

CHAPTER 2

GENERAL TECHNICAL REQUIREMENTS

STANDARD CONSTRUCTION SPECIFICATIONS

2 - GENERAL TECHNICAL REQUIREMENTS

Section	Page
201 - Mobilization and Demobilization	Page 2-1
201.01.00 Description	Page 2-1
201.02.00 Materials	Page 2-1
201.03.00 Construction	Page 2-1
201.03.01 General	Page 2-1
201.04.00 Measurement and Payment	Page 2-1
201.04.01 Lump Sum Basis	Page 2-1
201.04.02 Incidental Basis	Page 2-2
202 - Temporary Traffic Control	Page 2-2
202.01.00 Description	Page 2-2
202.02.00 Materials	Page 2-2
202.02.01 Uniform Traffic Control Devices	Page 2-2
202.03.00 Construction	Page 2-3
202.03.01 General	Page 2-3
202.03.02 Traffic Control within the Project	Page 2-3
202.03.03 Construction and Maintenance of Detours	Page 2-3
202.03.04 One-way Piloted Traffic Control	Page 2-4
202.03.05 Protection and Restoration of Traffic Facilities	Page 2-4
202.04.00 Measurement and Payment	Page 2-4
202.04.01 Lump Sum Basis	Page 2-4
202.04.02 Incidental Basis	Page 2-4
203 - Clearing and Grubbing	Page 2-4
203.01.00 Description	Page 2-4

203.02.00	Materials	Page 2-5
203.03.00	Construction	Page 2-5
203.03.01	General	Page 2-5
203.03.02	Merchantable Timber	Page 2-5
203.03.03	Protection of Existing Vegetation	Page 2-6
203.03.04	Clearing	Page 2-6
203.03.05	Clearing Borrow and Waste Disposal Areas	Page 2-6
203.03.06	Grubbing and Stripping	Page 2-6
203.03.07	Disposal of Waste Material	Page 2-7
203.03.08	Backfilling and Clean-up	Page 2-7
203.04.00	Measurement and Payment	Page 2-7
203.04.01	Acreage Basis (hectare or m ²)	Page 2-7
203.04.02	Lump Sum Basis	Page 2-7
203.04.03	Incidental Basis	Page 2-7
204	- Excavation, Embankment, Bedding, and Backfill	Page 2-7
204.01.00	Description	Page 2-7
204.01.01	General	Page 2-7
204.01.02	Unclassified Excavation	Page 2-8
204.01.03	Classified Excavation	Page 2-8
204.01.03A	- Rock Excavation	Page 2-8
204.01.03B	- Common Excavation	Page 2-8
204.01.04	Trench Excavation	Page 2-8
204.01.05	Borrow Excavation	Page 2-8
204.01.06	Embankment	Page 2-8
204.01.07	Foundation Stabilization	Page 2-9
204.01.08	Pipe Bedding	Page 2-9
204.01.09	Pipe Zone	Page 2-9
204.01.10	Trench Backfill	Page 2-9
204.02.00	Material	Page 2-9
204.02.01	Borrow and Embankment Materials	Page 2-9
204.02.02	Foundation Stabilization	Page 2-10
204.02.03	Pipe Bedding	Page 2-10
204.02.03A	- Rigid Pipes and Conduits	Page 2-10
204.02.03B	- Flexible Pipes and Conduits	Page 2-10
204.02.04	Pipe Zone Backfill	Page 2-10
204.02.05	Common Backfill Material - Class C	Page 2-10
204.02.06	Granular Backfill Material - Class D	Page 2-10
204.02.06A	- Reserved	Page 2-11

