller station. Locate one tag at each control valve and one tag per wire in the controller.
- E. Install separate common wire for each controller. When 2-wire decoder system is specified a common wire is not required.



- F. Sharp bends or kinks in the wiring shall not be permitted. Wires shall be unreeled in place alongside of or in the trench and shall be carefully placed along the bottom of the trench. Wire shall not be unreeled and pulled into trench from one end.
- G. Follow applicable requirements above for computer control/phone/communication wire. For all wiring coil a min. of 4' (four feet) slack at each location for all future connections. Place field ends in minimum ten inch (10") round valve boxes with extension(s) as needed to meet one half inch (1/2") above grade. Bring all control wires into controller. Leave a min. of 4 foot length for each wire coiled in box. Contractor will connect to appropriate equipment (Contractor will coordinate with Owner's Representative. The Contractor shall provide a 'continuity' test on all wiring to verify communication.
- H. Where any wiring is run in trench without irrigation piping the appropriate warning tape shall be placed in trench six inches (6") above the wiring.
- J. Trace wire shall be laid on top of all mainline and potable water service line and taped to the top of the pipe with electrical tape wrapping the entire circumference of pipe. Trace Wire shall be taped at intervals of no less than 10' and at all Tee's and turns in the pipe. A min. of 2' of trace wire shall be looped in each valve box unless otherwise directed by the Owner's Representative.

### 3.12 IRRIGATION CONTROLLERS

- A. All field control wire and communication wire shall be installed in a clean and neat manner into all equipment. A 48" pigtail is required at controller.
- B. Refer to plans for controller installation requirements.

# 3.13 BACKFLOW PREVENTION DEVICE (EXISTING)

A. Install complete with fittings and materials as specified (see plans). Follow all applicable state and local codes and requirements for installation and testing. (Contractor is responsible for any required permits, licenses and testing reports for double check valve.) Copy of test certificate to be sent to the Project Manager and included in Project Manual (see 3.19).

### 3.14 FLUSHING AND TESTING

- A. Thoroughly flush all piping before testing and installation of irrigation heads and before backfilling any trenches
- B. The Contractor shall not allow or cause any work to be covered before it has been inspected and approved. Work covered before approval shall be uncovered at the Contractor's expense.
- C. Soil may be placed in trenches between fittings to insure the stability of the line under pressure. In all cases, fittings and couplings must be open for visual inspection for full period of test. No testing shall be done until the last solvent welded joint has had a minimum of twenty-four (24) hours to set and cure.
- D. Before testing, fill pipe with water and expel all air from pipes.
- E. In system with concrete thrust blocks, the test shall not be made until at least five (5) days have passed after all concrete thrust blocks are installed, If higher early strength cement is



used in the concrete thrust block, the test shall not be made until at least two (2) days have elapsed.

- F. Test lateral piping at full pressure. Minimum pressure test on mainline, valves, joints and fittings, shall be one-hundred (100) pounds per square inch without losing more than three (3) pounds per square inch for a period of two (2) hour. The Contractor shall first perform the test for himself and repair any leaks or defects. The Contractor shall then notify the Owner's Representative at least twenty-four (24) hours in advance and complete another test in the presence of the Owner's Representative for approval. All testing shall be done with a certified pressure gauge supplied by the Contractor. Submit written certification of the gauges' accuracy prior to testing.
- G. The Contractor shall adjust and balance the irrigation system to provide uniform coverage. The Contractor shall change or adjust heads and/or nozzles as required to provide uniform coverage and match final grades. Upon completion of all systems and coverage tests performed by and for the Contractor, the Contractor shall notify the Owner's Representative at least twenty-four (24) hours in advance and perform another coverage test in the presence of the Owner's Representative for approval.
- H. Where inspected work does not comply with specified requirements or if pressure tests fail, replace the rejected work until reinspected by the Owner's Representative and found to be acceptable. The Contractor shall credit the Owner, against the Contract Amount, at a rate of sixty dollars per hour (\$60.00/hr.) for re-inspection of failed tests.
- I. All locator wires must be tested and approved by the Owner's Representative prior to Final Payment. All wire tests shall be conducted by the Contractor and approved by Owner's Representative.

### 3.15 CLEAN-UP

A. Upon completion of the work, clean up all boxes, wrappings, excess materials, and other rubbish resulting for this work and leave the site in original or better condition.

### 3.16 FINAL SUBMITTAL

- A. The Contractor shall comply with "Record Drawing Procedures" specified in Section 01700 PROJECT CLOSEOUT and shall include all approved variations or changes, indicating all main and lateral line locations, valves, quick-couplers, drains, wire runs, pump(s), and irrigation heads, located by field dimensions to the nearest permanent landmark approved by the Owner's Representative.
- B. The Contractor shall provide an Irrigation Valve Schedule, laminated on both sides with plastic, for placement inside the appropriate controller cabinet.
- C. Extra Materials: In addition to installed system, furnish the Owner with the below listed items. Provide with itemized invoice of closeout products and receive signature of receipt from the Project Manager.
  - 1. One quick coupler valve keys.
  - 2. One TBOS-FTUS (field transmitter)



#### SECTION 32 8400 PLANTING IRRIGATION

- D. The Contractor shall provide a clean, legible print of the final Project Record Drawing with all zones clearly color-coded. The Contractor shall laminate both sides with plastic. Submit to Owner's Representative for approval.
- E. The Contractor shall provide three (3) copies of all equipment operation instructions, parts lists, service manuals, specification sheets, warranty information, winterization instructions, precipitation rates for irrigation heads, and circuit operating time for each zone; properly collated, punched and bound in a three (3) ring binder. Each binder shall be clearly marked with the following information;

PROJECT MANUAL "Project Name" (from Contract Documents) Date of Project Completion Contractor's Name and Address

Submit project manuals to Owner's Representative for review and approval.

