

Cremation Garden – Lone Fir Cemetery
Specifications (RFB 13-2265)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

ATTACHMENT A

SPECIFICATIONS

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

TABLE OF CONTENTS

Section	Title
DIVISION 1 – GENERAL REQUIREMENTS	
Section 01 56 39	Tree and Plant Protection
DIVISION 31 - EARTHWORK	
Section 31 11 00	Site Clearing and Demolition
Section 31 20 00	Earthwork
DIVISION 32 – EXTERIOR IMPROVEMENTS	
Section 32 11 23	Aggregate Base
Section 32 13 14	Site Concrete
Section 32 91 19	Landscape Grading, Topsoil, and Soil Preparation
Section 32 93 00	Trees, Shrubs and Groundcover
Section 32 94 00	Landscape Stonework

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 01 56 39 TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Furnish all labor, materials, equipment and services necessary for the installation of temporary fencing, barricades, and guards to protect trees and plants indicated to remain, as necessary and required to prevent damage above and below grade.

1.02 DEFINITIONS

- A. Drip Line: Outer perimeter of branches of any tree or plant.
- B. Ground Cover: Includes, but is not limited to, shrubs and grass.

1.03 SUBMITTALS

- A. Submit the following in accordance with Division 1 Section “Submittal Procedures”.
 - 1. Proposal for tree and plant protection, describing methods of protection and stabilization.
 - 2. Drawings and supporting documentation as directed.

1.04 QUALITY ASSURANCE

- A. Contractor’s Condition Inspection: Include written report and digital photographs recording the condition of the site prior to commencing construction.
- B. The Contractor shall consult Metro’s Arborist and shall comply with the Arborist’s recommendations for tree protection and continued tree health when work occurs within the root zones of trees scheduled to remain.

1.05 PROJECT CONDITIONS

- A. Performance Requirements: Prevent damage to trees and plants including soil, roots, bark, trunks, limbs, branches, and foliage due to construction activities including, but not limited to, the following:
 - 1. Soil contamination, erosion and compaction.
 - 2. Excessive wetting, ponding of stormwater, and construction run-off.
 - 3. Alteration of grade and stockpiling of soil, debris, and materials.
 - 4. Unauthorized cutting, breaking, skinning, and bruising of trees and plants
- B. Project Conditions: Install protection during initial mobilization at the site and maintain until Substantial Completion.
 - 1. Driving and Parking: Not permitted within drip line of trees, plants and sensitive natural areas or lawn without Owner’s Representative’s written permission.
 - 2. Storage of Material and Debris: Not permitted within drip line of trees and plants.
 - 3. Where Owner’s Representative permits construction traffic, parking or materials storage on prepared lawn and planting areas, provide planks, plywood and similar protection; prevent rutting and compaction of soil.

PART 2 – PRODUCTS

NOT USED

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

PART 3 – EXECUTION

3.1 EXISTING TREES AND PLANTS

- A. Tree Protection Areas: The Contractor shall exercise the utmost care to protect existing trees and plants designated to remain. The Contractor shall install tree protection fencing at existing trees indicated to remain, as shown on plans and as needed. Fencing shall be chainlink, 6-foot high panels.
- B. Water trees and plants as necessary to maintain existing condition throughout Contract period until Substantial Completion.
- C. Review conditions with Arborist and Owner's Representative prior to pruning or cutting roots, branches and foliage, and proceed as directed. Perform pruning and cutting with sharp instruments intended for the purpose; do not break nor chop.
- D. Excavating and Trenching within Driplines: Permitted where indicated and at other specifically approved locations. Provide additional protection as recommended by the Arborist at no additional cost to the Owner. Tunnel under or around roots by hand digging or boring. Do not cut main lateral roots and tap roots over 1-inch in diameter, cut smaller roots which interfere with installation of new work.
- E. Do not allow exposed roots to be scarred nor to dry out; provide temporary earth cover, or pack with peat moss and wrap with burlap. Water and maintain in moist condition and temporarily support and protect from damage.
- F. Maintain existing grades within dripline of trees and plants unless otherwise indicated or approved by Owner's Representative.
- G. Provide construction fences around trees to prevent damage. Extend fencing 5-feet beyond dripline unless otherwise directed by Arborist or Owner's Representative to prevent compaction of soil over roots. Prevent entry into protected areas except as authorized in writing by the Owner's landscape maintenance personnel.
- H. Shrubs and small trees shall be fenced from the construction site.
- I. All construction debris shall be removed from shrub beds and landscape areas.

3.2 REPAIR AND RESTORATION

- A. All damage to turf, shrubs, and trees will be the Contractor's responsibility to repair or replace under the direction of the Owner's Representative, with like plant material and size or pay restitution if replacement plans are unavailable. Make repairs promptly after damage occurs to prevent progressive deterioration.
- B. Replace trees and plants damaged by construction operations where the Owner's Representative determines restoration to normal growth pattern is not possible. Plant and maintain as directed.
 - 1. Trees up to 13-inch caliper: Same size as damaged tree; species selected by Owner's Representative.
 - 2. Trees over 13-inch caliper: Compensate Owner as determined by Arborist.
 - 3. Plants: Same size, quality, and quantity as damaged; species selected by Owner's Representative.
- C. Where compaction of soil due to construction activity, including compaction of soil due to elevated water content, exceeds the critically limiting bulk density for the soil type in question, the Contractor shall provide measures as directed to reduce soil bulk density to acceptable levels to support normal plant growth.

— END OF SECTION —

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 31 11 00 SITE CLEARING AND DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish labor, material and equipment required for the removal of vegetation; clearing and grubbing; topsoil stripping; removing above-grade site improvements; disconnecting, capping or sealing, and removing site utilities; preparatory to site excavation, grading and construction. Include barricading of site areas to be protected and erosion control.
- B. Related Sections:
 - 1. Section 01 56 39 – Tree and Plant Protection
 - 2. Section 31 20 00 – Earthwork
- C. Definitions:
 - 1. Topsoil: Natural or cultivated surface-soil layer containing organic matter, sand, silt, and clay particles: fertile, friable, pervious natural fine sandy loam, or silt loam, with a pH range of 5.5-7, 4% organic material minimum, a darker shade of brown or gray than underlying subsoil, free of subsoil, stones or hard earth 1-inch or larger, free of noxious weeds (including quack grass and horsetail), roots, stones, sticks or other extraneous material..

1.02 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property, removed from site, and disposed of properly.

1.03 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site clearing operations.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on OWNER's premises where indicated.
- C. Notify utility locator service for Project area at least 72 hours prior to site clearing.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. All material and debris resulting from demolition and removal of work, unless specifically designated for reuse or to be turned over to the Owner, shall become property of the Contractor and be removed from the site at Contractor's expense.
- B. Historic items, relics, and other cemetery-related items of interest or value to the Owner encountered during the site clearing shall remain the Owner's property. Carefully remove and salvage in a manner to prevent damage and deliver promptly to Owner.
- C. Provide erosion control materials as necessary to prevent transport of soils off-site and/or into storm sewer system. Materials shall include, but not be limited to: bio-bags, sediment fencing, temporary surfacing such as straw or jute netting, and potable water for dust control.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- D. Satisfactory Soil Materials: as specified in Section 31 20 00 – Earthwork.
 - 1. Voids created by tree stump and root removal may be filled with native subsoil for areas 12-inches or lower than finish grade. Areas within 12-inches of finish grade shall be filled with topsoil.

PART 3 – EXECUTION

3.01 EROSION CONTROL

- A. Contractor's erosion control responsibilities include but are not limited to:
 - 1. Conduct all erosion control activities in accordance with all governing jurisdictions including but not limited to city, county, state and federal DEQ requirements.
 - 2. Provide erosion control materials and techniques to limit transport of soil materials off-site and/or into storm sewers..