204.02.06B - Reserved	Page 2-11
204.02.06C - Crushed Aggregate	Page 2-11
204.02.07 Impervious Backfill	Page 2-11
204.02.08 Imported Topsoil	Page 2-11
204.02.09 Native Topsoil	Page 2-11
204.02.10 Reserved	Page 2-11
204.02.11 Controlled Density Backfill (CDB)	Page 2-11
204.03.00 Construction	Page 2-12
204.03.01 Excavation	Page 2-12
204.03.02 Preservation of Existing Improvements	Page 2-12
204.03.03 Excavation of Existing Improvements and Miscellaneous	Page 2-13
204.03.04 Reserved	Page 2-13
204.03.05 Limits of Excavation	Page 2-13
204.03.06 Slope Grading	Page 2-13
204.03.07 Foundation Stabilization	Page 2-14
204.03.08 Common Excavation	Page 2-14
204.03.09 Rock Excavation and Explosives	Page 2-14
204.03.09A - Depth of Excavation	Page 2-14
204.03.09B - Methods and Records Required	Page 2-15
204.03.09C - Use of Explosives	Page 2-15
204.03.09D - Trench Blasting	Page 2-15
204.03.10 Disposal of Excess Materials	Page 2-15
204.03.10A - Reserved	Page 2-16
204.03.10B - Sites Provided by Contractor	Page 2-16
204.03.11 Temporary Location of Excavated Materials	Page 2-16
204.03.12 Overexcavation for Roadways	Page 2-17
204.03.13 Surface Removal and Replacement for Trenches	Page 2-17
204.03.13A - Removal and Replacement of Topsoil	Page 2-17
204.03.13B - Removal and Replacement of Pavement, Curb, Driveways, and Sidewalk	Page 2-18
204.03.13C - Removal and Replacement of Sod	Page 2-18
204.03.14 Trench Excavation and Shoring	Page 2-19
204.03.14A - Maximum Length of Open Trench	Page 2-19
204.03.14B - Trench Width	Page 2-19
204.03.14C - Grade	Page 2-20
204.03.14D - Shoring, Sheeting, and Bracing of Trenches	Page 2-20
204.03.15 Dewatering	Page 2-21
204.03.16 Embankment	Page 2-22
204.03.16A - Roadway Embankment	Page 2-22

204.03.16B - Pipeline Embankment	Page 2-23
204.03.16C - Embankment for Structural Foundations . . .	Page 2-24
204.03.17 Bedding	Page 2-24
204.03.17A - Bedding for Rigid Conduits	Page 2-24
204.03.17B - Bedding for Flexible Conduits	Page 2-25
204.03.18 Pipe Zone Placement	Page 2-25
204.03.19 Storm Sewer Trench Backfill and Compaction	Page 2-25
204.03.20 Water Course Undercrossings	Page 2-27
204.03.21 Riprap	Page 2-28
204.03.22 Waterline Trench Backfill and Compaction	Page 2-28
204.03.22A - Maintenance of Backfilled Trench	Page 2-28
204.03.23 Structural Backfill and Compaction	Page 2-28
204.03.23A - Moisture Control	Page 2-28
204.03.23B - Common Backfill Around Structures	Page 2-29
204.03.23C - Common Backfill Not Around Structures . . .	Page 2-29
204.03.23D - Granular Backfill Around Structures	Page 2-29
204.03.23E - Granular Backfill Under Footings and Slabs	Page 2-29
204.03.23F - Granular Backfill Under Facilities	Page 2-30
204.03.23G - Sand Backfill	Page 2-30
204.04.00 Measurement and Payment	Page 2-30
204.04.01 Common and Unclassified Excavation	Page 2-30
204.04.01A - Structural Excavation	Page 2-30
204.04.01B - Roadbed and Slope Excavation	Page 2-31
204.04.01C - Trench Excavation and Backfill	Page 2-31
204.04.02 Hard Surface Removal and Replacement for Trenches	Page 2-34
204.04.03 Rock Excavation	Page 2-34
204.04.03A - Structural Rock Excavation	Page 2-34
204.04.03B - Roadbed and Slope Rock Excavation	Page 2-35
204.04.03C - Trench Rock Excavation	Page 2-35
204.04.04 Embankment	Page 2-36
204.04.05 Foundation Stabilization	Page 2-36
204.04.05A - Structural and Roadway	Page 2-36
204.04.05B - Trench	Page 2-36
204.04.05C - Trench-stipulated	Page 2-37
204.04.06 Bedding for Storm Sewers, Water Mains, and Conduits	Page 2-37
204.04.07 Backfill	Page 2-38
204.04.07A - Structural	Page 2-38
204.04.07B - Pipe Zone Backfill	Page 2-38
204.04.07C - Granular Trench Backfill Material	Page 2-38