F. The Contractor shall be responsible for providing up to eight (8) hours of training and orientation covering the adjustment and maintenance of the irrigation system. The Contractor shall be responsible for one full winterization and one spring activation of the irrigation system, following completion of the work, and shall conduct these operations as part of the Owner's training and orientation procedures.

# END OF SECTION 32 8400



# PART 1 GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Soil materials.
  - 2. Preparing planting areas.
  - 3. Preparing lawn areas.

# B. Related Sections:

- 1. Division 1 Section 01 0000 "General Requirements".
- 2. Division 32 Section 32 9200 "Turf and Grasses".

# 1.2 REFERENCES

- A. Definitions:
  - 1. Noxious Weed: Includes Blackberry, Canada Thistle, Dandelion, Horsetail, Morning Glory, Nut Sedge, Poison Oak, Rush Grass, Annual Bluegrass, Bermuda Grass, Brome, Crabgrass, Johnson Grass, Nut Grass, Quack Grass, and other plants designated as a noxious weed by authorized State and county officials.

# 1.3 SUBMITTALS

- A. Quality Assurance Submittals:
  - 1. Submit certification of quantities of topsoil, and soil amendments delivered to the site.
  - 2. Submit one copy of certificates of inspection for soil amendments as required by governmental authorities.
  - 3. Submit one copy of manufacturer's or vender's certified analysis of soil amendments.

### 1.4 QUALITY ASSURANCE

- A. Qualifications of Topsoil:
  - 1. Prior to delivery of topsoil, submit written statement giving location of property from which topsoil will be obtained, Owner's Representative will inspect site.
  - 2. Include in written statement, names and addresses of property owners, depth of soil to be stripped and two-year history of crops grown from similar soil.
- B. Regulatory Requirements:
  - 1. Meet State of Idaho licensing requirements for the application of herbicides.
- C. Packing and Shipping:
  - 1. Deliver commercial fertilizer in original containers with labels indicating weight, chemical analysis and name of manufacturer.
- D. Storage and Protection:
  - 1. Store fertilizers and lime in dry place and protect from contamination by herbicides.
  - 2. Protect soil materials from deterioration by surface moisture erosion, freezing temperatures, and chemical contamination during storage and handling.
  - 3. Protect existing and new improvements from damage and staining.

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4. Provide protective cover and barriers as necessary to prevent damage and staining.

# 1.5 SITE CONDITIONS

- A. Environmental Requirements:
  - 1. Prepare soil only when topsoil is not in a wet, mud, and frozen condition.
- B. Scheduling:
  - 1. Schedule preparation of seeding and sodding areas within 48 hours prior to application of seeding and sodding.

# PART 2 PRODUCTS

# 2.1 MANUFACTURERS

- A. Substitute Manufacturers:
  - 1. N/A.

# 2.2 MATERIALS

- A. Existing Topsoil:
  - 1. Verify existing site topsoil prior to beginning work. Project site soil test is required from certified soil testing lab. Identify location of soil sample on site plan for review by Landscape Architect.
- B. New Imported Topsoil:
  - 1. Fertile, friable, natural loam, surface soil, free of subsoil, clay lumps, brush, weeds, roots, stones larger than 1 inch in any dimension and other material harmful to plant growth.
  - 2. Free of noxious weeds as designated on State of Idaho Dept. of Agricultures Noxious Weed List.
  - 3. Obtain from well drained site.
- C. Garden Mulch:
  - 1. Free from noxious weed seed, foreign materials, and chemicals and substances harmful to plant life.
- D. Humus:
  - 1. Compost, as approved by Owner
- E. Commercial Peat Moss:
  - 1. Dried horticultural peat moss, coarse, shredded, acid reaction pH 4.0-5.0, water absorbing capacity 1100 to 1200 percent moisture content approximately 30 percent, containing no more than 2 percent ash or foreign matter.
- F. Commercial Planting Fertilizers:
  - 1. Comply with State of Idaho fertilizer laws, uniform in composition, granular or pellet form, dry, free flowing, and bearing guaranteed analysis of manufacturer.
  - 2. PF1: Organic base fertilizer with minimum 10 percent nitrogen, 6 percent phosphoric acid and 4 percent potash, 50 percent nitrogen in slow release form, Webfoot Slow Release 10-



6-4 by Pacific Agro Company.

- 3. PF2: Nitroform 38-0-0.
- 4. PF3: 16-7-12 (+iron) controlled release.
- 5. PF4: Superphosphate 0-45-0.
- G. Commercial Lawn Seed Start Fertilizer:
  - 1. Comply with State of Idaho fertilizer laws, uniform in composition, dry, free flowing.
  - 2. Granular, non-burning product, composed of not less than 50 percent organic, slow acting, guaranteed analysis.
  - 3. SF1: Containing 20 percent nitrogen, 26 percent phosphoric acid, and 6 percent potash by weight, or similar composition.
- H. Commercial Lawn Top Dress Fertilizer:
  - 1. Comply with State of Idaho fertilizer laws, uniform in composition, dry, free flowing.
  - 2. Granular, non-burning product, composed of not less than 50 percent organic, slow acting, guaranteed analysis.
  - 3. DF1: Containing 31 percent nitrogen, 3 percent phosphoric acid, and 10 percent potash by weight, or similar composition.

# 2.3 EQUIPMENT

- A. Fertilizer Spreading Equipment:
  - 1. Power Operated Spreaders: Rotary or drop distribution equipment.
  - 2. Manual Operated Spreaders: Hand operated distribution equipment.