3.02 PREPARATION

- A. The layout on the Drawings has been developed from cemetery documents provided by Metro and on-site measuring by Landscape Architect. Some variation and adjustment may be required on the site layout.
- B. Tree Protection:
 - 1. Use care in the demolition and clearing operations to protect all trees on the project site outside the limits required for construction work, and trees within the construction area designated to remain undisturbed.
 - 2. Take necessary steps to prevent all heavy equipment, loaded dump and delivery trucks, concrete trucks, and any other vehicles that will significantly compact the soil, from entering tree root zone areas outside those areas specifically required to be barricaded.
 - 3. Locate and clearly flag trees to remain. See Section 01 56 39 for specific tree protection information.
- C. Contractor shall comply with all Metro policies pertaining to cemetery development and prevent damage to existing archaeological features. Contractor shall be responsible for any and all costs related to any damages to existing archaeological features. Delays that occur as a result of archaeological damage or disturbance shall result in no additional cost to Owner.

3.03 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be abandoned in place.
- B. Excavate for and remove underground utilities indicated to be removed.
- C. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted. Arrange to provide temporary utility services.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.04 CLEARING AND GRUBBING

- A. Remove obstructions, grass and other vegetation to permit installation of new construction and planting areas. Remove all stumps visible above ground on the entire site to 3-feet below finish grade. Remove roots only under direction of Arborist to 18-inches below finished grade. Fill voids with suitable on-site material.
 - 1. All adjustment and removal of tree roots is subject to the requirements of Section 01 56 39.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Use only hand methods for grubbing within driplines of remaining trees.
- B. Apply an approved herbicide to remaining roots larger than 1-1/2-inches diameter.
 - 1. Do not apply herbicide to roots of trees scheduled to remain, per the requirements of Section 01 56 39.
- C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.
- D. Remove cleared items from the site.
- E. Rake, lift and transport all small rocks, dead wood and plant fiber debris to a legal location off site.
- F. Protect from damage all trees and shrubs scheduled to remain. Within driplines of trees to remain (tree protection zones), strip sod and other vegetation only. Do not excavate topsoil within tree protection zones.
- G. Use care in demolition and clearing operations to protect all existing cemetery-related features on project site outside and within the limits required for construction work, per Metro policies.

3.05 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpile to 72 inches.
 - 2. Do not stockpile topsoil within dripline of remaining trees.
 - 3. Dispose of excess topsoil as specified for waste material disposal.

3.06 SITE IMPROVEMENTS

- A. Remove existing above and below grade improvements as indicated or required such as concrete paving, curbs, and well.
- B. Remove pavement at existing full-depth joints unless otherwise indicated. Neatly sawcut length of existing pavement to remain with vertical faces prior to removing existing pavement.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.07 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials and waste materials, including trash and debris, and properly dispose of them off Owner's property
 - 1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

— END OF SECTION—

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 31 20 00 EARTHWORK

PART 1 — GENERAL

1.01 SUMMARY

- A. Related Sections:
 - 1. 31 25 13—Erosion Control Devices
 - 2. 32 91 19—Landscape Grading, Topsoil, and Soil Preparation

1.02 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation and backfill work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Soil Testing Service:
 - 1. The Owner may engage a soil testing service to include soil materials proposed for use in the Work and for quality control testing during excavation and fill operations.
 - 2. Samples of materials shall be furnished to the testing service by the Contractor.
 - 3. Under this Contract, the Contractor shall smooth out areas for density tests and otherwise facilitate testing work as directed.

1.03 SUBMITTALS

- A. For information, submit description of dewatering methods proposed for use.
- B. For information, submit description of vibratory compactors proposed for use when requesting placement of backfill and fill materials greater than requirement established herein.
- C. Materials for use as “imported fill material”, and “pipe bedding and backfill material.”

1.04 PROJECT CONDITIONS

- A. Site information:
 - 1. The Data on indicated subsurface conditions are not available. A Geotechnical investigation has not been performed on the site. It is expressly understood the Owner will not be responsible for interpretations or conclusions drawn there from by the Contractor.
 - 2. Test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner.
- B. Disposal of Waste Material
 - 1. Disposal sites for earth waste materials are not available on Owner’s property. Materials that are not suitable for use as topsoil or cannot be used in embankments or construction shall be disposed off-site.
 - 2. Contractor shall restrict temporary storage of waste materials and materials to be reused to the designated work areas.
 - 3. Contractor shall arrange and pay for removal and disposal of all waste materials encountered in the work.
- C. Existing Utilities:
 - 1. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during excavation operations.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the Owner's Representative and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.
 3. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by Owner's Representative and then only after acceptable temporary utility services have been provided.
 4. Demolish and completely remove from the site existing underground utilities which are not to remain in service and are located within an excavation area. Coordinate with local utility companies for shut-off services in lines that are active.
- D. Barricade open excavations in compliance with code requirements. Protect structures, utilities, sidewalks, pavement, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout, and other hazards.
- E. Protection of Subgrade – Do not allow equipment to disturb subgrade, stripped areas, or other area prepared for project. Prevent water from collecting on surface. Repair disturbed subgrade as specified below for unauthorized excavation.
- F. Excavation Safety: The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain excavation side slopes and prevent rock falls to ensure that persons working in or near the excavation are protected.
- G. Contractor shall comply with Metro construction policies and use care in the grading operations to protect all existing cemetery-related features on the project site outside and within the limits required for construction work. Contractor shall be responsible for any damages or disturbance to existing cemetery-related features to be protected. Any delays in the schedule as a result of disturbances or damage to existing archaeological features shall result in no additional cost to Owner.
- H. Protection:
1. Protect trees and other features remaining as a portion of the final landscaping.
 2. Protect bench marks, utilities, sidewalks, paving and curbs from equipment, vehicular traffic, and general construction activities.
 3. Protect above and below grade utilities which are to remain.
 4. Notify Owner's Representative of unexpected subsurface conditions, including cemetery-related finds, and discontinue affected work in the area until notified to resume operations.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. "OSSC" Refers to the State of Oregon/APWA Standard Specifications for Construction.
- B. Topsoil: Provide topsoil to accomplish the Work. Refer to Section 32 91 19 – Landscape Grading, Topsoil, and Soil Preparation for topsoil characteristics.
- C. Compacted Fill: Any on-site soil materials free of organic matter, non-plastic (dried), containing no particles larger than 4 inches, capable of compaction as specified, and approved by the Owner's Representative. Use for trench zone and trench foundation stabilization material in all areas not receiving improvements. Material shall be tested by the soil testing service and approved by the Owner's Representative prior to use in the Work.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- D. Imported Fine-Grained Material: Material approved by the Owner's Representative for use as embankment material from an off-site source other than imported granular material. The source shall be approved by the Owner's Representative prior to use.
- E. Pipe Bedding and Backfill Material: Crushed rock with a maximum particle size of ¾ -inch for pipe zone and 1"-0 above the pipe zone capable of compaction as specified, with not more than 5 percent passing the No. 200 sieve (washed analysis) in trench zone. Material shall be in accordance with "OSSC" standards and tested by the soil testing service and approved by the Owner's Representative prior to use in the Work.

PART 3 — EXECUTION

3.01 EXCAVATIONS

- A. Excavation consists of removal and disposal of all material encountered when establishing required grade elevations. The spot elevations indicated on the drawings indicate finish grade unless otherwise indicated and the Contractor shall excavate to appropriate subgrades. Contractor to provide for the depth of imported topsoil specified in Section 32 91 19 – Landscape Grading, Topsoil and Soil Preparation.
 - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Owner's Representative. Unauthorized excavation, as well as remedial work directed by the Owner's Representative, shall be at no change in Contract amount.
- B. Foundation Stabilization: When excavation has reached required subgrade or trench invert elevations, notify the Owner's Representative and soil testing service, if required, who will observe conditions.
 - 1. Proof roll ground surface. Proof rolling will be observed by the Owner's Representative and testing service, if required. Remove soft areas detected by the proof rolling and replace with compacted fill or imported fill material as directed.
 - 2. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed.
- C. Stability of Excavation: The stability of excavation slopes will be the responsibility of the Contractor.
- D. Shoring and Bracing: Provide shoring and bracing to comply with local codes and authorities having jurisdiction. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.
- E. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding the project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent detrimental soil changes to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Convey water removed from excavations and rain water to collection or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
- F. Excavation for Structures:
 - 1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10-foot, and extend a sufficient distance from footings and foundations to permit placing and removal of concrete form work, installation of services, other construction and for inspection.
 - 2. In excavating for footings and foundations, take care not to disturb bottom of excavation.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

Excavate by hand to final grade just before concrete reinforcement is to be placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

- G. Excavation for Pavements: Cut surface under pavements to comply with cross sections, elevations, and grades as shown.
- H. Excavation for Trenches: Performed as part of work installed.
 - 1. Dig trenches to the uniform width required for the particular item to be installed, sufficient minimum width as shown on the Drawings and to provide ample working room.
 - 2. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below grade to avoid freeze-ups.
 - 3. When unstable pipe foundation is encountered, place a minimum of 12 inches of suitable fill material, approved by the Owner's Representative, under the pipe bedding material to stabilize the trench.
 - 4. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe.
 - 5. Backfill trenches prior to tests and inspections. Use care in backfilling to avoid damage or displacement of pipe systems.
- I. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35° F.
- J. Dust: Assume full responsibility for all alleviation or prevention of dust nuisance on or about the site in compliance with regulatory requirements.