204.04.07D - Controlled Density Backfill (CDB)	
Material	Page 2-39
204.04.08 Riprap and Filter Blanket	Page 2-39
204.04.09 Imported Topsoil	Page 2-40
204.04.10 Shoring and Cribbing Incidental	Page 2-40
204.04.11 Dewatering Incidental	Page 2-40
204.04.12 Withheld Progress Payments	Page 2-40
204.04.13 Payment	Page 2-40
205 - Materials	Page 2-41
205.01.00 Description	Page 2-41
205.02.00 Material	Page 2-41
205.02.01 General	Page 2-41
205.02.02 Portland Cement Concrete	Page 2-41
205.02.03 Cement Mortar	Page 2-42
205.02.04 Cement Grout	Page 2-43
205.02.04A - Type "A" Grout	Page 2-43
205.04.04B - Type "B" Grout	Page 2-43
205.02.05 Steel Reinforcement	Page 2-43
205.02.06 Dowels	Page 2-43
205.02.07 Structural Joint Material	Page 2-43
205.02.08 Curing Materials for Portland Cement Concrete	Page 2-43
205.02.09 Epoxy Cement	Page 2-44
205.02.10 Portland Cement	Page 2-44
205.02.11 Water	Page 2-45
205.02.12 Aggregates	Page 2-45
205.02.12A - General	Page 2-45
205.02.12B - Coarse Aggregates	Page 2-46
205.02.12C - Fine Aggregate	Page 2-48
205.02.13 Asphalt Materials	Page 2-49
205.02.13A - General	Page 2-49
205.02.13B - Asphaltic Concrete	Page 2-50
205.02.13C - Prime Coat	Page 2-50
205.02.13D - Seal Coat	Page 2-50
205.02.13E - Tack Coat	Page 2-50
205.02.13F - Slurry Seal	Page 2-50
205.03.00 Construction	Page 2-50
205.03.01 Reserved	Page 2-50
205.04.00 Measurement and Payment	Page 2-50

206 - Adjustment of Incidental Structures to Grade	Page 2-51
206.01.00 Description	Page 2-51
206.02.00 Materials	Page 2-51
206.02.01 General	Page 2-51
206.03.00 Construction	Page 2-51
206.03.01 Excavation and Backfill	Page 2-51
206.03.02 Salvage of Frames, Covers, and Grates	Page 2-51
206.03.03 Raising Tops of Masonry Structures	Page 2-52
206.03.04 Lowering Tops of Masonry Structures	Page 2-52
206.03.05 Adjusting Metal Structures	Page 2-53
206.03.06 Adjusting Manholes, Catch Basins, and Similar Structures	Page 2-53
206.04.00 Measurement and Payment	Page 2-53
206.04.01 Measurement and Payment Incidental	Page 2-53
206.04.02 Measurement as Units in Place	Page 2-53
206.04.03 Payment as Units in Place	Page 2-53
207 - Landscaping	Page 2-54
207.01.00 Description	Page 2-54
207.02.00 Materials	Page 2-55
207.02.01 Plants	Page 2-55
207.02.02 Seed	Page 2-55
207.02.03 Sod	Page 2-55
207.02.04 Imported Topsoil	Page 2-55
207.02.05 Sand	Page 2-56
207.02.06 Peat	Page 2-56
207.02.07 Lime	Page 2-56
207.02.08 Subdrains	Page 2-56
207.02.09 Irrigation and Watering Systems	Page 2-56
207.02.09A - Pipe	Page 2-56
207.02.09B - Gate Valves	Page 2-57
207.02.09C - Pressure Reducing Valves	Page 2-57
207.02.09D - Control Valves	Page 2-57
207.02.09E - Quick-coupling Valves	Page 2-57
207.02.09F - Risers	Page 2-57
207.02.09G - Vacuum Breakers	Page 2-58

207.02.09H - Backflow Preventers	Page 2-58
207.02.10 Fertilizer	Page 2-58
207.02.11 Mulch and Ground Covers	Page 2-58
207.02.12 Tie Downs	Page 2-59
207.02.13 Soil Sterilant	Page 2-59
207.03.00 Construction	Page 2-59
207.03.01 General	Page 2-59
207.03.02 Soil Test	Page 2-59
207.03.03 Lawns and Grass	Page 2-60
207.03.03A - Project Schedule	Page 2-60
207.03.03B - Delivery, Handling, and Storage	Page 2-60
207.03.03C - Preparation of Subgrade	Page 2-60
207.03.03D - Subsurface Drainage	Page 2-60
207.03.03E - Topsoil and Finish Grading	Page 2-61
207.03.03F - Soil Sterilant	Page 2-61
207.03.03G - Seeding	Page 2-61
207.03.03H - Sodding	Page 2-62
207.03.03I - Mulching and Protection	Page 2-62
207.03.03J - Maintenance	Page 2-62
207.03.03K - Lawn Guarantee	Page 2-63
207.03.03L - Inspection for Acceptance	Page 2-63
207.03.04 Trees, Shrubs, and Ground Cover	Page 2-63
207.03.04A - Delivery, Preparation, and Storage	Page 2-63
207.03.04B - Soil Conditioning	Page 2-65
207.03.04C - Planting Procedures	Page 2-65
207.03.04D - Drainage of Pits and Beds	Page 2-67
207.03.04E - Pruning and Repair	Page 2-67
207.03.04F - Paving Tree Pits	Page 2-68
207.03.04G - Plant Guarantee	Page 2-68
207.03.04H - Maintenance	Page 2-68
207.03.04I - Final Acceptance	Page 2-69
207.03.05 Irrigation Systems	Page 2-69
207.03.05A - General	Page 2-69
207.03.05B - Reserved	Page 2-69
207.03.05C - Copper Tubing	Page 2-69
207.03.05D - PVC Pipe	Page 2-69
207.04.00 Measurement and Payment	Page 2-70
207.04.01 Unit Price Basis	Page 2-70
207.04.02 Lump Sum Basis	Page 2-70
208 - Restoration and Cleanup	Page 2-70