# 2.4 SOURCE QUALITY CONTROL

- A. Laboratory Analysis:
  - 1. Provide imported topsoil analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.

# PART 3 EXECUTION

### 3.1 PERFORMANCE

- A. Site Verification of Conditions:
  - 1. Examine site for conditions which will adversely affect execution, permanence, quality of work, survival of plant material, and survival of grasses.
  - 2. Verify that grade and slopes of lawn areas are acceptable to Project Manager prior to beginning soil preparation.
  - 3. Report existing conditions detrimental to completion of soil preparation work.
  - 4. Begin Work required in this Section only after conditions are satisfactory.

# 3.2 PREPARATION

- A. Protection of Existing Site:
  - 1. Protect utility lines, storm drainage lines, site improvements, and underground utilities.
  - 2. Stake location of underground utilities and avoid excavation in these areas beyond safe

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limits.

- 3. Hand excavate where required to avoid utility line damage.
- B. Stockpiling:
  - 1. Stockpile and protect imported planting soil mix on site in designated location.
  - 2. Stockpile and protect acceptable existing topsoil on site in designated location.
- C. Preparation of Existing Topsoil:
  - 1. Remove stones, mortar, concrete, asphalt, and debris larger than 1 inch in diameter to a depth of 6 inches below finish grade.
  - 2. Remove branches, wood chips, roots, and material harmful to plant life to a depth of 6 inches below finish grade.
  - 3. Remove or spray as required to eradicate noxious weed growth and roots.
  - 4. Achieve complete removal or kill.
  - 5. Kill achieved by working soil is permissible for annual non-noxious broadleaf weeds.
  - 6. Place three inches of humus.
  - 7. Apply lime at 75 pounds per 200 square feet and lightly rake to incorporate into soil.
  - 8. After raking, apply 16-7-12- fertilizer at 10 pounds per 1000 square feet.
  - 9. Till to a depth of six inches, thoroughly mixing components.
- D. Preparing Planting Areas:
  - 1. Spread six cubic yards compost and 40 pounds of commercial fertilizer for each 1,000 square feet of planting bed area.
  - 2. Till soil amendments into existing topsoil to a minimum depth of 4 inches.
  - 3. Float existing amended topsoil to 2 inches below finish elevations indicated on Civil Drawings.
  - 4. Slope planting beds with 6 inch crown or slope 2 percent minimum.
  - 5. Apply garden mulch at 3 inch consistent depth.
- E. Preparing Lawn Areas:
  - 1. Spread six cubic yards of compost and 40 pounds commercial fertilizer for each 1,000 square feet of lawn area.
  - 2. Till soil amendments into existing topsoil to a minimum depth of 4 inches.
  - 3. Float lawn areas to achieve lawn elevations indicated on Civil Drawings.
  - 4. Smooth to finish grades before planting, mulching, and seeding.
  - 5. Roll finish grades to obtain firmness with minimum 200 pound roller.
  - 6. Surface soils shall be in a loose condition to a minimum depth of 1/2 inch and a maximum depth of 1-1/2 inches.
- F. Preparing Lawn Areas:
  - 1. Spread textural soil amendment, fertilizer, and limestone evenly over topsoil in the following amounts and rates:
    - a. Textural Soil Amendment: 1 inch.
    - b. Planting Fertilizer PF1: 15 pounds per 1000 square feet.
    - c. Nitroform Fertilizer PF2: 20 pounds per 1000 square feet.
  - 2. Topsoil shall be in a moist condition at time of mixing.
  - 3. Lawn areas less than 24 inches wide may have fertilizer and limestone raked into the top 1-1/2 to 2 inches of topsoil in lieu of foregoing mixing requirements.
- G. Finish Grading Lawn Areas:
  - 1. Remove high spots and fill depressions
  - 2. Drag and hand rake lawn areas to produces smooth, even grades as indicated on Civil Drawings.



- 3. Maintain existing grades at limits of Work.
- 4. Slope to grades acceptable to Owner's Representative.
- 5. Provide positive, 1 percent minimum drainage.
- 6. Remove gravel and stones larger than 1 inch.
- 7. Remove or break up soil clods larger than 1/2 inch.
- 8. Remove sticks, rubbish, debris, and material harmful to plant life.

#### 3.2 COMPLETION

A. Adjusting and Cleaning:

- 1. Restore prepared areas to specified condition where eroded, settled, or compacted after mixing of soil amendments and fine grading prior to landscape planting and seeding.
- 2. Remove excess topsoil and soil amendments from adjacent paving, curb, and walk surfaces.
- 3. Provide protective cover and barriers as necessary to prevent damage and staining.
- 4. Remove debris, topsoil, fertilizer, limestone, textural soil amendment, and soil mixes from curbs, walks, paving, and other improvement surfaces daily.
- 5. Broom and hose down curb, pavement, and walk areas daily as necessary to maintain clean surfaces.
- 6. Transport surplus materials to a legal disposal area.

# END OF SECTION 32 9115

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## PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Seeding.
    - 2. Sodding.

### 1.2 DEFINITIONS

- A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

#### 1.3 RELATED SECTIONS

- 1. Division 1 Section 01 0000 "General Requirements".
- 2. Division 32 Section 32 9113 "Soil Preparation"

### 1.4 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed.
  - 1. Certification of each seed mixture for turfgrass.
- B. Product certificates.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
  - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 2. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
    - a. Landscape Industry Certified Technician Exterior.
    - b. Landscape Industry Certified Lawncare Manager.
    - c. Landscape Industry Certified Lawncare Technician.