3.02 BACKFILL AND FILL

- A. In all excavations use satisfactory excavated or imported material for backfill. On-site materials may be used in structural fills only during dry conditions when optimum moisture content can be maintained.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Owner's Representative of construction below finish grade including, where applicable, waterproofing, damp proofing, drainage pipe and perimeter insulation.
 - 2. Inspection, testing, approval, and recording of locations of underground utilities.
 - 3. Removal of shoring and bracing and backfilling of voids with satisfactory materials.
 - 4. Removal of trash and debris.
- C. Placement and Compaction: Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 8 inches in loose depth for material compacted by hand-operated tampers.
 - 1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content.
 - 2. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
 - 3. Do not place backfill or fill material on surfaces muddy, frozen, or containing frost or ice.
 - 4. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.03 TOPSOIL

- A. All landscaped areas, planted areas, and fine seeded areas shall have imported topsoil, meeting the requirements of Section 32 91 19 – Landscape Grading, Topsoil and Soil Preparation.

3.04 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area.
- B. Prior to fill placement or aggregate base course placement, the subgrade shall be proof-rolled with a fully-loaded 10 to 12 yard dump truck. Any areas that pump, heave, or appear soft shall be over-excavated and backfilled a minimum of 12 inches with imported fill material.
- C. Percentage of Maximum Density Requirements: Compact soil to not less than following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with ASTM D 698.
 - 1. Structure Fill: Compact exposed subgrade where disturbed and each layer of backfill or fill material to 95 percent of maximum dry density (MDD).
 - 2. Non-Structural Landscape Fill: Compact top 6 inches of subgrade, and each layer of fill material to 80 percent of MDD.
 - 3. Pedestrian Paths and Sidewalks: Compact top 12 inches of subgrade to 95 percent of MDD.
 - 4. Pavements: Compact top 12 inches of subgrade and aggregate base course to 95 percent of MDD.
 - 5. Trench Backfill: Pipe base and pipe zone compacted to 90 percent of MDD. In pavement areas compact top 24 inches of subgrade, and each layer of backfill or fill material to 90 percent of MDD. Outside pavement areas compact fill to 90 percent MDD.
- D. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material. Prevent free water appearing on surface during or subsequent to compaction operations. All Work related to Moisture Control is incidental to the Contractor's base bid.
 - 1. Remove and replace, or scarify and air dry, soil material too wet to permit compaction to specified density.
 - 2. Soil material removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to satisfactory value.

3.05 GRADING

- A. General: Uniformly grade areas of work including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Provide a smooth, consistent slope across the site to follow the existing prevailing slope. Provide positive drainage away from all areas of proposed improvements, removing cut and/or providing fill materials and performing all work as necessary.
- C. Confirm proposed grading with Owner prior to starting construction operations.

3.06 FIELD QUALITY CONTROL

- A. General: The Contractor is responsible for preparing and scheduling all required testing activities.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- B. Quality Control Testing During Construction: Allow soil testing service retained by the Owner to observe, and test subgrades and fill layers, and receive approval from the Owner's Representative before further construction work is performed. If in the opinion of the Owner's Representative, based on soil testing service reports and observations of subgrades and fills which have been placed are below specified density, provide corrective work as required to reach specified density at no additional expense.

3.07 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density, and provide other corrective work as specified, prior to further construction.

— END OF SECTION —

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 32 11 23 AGGREGATE BASE

PART 1 — GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course.

1.02 RELATED SECTIONS

- A. Section 31 20 00 – Earthwork
- B. Section 32 13 14 – Site Concrete

1.03 REFERENCES

- A. ASTM D698 — Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb Rammer and 12 inch Drop.
- B. ASTM D2922 — Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- C. ASTM D3017 — Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.04 SUBMITTALS

- A. Section 103 — Administrative Requirement of the SCS: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, 1 lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements

1.05 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with all Federal, State and Local standards.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. "OSSC" Refers to the State of Oregon/APWA Standard specifications for Construction, for the various gradations indicated on the drawings.
- B. Minimum requirements for rock: OSSC Section 02630. Rock for aggregate base course shall be ¾-inch minus crushed rock, meeting the State qualifications.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Verify substrate has been inspected, gradients and elevations are correct, and substrate is dry.

3.02 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.03 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to the total compacted thickness indicated on the Drawings.
- B. Place aggregate in maximum 6-inch layers and compact as specified in Section 31 20 00.
- C. Level and contour surfaces to elevations and gradients indicated. If thickness is more than 6 inches, spread in two lifts.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to roller compaction equipment.

3.04 TOLERANCES

- A. Flatness: Maximum variation of ½-inch measured with 10-foot (3 m) straight edge.
- B. Scheduled Compacted Thickness: Within ¼-inch.
- C. Variation From Design Elevation: Within ½-inch.

3.05 STOCK PILING

- A. Stockpile materials on site at locations designated by the Owner's Representative.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.06 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.07 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D698, ASTM D2922, and ASTM D3017.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- C. Frequency of Tests: One initial test, then every 500 Sq. Yd.

— END OF SECTION —

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 32 13 14 SITE CONCRETE

PART 1 — GENERAL

1.01 GENERAL

- A. This Section includes the following:
 - 1. Portland cement concrete subslabs, as shown on Drawings.
- B. Related Sections:
 - 1. Section 31 20 00 – Earthwork.
 - 2. Section 32 11 23 – Aggregate Base.

1.02 REFERENCES

- A. American Society for Testing Materials (ASTM).
- B. American Concrete Institute (ACI).
- C. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".
- D. National Ready Mixed Concrete Association (NRMCA).

1.03 SUBMITTALS

- A. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.
- B. Furnish certified reports of each proposed mix for each type of concrete at least thirty days prior to start of installation of the work of this section.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.
- B. All codes referenced herein, shall include but not be limited to the following:
 - 1. American Society for Testing and Materials, ASTM
 - 2. American Concrete Institute
 - a. ACI 214 Recommended Practice for Evaluation of Strength Tests results; of Concrete
 - b. ACI 301 Details and Detailing of Concrete Reinforcement
 - c. ACI 305 Recommended Practices for Cold Weather Concreting
 - d. ACI 306 Recommended Practices for Hot Weather Concreting
 - e. ACI 308 Standard Practice for Curing Concrete
 - f. ACI 347 Recommended Practice for Concrete Formwork
 - 3. NRMCA National Ready Mix Concrete Association, latest revision: "Certificate of Conformance for Concrete Production Facilities."
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