208.01.00	Description	Page 2-70
208.02.00	Materials	Page 2-70
208.03.00	Construction	Page 2-70
208.03.01	Surface Dressing	Page 2-70
208.03.02	Removal of Materials	Page 2-71
208.03.03	Cleaning Drains	Page 2-71
208.03.04	Cleaning Paved Surfaces and Appurtenances	Page 2-71
208.03.05	Restoring Planted Area	Page 2-71
208.03.06	Restoring Mobilization, Borrow, and Disposal Areas	Page 2-71
208.03.07	Removal of Signs	Page 2-72
208.03.08	Restoring Curbs, Sidewalks, and Driveways	Page 2-72
208.04.00	Measurement and Payment	Page 2-72
208.04.01	Lump Sum Basis	Page 2-72
208.04.02	Incidental Basis	Page 2-72
209 - Mailbox Relocation		Page 2-72
209.01.00	Description	Page 2-72
209.02.00	Materials	Page 2-72
209.02.01	Concrete	Page 2-72
209.02.02	Reinforcement	Page 2-73
209.02.03	Tube Frame	Page 2-73
209.02.04	Mounting Bracket	Page 2-73
209.02.05	Galvanizing	Page 2-73
209.02.06	Mounting Socket	Page 2-73
209.02.07	Mailbox	Page 2-73
209.03.00	Construction	Page 2-74
209.04.00	Measurement and Payment	Page 2-74
210 - Mailbox Installation		Page 2-75
210.01.00	Description	Page 2-75
210.02.00	Materials	Page 2-75

210.03.00 Construction Page 2-75

210.04.00 Measurement and Payment Page 2-75



STANDARD CONSTRUCTION SPECIFICATIONS

2 - GENERAL TECHNICAL REQUIREMENTS

201 - Mobilization and Demobilization

201.01.00 Description

This Section covers, but is not limited to, work necessary to move in personnel and equipment; set up all offices, buildings, and facilities; and prepare for construction, complete.

201.02.00 Materials

Provide all materials required to accomplish the work as specified.

201.03.00 Construction

201.03.01 General

Set up construction facilities in a neat and orderly manner within designated or approved work area. Supply all labor and equipment necessary to accomplish the work as specified. Conform to applicable requirements of **Section 105 of General Conditions**, including, but not limited to: (1) required notifications; (2) protection of surveying monuments and other markers; (3) temporary traffic control; (4) temporary utility connections; (5) protection of property; and, (6) dust control.

201.04.00 Measurement and Payment

201.04.01 Lump Sum Basis

When mobilization is listed as a separate pay item on the proposal, it will be paid for on a lump sum amount basis. Normal retainage will be deducted from partial payments.

Partial payments for mobilization under the contract will be made under the following schedule:

1. after 5 percent of the total original contract has been earned (from other bid items), then 50 percent of the amount bid for mobilization will be paid, upon request;
2. after 15 percent of the total original contract has been earned (from other

bid items) then 85 percent of the amount bid for mobilization will be paid, upon request; and,

3. upon completion of 20 percent of the total original contract (from other bid items) then 100 percent of the amount bid for mobilization will be paid, upon request.

No bid for mobilization, when listed as a separate pay item in the proposal, will be accepted which is more than 20 percent of the total original contract price bid.

The above schedule of partial payments for mobilization shall not be construed to limit or preclude partial payments otherwise provided by the contract.

201.04.02 Incidental Basis

When not listed in the proposal, all mobilization costs will be considered incidental work for which no separate payment will be made.