3. Pesticide Applicator: State licensed, commercial.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

# PART 2 - PRODUCTS

# 2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species:
  - 1. Quality: State-certified seed of grass species as listed below for solar exposure.
  - 2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
- C. Grass-Seed Mix: Proprietary seed mix as follows:
  - 1. Products: Provided by Hobbs & Hopkins, Ltd., (503) 239-7518, Champion three-way blend of perennial rye grass variety; or "Celebration" by Sunmark Seeds, (503) 241-7333 or approved equal.

### 2.2 TURFGRASS SOD

- A. Turfgrass Sod: **Certified**, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Premium Perennial Ryegrass Blend.



#### 2.3 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

#### 2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
- C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.
- D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

### 2.5 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

### PART 3 - EXECUTION

- 3.1 TURF AREA PREPARATION
  - A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation".
  - B. Reduce elevation of planting soil to allow for soil thickness of sod.

- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

## 3.2 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
  - 1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  - 2. Do not use wet seed or seed that is moldy or otherwise damaged.
  - 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 5 to 8 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas.
  - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- E. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

### 3.3 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
  - 1. Lay sod across slopes exceeding 1:3.
  - 2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.



### 3.4 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

# 3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
  - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
  - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, evencolored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

# END OF SECTION 32 9200



## PART 1 - GENERAL

- 1.1 CONDITIONS AND REQUIREMENTS
  - A. Review construction process and product/material submittals with Landscape Architect and Owner's Representative prior to installation.
  - B. Division 1, General Requirements, apply to the work specified in this Section
  - C. The Landscape Contractor must have an Oregon Landscape Contractor's license (in good standing) and be bonded in the State of Oregon.

# 1.2 SECTION INCLUDES

- A. Labor, materials, equipment and supervision necessary to complete all work shown on the drawings and in the project manual.
  - 1. Soil preparation
  - 2. Weed eradication
  - 3. Fine-finish grading
  - 4. Planting material
  - 5. Trees, shrubs and groundcover planting
  - 6. Tree staking and guying

# 1.3 RELATED SECTIONS

- A. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
- B. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
- C. Division 32 Section "Irrigation" for site planting.
- D. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.
- 1.4 QUALITY CONTROL
  - A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
    - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
  - B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
  - C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.



- 1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above the ground for trees up to 4-inch caliper size, and 12 inches above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- F. Observation: Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
  - 1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

# 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver exterior plants freshly dug.
- B. Do not prune trees and shrubs before delivery except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist.
  - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  - 2. Do not remove container-grown stock from containers before time of planting.
  - 3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

### 1.6 DESIGN AND PLAN

- A. The layout of the landscape plan is schematic follow as closely as is practical.
  - 1. Verify placement of plantings with Landscape Architect prior to planting.

# 1.7 UTILITIES



A. Protect active utilities encountered; notify persons owning same. Contractor to verify location of all underground site utilities with General Contractor.

## 1.8 WARRANTY

- A. When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.
- B. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
    - b. Structural failures including plantings falling or blowing over.
    - c. Faulty operation of tree stabilization edgings tree grates.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Periods from Date of Substantial Completion:
    - a. Trees and Shrubs: One year.
    - b. Ground Cover and Plants: One year.
  - 3. Include the following remedial actions as a minimum:
    - a. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
    - b. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    - c. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

### 1.9 SUBMITTALS

- A. Sources and Delivery Dates: Provide list of sources and dates of estimated delivery of all plant material as specified, 21 days after signing Contract with Owner.
- C. Herbicide Applicator: Submit license of Herbicide Applicator to the Project Manager prior to application of herbicides.
- D. Submit five (5) gallon sample of each TEXTURAL SOIL AMENDMENTS (mulch) as specified a minimum of five (5) days prior to placement. Contractor to receive final approval prior to placement.
- E. Submit five (5) gallon sample of each TOPSOIL as specified a minimum of five (5) days prior to placement. Contractor to receive final approval prior to placement.



F.Submit five (5) gallon sample of each ORGANIC SOIL AMENDMENTS (compost) as specified a minimum of five (5) days prior to placement. Contractor to receive final approval prior to placement.

# PART 2 – PRODUCTS

- 2.1 TREES, SHRUBS AND GROUNDCOVERS
  - A. General: Genus, species and variety, quantity, size and condition as indicated on the drawings. Plant material shall be healthy nursery stock, well branched, full foliaged when in leaf, free from disease, injury, insects, all weeds, and weed roots. Plant materials must meet requirements of American Standard for Nursery Stock, 2004 Edition, ANSI Z60.1. No cold storage plants.
  - B. Nomenclature: Genus, species and variety as indicated on plant materials listing. Plant names conform to those given in Standardized Plant Names, 1942 Edition; names of varieties accepted in nursery trade.
  - C. Quantities, Sizes and Varieties: Exact quantities of named species and varieties of plant material shall be governed by that shown on the planting plan. Overgrown plants which have been pruned back to the specified sizes will not be accepted. In the event of a discrepancy between material listings or labeling on the plans, the indicated plant spacing or graphic location shall govern the number of items installed.
  - D. Condition: Balled and burlapped (B&B) stock shall have a natural ball sufficient to ensure survival and healthy growth. Potted and container stock well rooted, vigorous enough to ensure survival and healthy growth. Container plans shall have grown herein a minimum of 6 months and a maximum of 2 years, with roots filling the containers but not showing evidence of being or have been root bound nor damaged nor affected by heat, drought or freezing conditions.

# 2.2 TOPSOIL

- A. Topsoil: ASTM D 5268, PH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
  - 1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
    - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
  - 2. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.