1.05 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Schedule delivery of concrete to provide consistent mix times from batching until discharge.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. Forms: Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
 - 1. Use flexible spring steel forms or laminated boards to form radius bends as required.
 - 2. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.
- B. Form Release Agent” Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- C. Reinforcing Materials:
 - 1. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
 - 2. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs. Provide slip pin dowels as a product commercially manufactured for this use.
 - 3. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
- D. Concrete Materials:
 - 1. Portland Cement: ASTM C150, Type IA or IIA.
 - a. Use one brand of cement throughout Project unless otherwise acceptable to PROJECT ENGINEER.
 - 2. Fly Ash: ASTM C 618; Type F.
 - 3. Normal-Weight Aggregates: ASTM C 33, Class 4, and as follows. Provide aggregates from a single source.
 - a. Maximum Aggregate Size: 1-1/2 inches.
 - b. Do not use fine or coarse aggregates that contain substances that cause spalling.
 - c. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to PROJECT ENGINEER.
 - 4. Water: Potable.
 - 5. Air Entrainment: ASTM C 260.
 - 6. Chemical Admixture: ASTM C 494.
- E. Curing Materials:
 - 1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
 - 2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 - 3. Water: potable.
 - 4. Evaporation Retarder: Waterborne, monomolecular film forming: manufactured for application to fresh concrete.
 - 5. Clear Waterborne Membrane-forming Curing Compound: ASTM C 309, Type 1, Class B.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

6. White Waterborne Membrane-forming Curing Compound: ASTM C 309, Type 2, Class B.
 7. Curing Compound for Colored Concrete: Curing compound shall comply with ASTM C 309 and be approved by color additive manufacturer for use with colored concrete. Use "W-100 Clear Cure & Seal", manufactured by Davis Colors, or approved equal.
- F. Expansion Joint Materials: ASTM D 994, preformed asphalt impregnated, ½-inch thick with zip strip to accept joint sealer.
 - G. Joint Sealer Material: A polymer, designed for gun application, containing no free Toluene Diisocyanate (TDI), complying with ASTM C 920, Standard Specification for Elastomeric Joint Sealants. Standard concrete, color to match colored concrete, or approved equal.
 - H. Bonding Compound: Acrylic or styrene butadiene base, rewettable type.
 - I. Epoxy Adhesive: ASTM C 881, 2-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade" and "Class" to suit project requirements.
 - J. Detectable Warning Panels: as specified in Section 01 00 00 – SPECIAL PROVISIONS.

2.02 CONCRETE MIX, DESIGN, AND TESTING

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
 1. Do not use the OWNER'S field quality-control testing agency as the independent testing agency.
 2. Limit use of fly ash to 25 percent of cement content by weight.
- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
 1. Compressive Strength (28-Day):
 - a. Sidewalks, Walks, Concourse Plazas, and Curbs: 3000 psi.
 - b. Site Structures and footings: 3000 psi. or as per structural calculations.
 - c. Thrust blocks: 2,500 psi.
 2. Slump Limit at Point of Placement: 3 inches +/- 1-inch.
 - a. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches.
 3. Air Content: 5 percent +/- 1percent.
- C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by CONTRACTOR when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.
- D. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
 1. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1½ hours to 75 minutes; when air temperature is above 90°F (32 °C), reduce mixing and delivery time to 60 minutes.

2.03 IMBEDDED WELD PLATES

- A. Contractor to contact precast niche cabinet manufacturer to solicit design and placement for information for imbedded steel weld plates to match locations of those installed on precast cabinets to secure them to poured-in-place concrete footing. Manufacturer to be Koppenberg Enterprises, Monroe, WA, 1-800-574-2481, or approved equal.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

PART 3 — EXECUTION

3.01 SURFACE PREPARATION

- A. Remove loose material from compacted subbase immediately before placing concrete.
- B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.02 FORM CONSTRUCTION

- A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms not more than 3-inch in 10 feet.
 - 2. Vertical face on longitudinal axis, not more than ½-inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.03 REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.04 CONCRETE PLACEMENT

- A. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices.
- D. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- E. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
- F. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- G. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Place top layer of concrete, strike off and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Owner's Representative.
- H. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C) and not more than 80°F (27°C) at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix design.

3.05 JOINTS

- A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
- B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.
- C. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on Drawings or at approximate 8-foot intervals if not shown. Construct weakened-plane for a depth equal to at least $\frac{1}{4}$ concrete thickness, as follows:
 - 1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
 - 2. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.
- D. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 2 hour, except where such placements terminate at expansion joints.
 - 1. Construction joints as shown or, if not shown, use standard metal keyway-section forms.
 - 2. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.
- E. Expansion Joints: Provide pre-formed asphalt impregnated joint material.
 - 1. Locate expansion joints abutting catch basins, manholes, inlets, structures, foundations, footings, and other fixed objects, unless otherwise indicated, and as shown on Drawings. Locate at approximate 45-foot intervals if not included on drawings.
- F. Extend joint fillers full width and depth of joint, not less than 2-inch or more than 1-inch below finished surface for placement of backer rod and joint sealer.
- G. Finish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
- H. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
- I. Fillers and Sealants: Apply joint sealant to all joints in pedestrian or vehicular traffic areas.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.06 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 10-foot straightedge. Distribute concrete as required to remove surface irregularities or abrupt angles and refloat repaired areas to provide a continuous smooth finish, true to within ¼-inch in 10 feet.
- C. Edging: Tool edges of cremation bases after initial floating with an edging tool to a ¼ inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
- D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:
 - 1. Broom Finish: Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Owner's Representative.
- E. Do not remove forms for 24 hours after concrete has been placed, except where required for finishing. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner's Representative.

3.07 CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these.
- E. Curing/Sealer Compound: Apply uniformly in continuous operation according to manufacturer's instructions.

3.08 TOLERANCES

- A. Comply with the tolerances of ACI 117 and as follows:
 - 1. Elevation: ¼-inch.
 - 2. Thickness: Plus 3/8-inch, minus ¼-inch.
 - 3. Surface: Gap below 10-foot-long, unlevelled straightedge not to exceed ¼-inch.
 - 4. Joint Spacing: 1/2-inch.
 - 5. Contraction Joint Depth: Plus ¼-inch, no minus.
 - 6. Joint Width: Plus 1/8-inch, no minus.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.09 REPAIRS AND PROTECTION

- A. Repair or replace broken or defective concrete, as directed by Owner's Representative.
- B. Drill test cores where directed by Owner's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement with Portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage until acceptance of work.
- D. Sweep concrete surface and wash free of stains, discolorations, dirt, and other foreign material prior to final inspection.

3.10 FIELD QUALITY CONTROL

- A. Concrete test cylinders will be taken as directed by Owner's Representative.
- B. One slump test will be taken for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

— END OF SECTION —

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 32 91 19 LANDSCAPE GRADING, TOPSOIL, AND SOIL PREPARATION

PART 1 — GENERAL

1.01 SUMMARY

- A. This section covers all Work necessary to furnish and place topsoil mixes, and general preparation of planting areas as denoted on plan.
- B. Related Sections:
 - 1. Section 31 11 00 – Site Clearing and Demolition.
 - 2. Section 31 20 00 – Earthwork.
 - 3. Section 32 93 00 – Trees, Shrubs and Groundcover.

1.02 PROTECTION

- A. Protect existing trees to be preserved as denoted on plan, and other features such as surrounding archaeological features, roads, sidewalks, paving, and curbs as final work.

1.03 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter, sand, silt, and clay particles: fertile, friable, pervious natural fine sandy loam, or silt loam, a darker shade of brown or gray than underlying subsoil, with a pH range of 5.5-7, 4% organic material minimum, free of subsoil, stones or hard earth 1-inch or larger, free of noxious weeds (including quack grass and horsetail), roots, stones, sticks or other extraneous material.

1.03 SUBMITTALS

- A. Provide certification that the following materials meet the specified requirements.
 - 1. Compost.
 - 2. Soil test results with recommended soil additives.
- B. Furnish ½ cu. ft. of each of the following, including supplier's name and location of supply to Owner's Representative for approval before delivering to job site:
 - 1. Onsite stockpiled topsoil.
 - 2. Import topsoil, if required.
 - 3. Compost.
- C. Product data for fertilizer amendments recommended by Soils Report, as well as other specified amendments.

PART 2 — PRODUCTS

2.01 NATIVE TOPSOIL

- A. It is the intent of the project to use onsite stockpiled topsoil for all topsoil placement meeting the requirements of paragraph 1.03. If required, supplement with import topsoil.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

2.02 IMPORTED TOPSOIL

- A. If required, the imported topsoil shall be fertile, friable, natural loam or sandy loam topsoil, meeting the requirements of paragraph 1.03 that comes from a suitable, pre-approved source, such as Grimms 3-way Blend.