202 - Temporary Traffic Control

202.01.00 Description

This Section covers all work necessary to conduct construction operations so as to offer the least possible obstruction and inconvenience to the public and to protect pedestrian and vehicular traffic, complete.

Additional traffic control provisions are contained in **Subsections 105.13 and 107.14** of the **GENERAL CONDITIONS**.

This Section also covers protection and restoration of pavement markings and repairs to traffic signal installations.

202.02.00 Materials

202.02.01 Uniform Traffic Control Devices

Provide barricades, signs, and traffic control devices built in conformance with the Manual on Uniform Traffic Control Devices, published by the U.S Department of Transportation as amended by the Oregon supplement thereto.

202.03.00 Construction

202.03.01 General

Provide flagger, barricades, lights, signs, pilot cars, and/or all traffic control devices necessary to comply with **Sections 105, 107.13, and 202** of these **Standard Construction Specifications**.

Whenever the Contractor must close a street or lane(s) of traffic in any street, a permit shall be obtained from the City two work days prior to the planned closure.

Patrol and traffic-control the area and reset all disturbed signs and traffic-control devices immediately. Remove or cover nonapplicable signs during periods not needed, and approved. Prior to closing or partial closing of any street, conform to **Subsection 105.06.00 in GENERAL CONDITIONS**.

202.03.02 Traffic Control within the Project

The Contractor shall present a proposed traffic control plan to the Engineer at the pre-construction meeting and obtain approval prior to commencing work. When necessary, allow traffic to pass through the work with as little inconvenience and delay as possible.

Provide approved access to private properties at all times, except during urgent stages of construction when it is impractical to perform construction and maintain access to private property simultaneously. When access is to be denied or impaired, give occupants of affected properties at least 24 hours prior notice.

Failure to provide proper, timely notification to the City and occupants of affected properties will be grounds to deny the commencement of construction.

When, in the judgment of the Engineer, vehicular parking is a hazard to through traffic or to the work, furnish and place NO PARKING signs on any street which is directly involved in the construction work.

202.03.03 Construction and Maintenance of Detours

Construct and maintain temporary detours for protection of the work and the safe passage of traffic around the work area, as approved.

202.03.04 One-way Piloted Traffic Control

When detours are not available, confine operations to a width which provides for safe passage of traffic. If, in the judgment of the Engineer, one-way piloted traffic is necessary, provide at least two flaggers to control traffic, one flagger being stationed at each end of the roadway being limited to restricted use and furnish a pilot car and driver to lead traffic. At the end of each day leave work in such condition that it can be traveled without damage to the work and without danger to public traffic.

202.03.05 Protection and Restoration of Traffic Facilities

The Contractor shall repair all traffic signal installations damaged or changed as a result of the work and limit activities in the street to preclude extensive damage to pavement markings. Temporary pavement markings for parking lane lines shall be placed and maintained by the Contractor, if such are damaged, throughout the course of the project. Such temporary markings shall be placed at the end of each working day for the completed portions of the project.

Placement of final pavement markings and signs shall be done by the City. In new subdivisions, the City will bill the developer for actual costs.

202.04.00 Measurement and Payment

202.04.01 Lump Sum Basis

When listed in the proposal as a separate pay item, payment for traffic safety and control will be made on a lump sum basis.

202.04.02 Incidental Basis

When not listed in the proposal for separate payment, all temporary traffic control will be considered incidental work for which no separate payment will be made.

203 - Clearing and Grubbing

203.01.00 Description

This Section covers work necessary to clear, remove, and dispose of all debris and vegetation such as stumps, trees, logs, roots, shrubs, vines, grass, and weeds within the designated limits, to preserve from injury or defacement such objects and vegetation as are designated to remain in place, and to perform final clean-up of the designated area.

Clearing is defined as cutting of trees, bushes, vines, and other vegetative growth at or above ground surface and removal from the site of all such cut or downed vegetation.

Grubbing is defined as removal of vegetative growth and natural wooden items remaining at or below ground surface following the clearing operation.

Review with the Engineer the location, limits, and methods to be used prior to commencing work under this Section.

Removal of man-made structures, including, but not limited to, concrete slabs, walls, vaults, footings, asphaltic surfaced areas, and graveled areas, shall be included in payment for excavation or excavation and backfill as provided in **Subsection 204.03.03**, and will not be included in clearing and grubbing.