- 3. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
  - a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

#### 2.3 INORGANIC SOIL AMENDMENTS

- A. Limestone is used to raise pH and neutralize acidic soils. In first paragraph below, insert percentages of carbonates, calcium, and magnesium if required. Revise to a pelleted form of limestone with a water-soluble binder that speeds breakdown if required.
- B. Lime: ASTM C 602, agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent and as follows:
  - 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
  - 2. Provide lime in form of dolomitic limestone.
- C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- D. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- E. Aluminum Sulfate: Commercial grade, unadulterated.
- F. Perlite: Horticultural perlite, soil amendment grade.
- G. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
- H. Sand: Clean, washed, natural or manufactured, free of toxic materials.

### 2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:.
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
  - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

### 2.5 FERTILIZERS

A. General: Approved brands meeting requirements or applicable state fertilizer laws. Uniform in composition, dry and free flowing. Deliver to the site in original unopened containers,



### SECTION 32 9300 TREES, PLANTS AND GROUND COVERS

each bearing the manufacturer's guaranteed analysis.

- 1. Commercial Mix 'B' 50% Slow Release Nitrogen, Inorganic 16-16-16-5.
- 2. Commercial Mix 'C' 10-15-10 Slow Release, as manufactured by Webfoot Fertilizer Company, Portland, Oregon, or equal.
- 3. Agricultural Gypsum.
- 4. Best-Paks, 20-10-5, or equal.

# 2.6 TEXTURAL SOIL AMENDMENTS

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
  - 1. Type: Shredded hardwood, Ground or shredded bark, Wood and bark chips.
    - a. Contractor to receive approval of type from Owner's Representative prior to placement.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- A. Garden mulch, as supplied by Grimm's Fuel Company, Sherwood, Oregon, 503-625-6532, or as approved by Owner.
- 2.7 TREE GUYING AND STAKING MATERIALS
  - A. Wood Tree Stakes: 2x2 S4S, Douglas Fir, 8' lengths, free of knot holes or grain defects, treated with two liberal coats of Olympic stain number 713 finish preservative (two per deciduous tree, three per conifer).
  - B. Tree Ties: "GardenPlus" tree ties. "chain-lock" tree tie or approved equal.
  - C. Guy Wire and Stakes: 12-gauge steel wire, galvanized, use double strand.
  - D. Tree Wrap: Provide and install as shown on tree planting detail; refer to drawings.
  - E. Additional Requirements: Meet other detail requirements as shown on plan and details.
- 2.8 ANTI-DESICCANT/ANTI-TRANSPIRING SPRAY
  - A. Wilf-Pruf or Vapo-Guard.
- 2.9 GARDEN MULCH MATERIALS
  - A. Free from noxious weed seed and all foreign material harmful to plant life. Submit sample for approval.



# **PART 3 - EXECUTION**

## 3.1 GENERAL

- A. Remove from all planting areas, stones, mortar, concrete, asphalt, rubbish, construction debris, and any other materials harmful to plant life. Additional excavation may be required at tree and shrub locations to obtain proper soil depth for root ball.
- 3.2 WEED ERADICATION AND CONTROL
  - A. Application of Herbicides: Application of herbicides for weed control as may be required, may be made only by approved applicator licensed by the State of Oregon.
  - B. Spray: Spray as required to eradicate all grasses, noxious weed growth and roots (two applications minimum).
  - C. Restrictions: Kill achieved by working soil is not permissible.
- 3.3 SOIL PREPARATION FOR PLANTING AREAS
  - A. Broadcast the following materials (per 1,000 square feet of area) evenly over topsoil placed in each planting area. Rototill materials into topsoil, 4" to 6" deep, prior to installation of plant material.
    - 1. Amount/1,000 Square Feet:

6 cubic yards	Textural Soil Amendment
15 lbs.	Commercial Mix 'B' Fertilizer
50 bs.	Agricultural Gypsum

## 3.4 PLANTING BED ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply per the soil analysis, fertilizer directly to subgrade before loosening.
  - 2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - b. Mix lime with dry soil before mixing fertilizer.
  - 3. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet. Spread approximately one-half the thickness of



planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil mix.

- B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

# 3.5 EXCAVATION FOR TREES AND SHRUBS

- A. Revise size and cross section of tree and shrub pits and trenches if required. As planting practices have evolved, pit proportions have changed: They are wide at top with sides tapered to a narrow base and are as deep or almost as deep as root ball that is to be set on an undisturbed subgrade. Revise descriptions if required and supplement with drawing details.
- B. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
  - 1. Excavate approximately three times as wide as ball diameter for balled and burlapped balled and potted container-grown stock.
  - 2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
  - 3. Subsoil removed from excavations may be used as backfill if deemed suitable by soil analysis. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
  - 4. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- C. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- D. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

## 3.6 TREE AND SHRUB PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
- B. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
  - 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.



- C. Set balled and potted, or container-grown stock plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
  - 1. Carefully remove root ball from container without damaging root ball or plant.
  - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- D. Organic Mulching: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.
- E. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

# 3.7 TREE AND SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

### 3.8 TREE STABILIZATION

- A. Retain this article if tree stabilization is required but not sufficiently detailed on Drawings. See Evaluations for discussion of advantages and disadvantages of stabilization methods.
- B. Trunk Stabilization: Unless otherwise indicated, provide trunk stabilization as follows:
  - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
  - 2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- C. Guying and Staking: Guy and stake trees exceeding 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches long, driven to grade.
  - 1. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
  - 2. Attach flags to each guy wire, 30 inches above finish grade.
  - 3. Paint turnbuckles with luminescent white paint.