2.03 COMPOST

- A. Compost: Shall be derived from plant material and provided by a member of the US Composting Council Seal of Testing Assurance (STA) program. The compost shall be the result of the biological degradation and transformation of plant-derived materials under conditions designed to promote aerobic decomposition. The material shall be well composted, free of viable weed seeds, and stable with regard to oxygen consumption and carbon dioxide generation. The compost shall have no visible free water and produce no dust when handled. It shall meet the following criteria, as reported by the US Composting Council STA Compost Technical Data Sheet provided by the vendor:
 1. 100% of material must pass through a ½” screen.
 2. The pH of the material shall be between 6 and 8.
 3. Manufactured inert material (plastic, concrete, ceramics, metal, etc.) shall be less than 1.0% by weight.
 4. The organic matter content shall be between 35 and 65 percent.
 5. Soluble salt content shall be less than 6.0 mmhos/cm.
 6. Germination (and indicator of maturity) shall be greater than 80%.
 7. Stability shall be 5-7.
 8. Carbon/nitrogen ration shall be less than 25:1.
 9. Trace metals test result = “pass”.
 10. Approved compost suppliers:
 - a. McFarlanes Bark Co. (503) 659-4240.
 - b. Clackamas Compost Products (503) 557-1028.
 - c. Grimm’s Fuel Company (503) 636-3623.
 - d. Or approved equal.

2.04 COMMERCIAL FERTILIZER

- A. Provide Fertilizer that meets the recommendations of the ‘Soil Fertility Test’ as required in Section 32 91 19 - 3.4.
 1. For the purposes of bidding, assume “Par 4 Mini Greens Grade Granulated Organic Fertilizer, available from North Pacific (800) 461-3477, broadcast over topsoil in all planting areas at a rate of 10 lb. per 1000 sq.ft. and rototilled into the top 6” of soil.
- B. Lime: Provide Lime that meets the recommendations of the ‘Soil Fertility Test’ as required in Section 32 91 19 - 3.4.
- C. Other Amendments: Gypsum, magnesium sulfate, iron sulfate, soil sulfate and others tha may be recommended in Soils Report.
- D. Mycorrhizal Treatment: “Endo Apply” mycorrhizal granular inoculums as available from Mycorrhizal Applications (541) 476-3985.
- E. Herbicide: Roundup.
- F. Water: Potable.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

2.05 SOIL ADDITIVES — All Work in this section is incidental to the Contractor's base bid.

- A. Soil additives for correction of pH and nutrient deficiencies shall be factory labeled containers and approved prior to application.

PART 3 — EXECUTION

3.01 EQUIPMENT

- A. Contractor shall furnish and maintain earth-moving and compaction equipment in satisfactory condition and shall operate such equipment as necessary to control uniform density, and smoothness.

3.02 INSPECTION

- A. Verify site conditions and note irregularities affecting work in this Section.
- B. Beginning work of this section means acceptance of existing conditions.

3.03 EXCAVATION HANDLING

- A. Remove all foreign matter obtained from site soil cleaning, screening and/or picking process from the site and legally dispose of as required by the appropriate jurisdiction. Dispose of all waste off-site.

3.04 SOIL FERTILITY TEST AND RECOMMENDATION

- A. Section 104 - Quality Requirements: Testing, inspection, and analysis requirements.
- B. Existing Topsoil: Obtain and submit a minimum of three soil samples from the project site to a qualified testing laboratory for a soil fertility test and recommendation report. The soil fertility test must evaluate available soil nutrient content and fertility status, soil pH, salinity, nitrate, ammonium, phosphate, potassium, calcium, and magnesium, and other element necessary to determine soil fertility. A list of qualified soils testing laboratories is available from the Oregon State University Extension Service. The cost for testing and the fertilizer and lime soil additives recommended by the tests is to be borne by the Contractor and is incidental to the topsoil work.
- C. Imported Topsoil: Obtain and submit a minimum of three soil samples of the imported topsoil to a qualified testing laboratory for a soil fertility test and recommendation report. The soil fertility test must evaluate available soil nutrient content and fertility status, soil pH, salinity, nitrate, ammonium, phosphate, potassium, calcium, and magnesium, and other element necessary to determine soil fertility. A list of qualified soils testing laboratories is available from the Oregon State University Extension Service. The cost for testing and the fertilizer and lime soil additives recommended by the tests is to be borne by the Contractor and is incidental to the topsoil work.
- D. Submit the soil fertility test report(s) and laboratory recommendations for appropriate plant growth to the Owner's Representative for approval before beginning work with the topsoil.

3.05 PREPARATION

- A. Prepare soil at a time when moisture conditions will permit proper cultivation.
- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- C. Remove stones over 1-inch diameter, sticks, mortar, concrete, rubbish, debris and all materials harmful to plant life.
- D. Remove or spray as required to eradicate noxious weed growth and roots.
- E. Achieve complete removal or kill of all weeds within all areas receiving new planting.
 - 1. Prior to amending soil in all areas, spray all areas to be planted or seeded where weeds or grass are growing with "Roundup" at a 2 percent solution. Spray as per manufacturer's directions for area and plant materials involved. Always follow weed control container label directions.
 - 2. Spray work shall be done by a spray applicator licensed in the State where the project resides.
 - 3. Do not do any work on the areas sprayed for a minimum of seven days after spraying.
 - 4. Protect all existing vegetation to remain from damage from spray application.
- F. Request inspection and allow observation by Owner's Representative of prepared soils before planting.

3.06 FINAL FINISH GRADING

- A. All Topsoil and Conditioner placement shall not be performed when satisfactory results cannot be obtained due to rain freezing weather, or other unsatisfactory conditions.
- B. Rocks, stones, sticks, brush, roots, and other objectionable materials shall be removed and disposed of off-site.
- C. All areas to be planted shall be graded and floated to eliminate water holding depressions and pockets.
- D. Provide a uniform slope across the site that follows the prevailing slope. Undulations and unsightly variations in grade that will not permit the use of normal mowing equipment without scalping or missing shall be re-graded and floated to smooth surfaces.
- E. All areas shall be graded to provide positive drainage. Owner's Representative shall review grades prior to Contractor proceeding with further construction or planting.
- F. All planted areas shall be machine or hand worked to eliminate objectionable lumps and soil clods, as deemed necessary by the Owner's Representative. Tillage shall include the removal of all equipment ruts and tracks, areas of compaction or erosion, and any other undesirable soil conditions which would prevent the proper formation of a finely pulverized seedbed, as directed by Owner's Representative.
- G. Finish grade after full settlement, not including mulch, shall be 1-inch below tops of curbs, walks, or existing grades in shrub, groundcover and ornamental grass areas, and ½-inch lower in seeded grass areas.

3.07 CULTIVATION UNDER EXISTING TREES

- A. Do not machine-cultivate within the dripline of existing trees (Tree Protection Zones). Perform all bed preparations required using hand tools, and avoid damage to protect roots as required.

3.08 SHRUB PLANTING AREAS

- A. This section pertains to those areas on-site where mass planting of shrubs, groundcover and ornamental grasses are scheduled.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- B. Excavate and remove soil, debris, rock and other materials to 14-inches below adjacent flatwork or finish grade or deeper as required to ensure that all soil with construction rock and other debris is removed from all planting areas. Contact Owner's Representative for approval of all excavated planting areas prior to installing topsoil.
- C. Thoroughly rototill subgrade to a minimum 6-inches depth for approval.
- D. Place topsoil backfill in 6-inch lifts, watering lightly to allow topsoil to settle between lifts. Add additional topsoil to bring soil level to grades shown on plan with allowance for compost placement.
- E. Spread 2-inch of approved compost over all shrub planting bed areas, and broadcast recommended amendments from Soils Report, and fully incorporate by discing, tilling, hand spading, or other methods to a minimum depth of 6 inches.
- F. See Section 32 93 00 – Trees, Shrubs and Groundcover for mulch placement in beds.