# 3.9 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants as indicated.



- B. Dig holes large enough to allow spreading of roots and backfill with planting soil.
- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
- 3.10 PLANTING BED MULCHING
  - A. Mulch backfilled surfaces of planting beds and other areas indicated. Provide mulching around trees in lawn areas Organic Mulch: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.
  - B. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports and root-ball stabilization, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
  - C. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.
- 3.11 PLANTING OF TREES AND SHRUBS
  - A. Appearance: Plant trees and shrubs upright and face to give best appearance or relationship to adjacent plants and structures.
  - B. Weather Conditions: Planting operation to begin as soon as weather conditions permit by accepted local practice.
  - C. Layout Approval: Layout of planting areas to be approved by the Project Manager prior to installation.
  - D. Excavation of Holes: All planting holes shall be excavated twice the size of the tree, shrub or groundcover root ball or root system. Trees to be planted on undisturbed subgrade where possible.
  - E. Prior to placement of each tree and shrub, place Best-Pak according to manufacturer's recommendations in the bottom of each hole.
  - F. Balled and Burlapped Materials: Loosen and remove carefully twine binding and burlap from top of root balls. Stake or guy trees immediately after planting each tree.
  - G. Roots: Cut off cleanly all broken or frayed roots.
  - H. Pruning: Prune trees and shrubs to remove damaged branches, improve natural shape and thin not more than 15% of branches.



- I. Backfilling: Place and compact lightly backfill soil mixture carefully to avoid injury to roots, fill all voids.
- J. Planting Fertilizer: When hole is three-fourths filled, spread evenly around root ball: Commercial Mix 'C'. Provide the following:
  - 1. All one gallon containers: 1 Teaspoon
  - 2. All two gallon containers: 1 Tablespoon
  - 3. All three to five gallon containers: 2 Tablespoons
  - 4. All evergreen or deciduous trees: 1 lb. for each caliper inch measured 4" above top of root ball.
- K. Watering: When hole is filled, completely soak and allow water to soak away. Fill holes to finish grade and prepare for other work indicated.

### 3.12 PLANTING BED GRADES

A. Grades and slopes are to be in accordance with rough finish grades established by others, plus increase resulting from addition of topsoil and mulch. Grades shall be 2" below bordering paving, curbs, walls, etc. before application of mulch. Heights of berms above top of curbs to be approved by Project Manager before planting.

#### 3.13 PRE-EMERGENCE WEED KILLER

A. Apply weed killer according to the manufacturer's directions on the planting beds, after planting and before mulching. No weed killer shall be applied to areas of future bulb plantings. Herbicide must be applied by a licensed chemical applicator. The Landscape Contractor shall use his best judgment during application procedures to avoid lateral movement of chemical into lawn areas. The Landscape Contractor may elect to skip certain portions of planting beds if lateral movement of chemical cannot be avoided. Notify the Project Manager of areas that did not receive herbicide. Landscape Contractor is still responsible for weed control through maintenance period.

### 3.14 MULCHING OF PLANTING BEDS

A. Apply garden mulch to shrub planting areas with 3" layer of specified garden mulch within two days of planting. Cover entire planting beds, apply evenly.

#### 3.15 WATERING EQUIPMENT

A. Hose and other watering equipment required for performance of work to be furnished by Landscape Contractor.

### 3.16 CLEAN-UP

A. Keep premises reasonably free from accumulation of debris, equipment and surplus materials. Leave project site in neat and orderly condition.

#### 3.17 MAINTENANCE

A. Begin maintenance immediately after each tree, shrub and groundcover is planted.



# SECTION 32 9300 TREES, PLANTS AND GROUND COVERS

Sherwood Skatepark

Continue maintenance as follows, for 30 days after acceptance. Protect and maintain planting until acceptance. Water, weed, cultivate, mulch and reset plants to proper grade or upright position, remove dead wood from plant material as required for best appearance. Irrigate when necessary to avoid drying out of plant materials, and as required to promote healthy growth. Maintain all planters according to the above. Provide for additional "spot" watering of tree stock during maintenance period.

END OF SECTION 32 9300



#### SECTION 33 4600 SUBDRAINAGE SYSTEMS

## PART 1 GENERAL

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Foundation drainage.
    - 2. Retaining wall drainage.
    - 3. Planter drainage.
    - 4. Under floor slab drainage.
    - 5. Landscape drainage.
    - 6. Pedestrian walk drainage.
    - 7. Pipe sleeves for future irrigation lines.
  - B. Related Sections:
    - 1. Section 31 2300, Excavating, Backfilling, and Compacting Skatepark: Geotextile fabrics, trenching, backfilling, and compacting.
    - 2. Section 03 3010, Portland Cement Concrete Skatepark: Concrete for catch basin base, thrust blocks, and cleanout slabs.
    - 3. Section 03 3000, Cast-in-Place Concrete Skatepark.

# 1.2 SUBMITTALS

- A. Product Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit product data for catch basins, catch basin frames, drain grates, and storm sewer pipe.
  - 3. Submit product data for perforated drain pipe, nonperforated drain pipe, and geotextile filter fabric.
  - 4. Submit product data for drain tubing and slotted surface drains.
- B. Quality Control Submittals:
  - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
  - 2. Submit one copy of site test reports for water exfiltration tests on installed nonperforated sewerage and drainage systems.
  - 3. Submit one copy of City of Sherwood standard Certificate of Inspection for each drainage system.
  - C. Closeout Submittals:
    - 1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.
    - 2. Submit Project Record Documents for drainage systems with record of invert elevations and dimensions from drain lines to property and building lines.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Conform to requirements of governing agencies for each sewerage and drainage system.

# PART 2 PRODUCTS

- 2.1 MANUFACTURERS
  - A. Substitute Manufacturers:



#### SECTION 33 4600 SUBDRAINAGE SYSTEMS

1. Comply with requirements in City of Sherwood and State of Oregon Standard Specifications.

# 2.2 PIPE COMPONENTS (REFER TO DRAWINGS)

- A. Corrugated Polyethylene (PE) Drain Tubing:
  - 1. Industry Standard: ASTM F 405.
  - 2. Tubing Components: Corrugated polyethylene drainage tubing, slotted with drain filter and nonperforated.
  - 3. Tubing Joint Accessories: Coupling, reducing coupler, tee, 90 degree ell, 45 degree wye, and end plugs.
  - 4. Solvent Cement: ASTM D 2235.
  - 5. Acceptable Tubing: ADS Drain Guard by Advanced Drainage Systems, Inc. (N-12, double wall) or Agri-Flow by Hancor.
- B. ABS Sewer Pipe:
  - 1. Industry Standard: ASTM D 2751, SDR 23.5, SDR 35 or SDR 42.
  - 2. Sizes: 4, 6 and 8 inch diameter pipe.
  - 3. Solvent Cement: ASTM D 2235.
- C. ABS Plastic Drain, Waste, and Vent Pipe:
  - 1. Industry Standard: ASTM D 2661, Schedule 40.
  - 2. Diameter: As indicated on Drawings.
- D. PVC Small Diameter Sewer Pipe:
  - 1. Industry Standard: Gasket bell end pipe, ASTM D 3034, SDR 35 from PVC components of ASTM D 1784.
  - 2. Diameters: 4, 6, 8, 10, 12, and 15 inches.
  - 3. Rubber Gaskets: ASTM F 477.
  - 4. Fittings: Manufacturer's standard.
  - 5. Solvent Cement: ASTM D 2564.
- E. PVC Drain Pipe:
  - 1. Industry Standard: ASTM D 2729, bell end pipe.
  - 2. Standard Pipe Diameter: 2, 3, 4, 5, and 6 inches.
  - 3. Perforated Pipe Diameter: 3, 4 and 6 inches.
  - 4. Solvent Cement: ASTM D 2564.

- A. Cast Iron Frame and Grate for Concrete Pipe Catch Basins:
  - 1. Industry Standard: ASTM A 48, Class 30B.
  - 2. Heavy Duty: 16,000 pound wheel load for traffic lanes.
  - 3. Medium Duty: 1,000 pound wheel load for parking areas.
  - 4. Light Duty: No wheel load for Landscape areas.
  - 5. Pipe Diameter: 4, 6 and 8 inches.
  - 6. Acceptable Frames and Grates: Neenah Foundry Company, Valley Iron and Steel Co., The Lynch Company, Inc.
- B. Landscape Area Drains:
  - 1. Refer to Drawings.
- C. Aggregate Backfill and Geotextile Filter Fabric:
  - 1. Bedding, Haunching, Initial Backfill Aggregate: Initial backfill aggregate as indicated in

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# **City of Sherwood Public Works**

15527 SW Willamette Street Sherwood, OR 97150 Phone: 503.625.5722

<sup>2.3</sup> ACCESSORIES (REFER TO DRAWINGS)



#### SECTION 33 4600 SUBDRAINAGE SYSTEMS

Section 31 2300, Excavating, Backfilling, and Compacting - Skatepark.

- 2. Drainage Aggregate: Drain gravel as indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- 3. Geotextile Filter Fabric: Geotextile nonwoven drainage fabric as indicated in Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- D. Geotextile Erosion Control Fabric:
  - 1. Thickness: 19 mils.
  - 2. Weight: 6.5 ounces per square yard.
  - 3. Acceptable Fabrics: Propex 1199, 1325, 2006 by Amoco, 700X by Mirafi.
- E. Geotextile Soil Stabilization Fabric:
  - 1. Thickness: 23 mils.
  - 2. Weight: 4 ounces per square yard.
  - 3. Acceptable Fabrics: Propex 2002 by Amoco, 500X by Mirafi.
- F. Foundation Drainage Matting:
  - 1. Composition: Nylon matting heat bonded to polyester nonwoven fabric.
  - 2. Thickness for Depths to 8 Feet: 0.4 inch thick, Enkadrain 9010 by American Enka.
  - 3. Thickness for Depths from 8 to 24 Feet: 0.8 inch thick, Enkadrain 9120 by American Enka.
- G. Reinforced Concrete Manholes:
  - 1. Regulatory Requirements: Conform to City of Sherwood Standards.
  - 2. Industry Standard for Reinforced Concrete Storm Drain Pipe: ASTM C 76, Class 2.
  - 3. Nominal Pipe Size: 48 inches inside diameter.
  - 4. Pipe Joints: Rubber gaskets, conforming to ASTM C 443.
  - 5. Precast Reinforced Concrete Manhole Sections: ASTM C 478.
  - 6. Sloping Side Top Pipe: Eccentric cone precast concrete.
  - 7. Base Slab: Minimum 6 inch thick, cast-in-place concrete, ASTM C 94, 3,000 psi minimum compressive strength in 28 days.
  - 8. Medium Duty Cast Iron Manhole Cover: R1690 by Neenah, for medium duty parking areas or equal.
- H. Reinforced Concrete Sump:
  - 1. Regulatory Requirements: Conforming to City of Sherwood Standards.
  - 2. Industry Standard for Reinforced Concrete Storm Drain Pipe: ASTM C 76, Class 2.
  - 3. Nominal Pipe Size: 48 inches inside diameter.
  - 4. Pipe Joints: Rubber gaskets, conforming to ASTM C 443.
  - 5. Precast Reinforced Concrete Sump Sections: ASTM C 478.
  - 6. Sloping Side Top Pipe: Eccentric cone precast concrete.
  - 7. Base Slab: Minimum 12 inch thick, cast-in-place concrete, ASTM C 94, 3,000 psi minimum compressive strength in 28 days.
  - 8. Medium Duty Cast Iron Sump Cover: R1690 by Neenah, for medium duty parking areas or equal.
- I. Location Tracer:
  - 1. Wire Size and Type: No. 18, insulated copper.
  - 2. Insulation Cover Color: Green.
- J. Exterior Cleanouts:
  - 1. Access Box: Heavy duty cast iron.
  - 2. Covers and Flanges: Secured, cast iron.
  - 3. Cutoff Sections: Serrated.