3.09 UTILITY PROTECTION

- A. Contractor shall be responsible for protecting all existing and proposed water lines, underground utilities, and any other subsurface features while excavating and working on the project site.

— END OF SECTION —

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 32 93 00 TREES, SHRUBS, AND GROUNDCOVER

PART 1 — GENERAL

1.01 SUMMARY

- A. The work included in this section, whether mentioned or not, shall consist of all labor, tools, materials, tests, permits, and other related items necessary for the installation of all plant materials as shown on the drawings and/or as specified in the Specifications.
- B. The work in this section includes:
 - 1. Plants and groundcover.
 - 2. Staking.
 - 3. Mulching.
 - 5. Pruning.
 - 6. Weed Control.
 - 9. Maintenance.
- C. Related Sections:
 - 1. Section 31 20 00 – Earthwork.
 - 2. Section 32 91 19 – Landscape Grading, Topsoil & Soil Preparation.

1.02 RELATED WORK

- A. Topsoil placed and graded to a grade tolerance of +/- 0.1-foot prior to start of the landscape work.
- B. Grass and weed removal for planting areas shall be performed per these specifications.

1.03 REFERENCES

- C. American National Standards Institute:
 - 1. ANSI A300 - Tree Care Operations - Tree, Shrubs, and Other Woody Plant Maintenance - Standard Practices.
 - 2. ANSI Z60.1 - Nursery Stock.

1.04 SUBMITTALS

- A. Certified Confirmed Orders: Certify in writing to the Owner's Representative within 10 business days of the award of the contract, confirmed orders for plants and provide the quantity, location, phone number, and address of the grower who has agreed to provide any plant material. Should the Contractor neglect to provide this documentation within the allocated time, Contractor may forfeit any substitution benefits.
- B. Certificates: Certificates required by law shall accompany shipments. Upon completion of the installation, submit certificates to the Owner's Representative.
- C. Quantity Certification: Provide certification of quantities of mulch, fertilizer, herbicide, and planting accessories delivered to the site.

1.05 QUALITY ASSURANCE

- A. Tree Pruning: ANSI A300 Pruning Standards for Woody Plants.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- B. Field Superintendent – Provide one person who shall:
 - 1. Be present at all times during execution of work in this section;
 - 2. Be familiar with the materials and best methods for installation;
 - 3. Direct work performed under this section.
 - 4. Be a Certified Landscape Technician, certified by the Oregon Landscape Contractor's Association.
- C. Government Inspection: All plants and planting material shall meet or exceed the specifications of federal, state, and county laws requiring inspection for plant disease and control.
- D. Industry Standards: Quality definitions, size tolerances and caliper-to-height ratios shall be no less than minimums specified in American Standards for Nursery Stock, published by American Association of Nurserymen, Inc., ANSI Z60.1-1990.
- E. Owner reserves the right to reject any or all plant material at any time until final review and acceptance. Remove rejected plants immediately from site.
- F. Produce upon request, sales receipts for all nursery stock and certificates of inspection from federal, state, and other authorities.

1.06 UNIT PRICES

- A. The Owner may elect to provide selected types and quantities of native groundcover plants to be installed by the Contractor.
- B. The Contractor shall provide unit prices for all plants listed on the Plant List on the Planting Plan, to include separate costs for plant materials, installation, and warranty.
- C. The Contractor shall confirm the types and quantities of plants to be supplied by the Owner prior to purchasing or installing any plants.

1.07 CHANGE ORDERS AND SUBSTITUTIONS

- A. The Contractor shall provide all plants of the size, species, variety, and quality noted and specified. If unavailable, the Contractor shall notify the Owner's Representative in writing immediately and provide the names and telephone numbers of five nursery suppliers that he has contacted. If substitution should be permitted, it can be made only with the prior written approval of the Owner. The nearest variety, size, and grade as approved by the Owner's Representative shall then be furnished.

1.08 QUALIFICATIONS

- A. Installer: The Contractor installing work covered by this specification section must be a state licensed and bonded Landscape Contractor. Contractor must be experienced in landscape work of best-accepted trade practices and have equipment and personnel adequate to perform the work specified. Contractor must be familiar and comply with American Standard for Nursery Stock published by the American Association of Nurserymen.

1.09 PRE-INSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing work of this section.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Notify Owner's Representative of delivery schedule so plant materials may be inspected upon job site delivery. Remove unacceptable products immediately from job site.
- B. Storage and Handling: Protect products against damage or dehydration. Cover plant roots and root balls with soil or other accepted material upon job site delivery if not to be planted within four hours. Store plant material in light shade and protect against harmful weather until planted. Maintain plant materials not to be planted within four hours.
- C. Plant material damaged as a result of delivery, storage or handling will be rejected.
- D. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Do not install plant life when ambient temperatures may drop below 35°F or rise above 90 °F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

1.12 COORDINATION

- A. Install plants after finish grading.
- B. Coordinate the removal of grass and weeds for planting areas prior to work in this section.

1.13 PROTECTION

- A. Protect Existing Site Improvements: Verify location of underground facilities prior to doing work. Protect active service lines whether indicated or not. Repair and make good any damage to service lines or improvements caused by planting operations.
- B. Barricade or Cover Excavations: Barricade or cover as necessary all excavations to protect pedestrians & workers.
- C. Contractor is responsible for protecting plant material through final acceptance.

1.13 WARRANTY

- A. Warranty begins at date of substantial completion.
- B. Plant materials must be in healthy condition at end of 60-day warranty period covering establishment.
- C. Contractor is responsible to assume liability for all plant material and to warranty plants against disease, insect infestation, desiccation, sun scald, freeze damage, or any other condition that would cause plants to be unhealthy or to die through substantial completion.
- D. Replace all trees, shrubs, and groundcovers when plants are no longer in a satisfactory growing condition as determined by the Owner for the duration of the Warranty period. Make replacements within seven days of notification from the Owner. Remove dead plants within two days of notification and mark the planting plan showing the exact location of replaced plants.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- E. Contractor is not responsible for damage to plants due to vandalism, theft, or accidental damage from pedestrians during the warranty period.

PART 2 — PRODUCTS

2.01 TREES, PLANTS, AND GROUNDCOVER

- A. All plants shall be nursery grown, or normal habit of growth, healthy, vigorous and free of disease, insect eggs and larvae. Plants shall not be pruned prior to delivery. Plants shall have all leaders and buds intact. Grading of plant material and root ball / container sizes shall be in accordance with the code of standards of the American Association of Nurserymen.
- B. Provide the number of plants shown graphically on the Landscape Drawing or listed on the Plant Materials List, whichever is greater, or to cover at specified spacings.
- C. Plants are required to be from stock acclimated to 'Project Site' environmental conditions, having been consistently cultivated and grown under these conditions.
- D. Root Protection: Large plants Balled and Burlapped (B&B) with natural ball of size to ensure healthy growth. Small plants container-grown furnished in removable containers or integral peat pots well rooted to ensure healthy growth. Grow container plants in containers from six months to two years prior to delivery with roots filling container but not root bound.
- E. Plant Names: Plants shall be true to name and one of each bundle or lot shall be tagged with the common and botanical name and size of the plants in accordance with the standards of practice of the American Association of Nurserymen and shall conform to Standardized Plant Names, 1942 Edition, published by J. Horace McFarland Company. In all cases, botanical names shall take precedence over common names.

2.02 FERTILIZER

- A. Fertilizer: Agriform planting tablets, 10 and 21 gram, or approved equal.

2.03 MULCH MATERIALS

- A. Bark Mulch: Commercial product, medium ground bark mulch. Bark shall be ground fir or hemlock bark of uniform color, free from weeds, seed, sawdust, and splinters and shall not contain resin, tannin, wood fiber or other compounds detrimental to plant life. Source shall be from freshwater mill.

2.04 WATER

- A. Contractor shall make, at Contractor expense, whatever arrangements are necessary to ensure an adequate water delivery system to meet the needs of this Contract. The Owner will make water available to the Contractor from the existing domestic water hose bibs on site.
- B. Water for plant irrigation must be clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of plants.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Verify prepared subsoil and planting beds are ready to receive the Work of this section, including the removal of grass and weeds per these specifications and as shown on the drawings.

3.02 SOIL PREPARATION

- A. Prepare planting bed soils per specification Section 32 91 19 – Landscape Grading, Topsoil and Soil Preparation.

3.03 EXCAVATION

- A. Excavate planting pits or beds for trees, shrubs, and groundcover consistent with good horticultural practices. The inside surfaces of all planting holes are to be rough, not smooth. If the Contractor encounters any unusual condition which, in his opinion, is detrimental to the new planting, he shall notify Owner's Representative immediately.

3.04 PLANTING

- A. Place all plants as shown on drawings. Plant upright and orient to give best appearance or relationship to adjacent plants and structures. Notify Owner's Representative for review and approval of final orientation.
- B. Set plants in prepared pits or beds. Loosen and remove twine binding and burlap from top one-half of root balls. Weeds in the top of root balls must be removed prior to planting.
- C. Place bare root plant materials so roots lay in natural position.
- D. Cut off cleanly all broken or frayed roots.
- E. Backfill planting hole with prepared planting mix material comprised of a mixture of 2/3 native topsoil and 1/3 compost. When planting hole is one-half backfilled, fill with water and let stand until water is absorbed into soil. Continue topsoil fill and when planting hole is three-fourths filled.
- F. Place and compact topsoil backfill to finish grade and provide 2-inch depressed water basin at each shrub and tree.
- G. Water each plant thoroughly upon completion of planting.
- H. Remove non-biodegradable root containers and all plant pots from site.

3.05 FIELD PRUNING

- A. Prune trees and shrubs to remove damaged branches.
- B. Paint all cuts more than ½-inch in diameter with tree paint approved by American Association of Nurserymen.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3.06 MULCH

- A. Apply a 2½-inch layer of specified mulch over all planting areas after planting and rake to a smooth finish grade.
- B. Provide mulch layer around newly planted trees as detailed.

3.07 ADJUSTMENT AND CLEANING

- A. Remove and replace plants or materials not meeting specified standards.
- B. Areas are to be kept clean during progress of work until completion.

3.08 MAINTENANCE

- A. Maintain plant life immediately after placement. Continue maintenance through substantial completion.
- B. Protect and maintain work in this specification section against all defects of materials and workmanship. Maintenance of all the planted areas shall include, but not be limited to, watering, mowing, weeding, herbicide and insecticide applications, cultivation of beds, mulch replacement, guys, turnbuckles, and stakes, and pruning as well as replacement of any plants that appear to be in distress.
- C. Irrigate when necessary to avoid drying out of plant materials, and to promote healthy growth.
- D. It is understood that the Owner will be responsible during the Warranty period for normal landscape maintenance of the project.

3.09 FIELD QUALITY CONTROL

- A. Plants will be rejected when ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.10 SCHEDULE - PLANT LIST

- B. A. Refer to planting lists on Drawings.

— END OF SECTION—

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

SECTION 32 94 00 LANDSCAPE STONEWORK

PART 1 — GENERAL

1.01 SUMMARY

- A. The work in this section includes:
 - 1. Furnish all labor, material and equipment necessary for the installation of landscape stonework, stone memorials and pvc piping form remains as detailed and specified herein.
 - 2. Owner provided, Contractor installed items include:
 - a. Urn chambers associated with granite cremation products.
- B. Related Sections:
 - 1. Section 31 20 00 – Earthwork.
 - 2. Section 32 11 23 – Aggregate Base.
 - 3. Section 32 13 14 – Site Concrete.
- C. References:
 - 1. American Society of Testing and Materials (ASTM).

1.02 SUBMITTALS

- A. Submit the following in accordance with Division 1 Section “Submittal Procedures”.
 - 1. One sample of paving stone specified, in finish specified.
 - 2. One quart bag of crushed basalt paving.
 - 3. Color photographs of memorial boulders.
 - 4. Product information for mortar and grout materials.
 - 5. Product information for metal edger.
 - 6. Product information for pvc pipe urn chambers for remains.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed landscape stonework similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment, with 5 years minimum experience.
- B. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties and to cut and finish material without delaying the Work.
- C. Pre-installation Conference: Conduct conference at Project site to comply with requirements.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in manufacturer's unopened containers, fully identified by name, brand, type, weight and analysis.
- B. Deliver stone materials to project site in undamaged condition. Stone that has been broken, chipped, stained, or discolored will be rejected.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- C. No material which may cause staining or discoloration shall be used for blocking or packing.
- D. Upon receipt at the project site, the stone shall be packed on timber or platforms at least 3-inches above the ground, and extreme care shall be taken to prevent staining during storage. If storage is to be a for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering.

PART 2 — PRODUCTS

2.01 STONE

- A. General: All stone to be generally clean, free of mud or dirt.
- B. Paving:
 - 1. Pavers/Stepping Stones: Basalt, 2" thickness in sizes indicated on the plans, as available from Mutual Materials (503) 650-2939, or approved equivalent.
 - 2. Threshold Paver/Slabs: Basalt, 2" thickness in sizes indicated on the plans, as available from Mutual Materials (503) 650-2939, or approved equal.
- B. Crushed Stone Paving: ¼" Crushed Basalt, as available from Mutual Materials (503) 650-2939, or approved equal.
- C. Memorial Curbing: Granite, China Gray color, with standard surface finishes, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
 - 1. Curbing: 18-inches long by 9-inches wide by 4-inches high.
 - 2. Wedges (where applicable): 11-inches long by 6-inches high by 3-inches wide.
 - 3. Endposts: 12-inches long by 12-inches wide by 6-inches high.
- E. Memorial Blocks: Granite, China Gray, with standard surface finishes as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
 - 1. Large: 16-inches by 16-inches by 8-inches high.
 - 2. Medium: 12-inches by 12-inches by 6-inches high.
- F. Memorial Pavers: Granite, China Gray color size to be 12-inches by 24-inches by 4-inches, with standard surface finishes, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
- G. Cored Upright Markers: Granite, China Gray color, size to be 12-inches wide by 18-inches long by 20 3/8-inches tall, with standard surface finishes, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
- H. Non-Cored Upright Markers: Granite, China Gray color, size to be 10-inches wide by 18-inches long by 10 7/8-inches tall, with standard surface finishes, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
- I. Ossuary Capstone and Cover:
 - 1. Capstone: Basalt, size to be 4-inches thick by 28-inches square with 8-inch diameter hole centered and core-drilled through entire thickness; surfaces to be: sides snapped, top flamed, bottom saw-cut. Core drill holes for cover attachment per details.
 - 2. Cover: Basalt, size to be 1-inch thick by 24-inches square; surfaces to be: top and all sides polished, bottom saw-cut. Core drill holes for cover attachment per details.
 - 3. Capstone and Cover as available from Coverall Stone, Seattle, WA. (800) 779-3234, or approved equal.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- J. Niche Columbarium: Custom assembled niche wall with 18 single/companion pre-cast concrete niche cabinets at 13-inches by 13-inches by 10-inches deep, and 2 niche estates with 2 estate niches with 2 pre-cast-concrete cabinets each at 13-inch by 13-inch by 10-deep, as available from Koppenberg Enterprises, contact Kim Koppenberg (800) 574-2481, or approved equivalent.
 - 1. Provide all necessary products for complete installation including footing per Metro, weld plates per cabinet manufacturer, fasteners, and epoxy based anchoring adhesives, as recommended by manufacturer.
 - 2. Niche covers and hardware: Granite, gray color, surface finish “flamed,” and “Rosette”-type fasteners. as provided by manufacturer, Koppenberg Enterprises (800) 574-2481. Or approved equal.
 - 3. Capstones and shelves: Granite, China Gray color, surface finishes TBD, in sizes/thicknesses indicated on the plans, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
 - 4. Veneer: Basalt, thickness and pattern as indicated on the plans, as available from Mutual Materials (503) 650-2939, or approved equal.
 - 5. Masonry Anchors and Adhesives: As required.
 - 6. Steel Weld-Plates: As recommended by niche cabinet manufacturer.
- K. Cenotaph Panels: Granite, gray color (name TBD), size to be 14-inches by 14-inches by 1-inch thick, top surface and sides finish “flamed, bottom sawn, as available from Life Remembrance, contact: Doug Flin (877) 269-4976, or approved equal.
- L. Memorial Boulders: Natural granite boulders selected for best surfaces for use for sand-blasted memorialization, as available from Mutual Materials (503) 650-2939, or approved equivalent. Boulder size to be approximately 36 to 40-inches long by 36-inches wide by 36-inches tall.
- M. Basalt Column Bench: Natural “crust” finish, with single largest surface polished and edges rounded for seating, and ends snapped; size to be 18-inches to 22-inches thick by 4- feet 6-inches long, as available from Coverall Stone, Seattle, WA. (800) 779-3234, or approved equal.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement-Lime Mix: Packaged blend of Portland Cement complying with ASTM C 150, Type I or II, and hydrated lime complying with ASTM C207, Type S.
- B. Aggregate: ASTM C 144 #60 Silica Sand.
- C. Mortar Admix: CustomCrete Admix, manufactured by Custom Building Products, or approved equal.
- D. Grout: “Saltillo Grout”, natural color, manufactured by Custom Building Products, or approved equivalent.
- E. Water: Clean and potable.