- 4. Plugs: Threaded bronze.
- 5. Mounting: 18 inches square by 6 inches thick concrete pad at grade.
- 6. Acceptable Cleanouts: 58860 by Josam.

# PART 3 EXECUTION

## 3.1 PERFORMANCE

- A. Protection:
  - 1. Cover exposed ends of drain and sewer lines during construction work to protect lines from debris.

### B. Preparation:

- 1. Trench soil as required for installation, inspection, and backfill compaction.
- 2. Install PVC pipe sleeves under walks and paving as indicated on Drawings, or as required to provide pipe access under Work.
- 3. Fill trench with bedding aggregates to height required for 0.5 percent continuous slope in drain tubing, drain pipe, and storm sewer pipe, unless otherwise indicated on Drawings.
- C. Installation of Nonperforated Foundation Drain Pipe:
  - 1. Install bedding aggregate 4 to 6 inches thick in trench and excavate bedding for base of pipe and pipe bells.
  - 2. Install pipe system in sizes and locations indicated on Drawings with ells, tees, wyes, couplers, and end plugs as required.
  - 3. Continue underslab drain, storm sewer, roof drain, and foundation drain lines to storm sewer catch basin, drain ditch, or holding basin.
  - 4. Pressure test nonperforated lines prior to haunching.
  - 5. Install haunching aggregate to spring line of pipe.
  - 6. Install initial backfill aggregate to at least 6 inches over pipe and tamp and vibrate to required density.
  - 7. Install location tracer wire over non-metallic pipe.
  - 8. Backfill and compact subsequent lifts in accordance with Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- D. Installation of Perforated Drain Pipe:
  - 1. Install drainage aggregate 4 inches minimum thick on top of pipe.
  - 3. Install perforated pipe systems in sizes and locations indicated on Drawings with ells, tees, wyes, couplers, and end plugs as required.
  - 4. Continue perforated pipe to nonperforated pipe distribution lines.
  - 5. Install perforated pipe at 2 percent continuous slope (ADS single wall) 0.5 percent or higher continuous slope (ADS double wall N-12).
  - 6. Install drainage aggregate to spring line of pipe and tamp in place.
  - 7. Install drainage aggregate to 6 inches over and around pipe and tamp and vibrate.
  - 8. Pull filter fabric over drainage aggregate, lap fabric edges 12 inches minimum and tie loose edges of fabric with 18 gage tie wire.
  - 9. Install location tracer wire over non-metallic pipe.
  - 10. Backfill and compact subsequent lifts in accordance with Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
  - 11. Solvent weld perforated PVC drain pipe joints in accordance with ASTM D 2855.
- E. Installation of Non-perforated Drain Tubing:
  - 1. Install bedding aggregate 4 to 6 inches thick in trench and excavate bedding for base of

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tubing and tubing bells.

- 2. Install drain system in sizes and locations indicated on Drawings with ells, tees, wyes, couplers, and end plugs as required.
- 3. Solvent weld drain tubing joints.
- 4. Continue foundation drain lines to storm sewer catch basin, drain ditch, or holding basin.
- 5. Install haunching aggregate to spring line of tube.
- 6. Install initial backfill aggregate to at least 6 inches over tubing and tamp and vibrate to required density.
- 7. Install location tracer wire over non-metallic tubing.
- 8. Backfill and compact subsequent lifts in accordance with Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.
- F. Installation of Slotted Drain Tubing:
  - 1. Install drainage aggregate 6 inches thick on top.
  - 2. Install slotted tubing systems in sizes and locations indicated on Drawings with ells, tees, wyes, couplers, and end plugs as required.
  - 3. Install slotted drain tubing as indicated on Drawings.
  - 4. Continue slotted tubing lines to storm sewer pipe, standard drain pipe, and non-perforated drain tubing distribution lines.
  - 5. Install slotted tubing at .5 minimum percent continuous slope.
  - 6. Install drainage aggregate to spring line of tubing and tamp in place.
  - 7. Install drainage aggregate to 6 inches over and around tubing and tamp and vibrate to required density.
  - 8. Install location tracer wire over non-metallic tubing.
  - 9. Backfill and compact subsequent lifts in accordance with Section 31 2300, Excavating, Backfilling, and Compacting Skatepark.

# 3.2 COMPLETION

- A. Testing Requirements:
  - 1. Notify Owner's representative 24 hours before conducting tests.
  - 2. Test in large sections before covering above the spring line.
  - 3. Continue to monitor water test levels during backfilling and compacting.
- B. Adjusting and Cleaning:
  - 1. Repair or replace defective lines and system components.
  - 2. Excavate and recompact backfill where settlement damages site improvements.
  - 3. Replace or repair walks, paving, site, and landscape improvements damaged by backfill settlement.
  - 4. Remove excess soil materials from paving, walk, and landscape areas as soon as backfilling is complete.

# END OF SECTION 33 4600