2.03 STONE ADHESIVES

- A. Permanent Adhesives: Adhesives used to permanently affix stone cremation products to concrete and/or stone bases shall be waterproof, latex-based landscape construction types, such as Liquid Nails Landscape Block, or approved equal. Permanent adhesive to be used on the following: Memorial Blocks, Memorial Curbing (with and without wedge dividers), Memorial End Blocks,

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

- B. Temporary Adhesives: Adhesives used to temporarily affix stone cremation products to concrete and/or stone bases shall be one-part, silicone-based, elastomeric materials, such as Masterbond One-Part Silicone, or approved equal. Temporary adhesive to be used on the following: Cored Upright Markers.

2.04 ACCESSORIES

- A. PVC Ossuary Pipe with End Caps: Schedule 40 PVC Pipe, 18-inch diameter by 5' long with preassembled removable end caps, as available from Life Remembrance, or approved equivalent.
- B. Metal Edging: 1/8-inch by 6-inch strap steel. Anchor using 10-inch by 3/8-inch spiral steel spikes on center, or approved equivalent.
- C. Filter Fabric: Nonwoven geotextile permeable fabric, "LINQ 180 EX" available from Thrace-LINQ, (800) 445-4675, or approved equivalent.
- D. Bedding Sand: Clean, All Purpose sand, as available from Mutual Materials, or approved equivalent.

PART 3 — EXECUTION

3.01 INSTALLATION, GENERAL

- A. Execute stone installation by skilled installers.
- B. Install and compact aggregate base material as detailed and as specified in Section 32 11 23 – Aggregate Base.
- C. Install PVC Ossuary Pipe as detailed on the drawings.
- D. Set stone to comply with Contract Documents.

3.02 MORTARED AND EPOXIED STONE APPLICATIONS

- A. Examine related work and surfaces with Installer present before starting work in this Section. Note conditions that require correction. Verify that corrections have been made before starting stone work. Do not proceed with work when ambient temperature is below 45 degrees F. Ensure that materials such as curing compounds, which would prevent proper adhesion of the setting bed to the concrete are removed. Allow concrete slab or substructure to cure for a minimum of 14 days before beginning work in this Section.
- B. Mortar and Grout Mixes; Masonry Anchors:
 - 1. Comply with referenced standards and with manufacturer's instructions relative to mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics.
 - 2. Do not use admixtures, including coloring pigments, air-entraining agents, accelerators, retarders, water-repellant agents, antifreeze compounds, or calcium chloride, unless indicated otherwise.
 - 3. Mixing: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer. Comply with referenced ASTM or ANSI standards, as applicable, for mixing time and water content, unless otherwise indicated.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

4. Mortar for stone masonry (setting) shall be composed of one part Portland cement, 3 parts fine aggregate by volume and hydrated lime in an amount not to exceed 10% of the cement by weight.
 5. Setting and Pointing Mortar: ASTM C270, cement-lime mortar, Type N, proportion specification.
 6. Joint Grout: Comply with mixing requirements of ANSI Standards referenced for materials, color and installation methods. Mortar for stone masonry (pointing) shall be composed on one part dark Portland cement and 2 parts fine aggregate to which sufficient hydrated lime may be added to make as stiff a mixture as can be properly worked into joints.
 7. Masonry anchors: As required.
 8. Vacuum clean concrete substrates to remove dirt, dust, debris, and loose particles.
 9. Keep face of concrete subslab wet continuously for 2 hours preceding the placing of stone.
- C. Stone Adhesives:
1. Install stone with temporary and permanent adhesives per manufacturer's recommendations.
- B. Installation Tolerances:
1. Maximum Grouted Joint Width: ½-inch, plus or minus 1/16-inch.
 2. Columbaria: Set Columbaria level, plus or minus 1/8-inch in any direction.

3.03 MEMORIAL BOULDER AND CENOTAPH INSTALLATION

- A. Install memorial boulders and cenotaphs in locations indicated and as detailed on the plans.

3.04 STONE PAVING

- A. General: Examine subgrade under which crushed stone gravel is to be installed. Notify Owner's Representative of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
1. Install aggregate base course per the requirements of Section 32 11 23.
 2. Lines and Levels: Finish grades shown on the Drawings are given in feet and decimals of feet are to the top of all graded or paved surfaces. Slope uniformly between given spot elevations unless otherwise indicated.
 - a. Surfaces shall be true to within ¼-inch when tested in any direction with a 10-foot straightedge. There shall be no pools of water standing on the surface after a rain.
 - b. Transition between changes in vertical gradient of walks and paving shall be smooth and gradual with no abrupt or sharp changes greater than ¼-inch.
 - c. Horizontal layout shall not vary more than 1-inch from dimensions indicated on the drawings.
- B. Metal Edging: Metal edging shall be installed prior to installation of crushed stone paving.
1. Metal edging shall be installed true to line and grade as indicated and detailed on the Drawings and per the manufacturer's recommendations. Metal edging shall be set flush with adjacent paving. Metal edging shall be installed in a continuous fashion per the manufacturer's recommendation, including splicing joints and bending edger at corners (separate edger pieces at corners will not be accepted).
- C. Concrete Subslabs: Concrete subslabs for memorial coping and columbaria shall be installed prior to crushed stone paving, stepping stone paving, and mulch paths.
- D. Crushed Stone Paving:
1. Ensure memorial curbing and columbaria have been installed prior to crushed stone paving installation.
 2. Install filter fabric over aggregate base overlapping edges 6-inches.

Cremation Garden – Lone Fir Cemetery

Specifications (RFB 13-2311)



Metro

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700

3. Uniformly spread ¼-inch minus crushed basalt and compact to grades and lines shown. Compaction shall be made by power rollers to 19% at optimum moisture content per test of Section 32 11 00. Each lift shall be compacted separately immediately after placement.
 4. Finish surface of crushed stone paving shall be uniform in appearance as to texture and color, and shall have a firm stable consistency and shall be resistant to erosion.
 5. Remove and replace crushed stone paving that is damaged, defective or does not meet the requirements of this section.
- E. Pavers and Stepping Stone Paving:
1. Ensure all adjacent garden cremation improvements have been installed prior to placement of pavers and stepping stones.
 2. Uniformly install bedding aggregate base as detailed.
 3. Install pavers and stepping stones with joints as shown on the plans.
 4. Ensure all pavers and stepping stones are secure and stable in installation and do not rock.

3.05 REPAIR AND PROTECTION

- A. Remove and replace stone that is loose, chipped, broken, stained or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.
- B. Remove excess stone from project site.
- C. Remove protective coating or grout release if applied, as recommended by the manufacturer.
- D. Protect stone and adjacent surfaces during construction with non-staining kraft paper.
- E. Provide final protection and maintain conditions in a manner acceptable to Owner's Representative that ensures stonework is without damage or deterioration at the time of Substantial Completion.

— END OF SECTION —