203.02.00 Materials

Explosives used for clearing and/or grubbing shall be fresh, stable material manufactured to the standards of the Institute of Makers of Explosives (IME), and shall conform to the applicable requirements of ORS Chapters 476 and 480.

No blasting may be done unless the Contractor or Subcontractor doing the blasting, furnished evidence of insurance approved by the City, prior to commencing work.

203.03.00 Construction

203.03.01 General

Obtain the required permit from the State Forester as specified in **Subsection 105.11 Protection of Property**, and perform clearing work in conformance thereto.

Remove trees and plants as designated within the area of work, and remove all sod, topsoil, and organic earth within designated areas.

Remove and stockpile as directed, all topsoil that is free of roots, rocks, and other objectionable material and is determined by the Engineer to be suitable for future use. Take reasonable care to prevent topsoil from becoming mixed with subsoil.

203.03.02 Merchantable Timber

The City reserves the right to merchantable timber as designated in the Contract documents and as marked at the project site by the Engineer. Assume ownership,

remove, and dispose of all other timber. Cut, trim, and handle marked merchantable timber in such a manner as to ensure the best sale value to the City and dispose of resulting waste materials as hereinafter specified.

203.03.03 Protection of Existing Vegetation

Protect all trees, shrubbery, and other vegetation, not designated for removal, from damage caused by the work. Cut and remove tree branches only where approved. When directed, remove branches to provide a balanced appearance of any tree. Scars from removal of branches shall be treated with an approved tree sealant.

203.03.04 Clearing

Clear the area above the natural ground surface of all vegetable growth and objectionable materials, and cut timber and timber growth so that no stump extends above ground surface more than 6 inches (152.40 mm).

203.03.05 Clearing Borrow and Waste Disposal Areas

Clear areas designated as borrow and waste disposal areas to designated limits and dispose of all waste as herein specified. Comply with **Subsection 107.19.00 - Waste Sites**.

203.03.06 Grubbing and Stripping

Completely remove all stumps within the limits of required excavations, and within the limits of required embankments having heights of less than 4 feet (1.2192 m). No stump or portion thereof shall come within 3 feet (0.9144 m), horizontally, of embankment subgrades or slope surfaces. Use of explosives for stump removal shall conform to requirements of **Subsections 204.03.09, 203.02.00 and 107.16**.

On areas to be occupied by embankments, remove all roots and embedded wood to a depth not less than 1 foot (0.3048 m) below subgrade or slope surface on which the embankment is to be constructed.

On excavation areas, remove all roots and embedded wood to a depth not less than 6 inches (152.40 mm) below subgrade of slope surface through which excavation is required.

Areas on which grubbing and/or stripping is to be performed shall be indicated on the plans or otherwise specified.

203.03.07 Disposal of Waste Material

Remove and dispose of all waste materials or debris from the site. Burning is not allowed according to DEQ regulations.

203.03.08 Backfilling and Clean-up

In areas not subject to future excavations or filling, fill all holes and depressions caused by clearing and grubbing with material acceptable to the Engineer and reshape area to conform to adjacent undisturbed topography.

Leave work area in a clean and sightly condition, free from litter and debris.

203.04.00 Measurement and Payment

203.04.01 Acreage Basis (hectare or m²)

When shown in the proposal, payment for clearing and grubbing will be made on an acreage (hectare) basis for the area cleared and grubbed within limits staked by Engineer, measured to the nearest 0.1 acre (0.04047 m²). No payment will be made for area within the existing street or easement where clearing or grubbing is not required.

203.04.02 Lump Sum Basis

When shown in the proposal, payment for clearing and grubbing will be made on a lump sum basis for all clearing and grubbing within the limits specified.

203.04.03 Incidental Basis

When not listed in the proposal for separate payment, all clearing and grubbing will be considered incidental work for which no separate payment will be made.

204 - Excavation, Embankment, Bedding, and Backfill

204.01.00 Description

204.01.01 General

This Section covers work necessary for excavation, construction of embankment, foundation stabilization, pipe bedding, trench backfill, and disposal of material required in construction of streets, sewers, water mains, storm drains, structures, and appurtenances thereto.

204.01.02 Unclassified Excavation

Unclassified excavation is defined as all excavation, regardless of type, nature, or condition of materials encountered unless separately designated. The Contractor shall assume full responsibility to estimate the kind and extent of various materials to be encountered in order to accomplish the work.

204.01.03 Classified Excavation

204.01.03A - Rock Excavation

Rock excavation is defined as solid bedrock or ledge rock or boulders over 1/2 cubic yard (0.3823 m³) in volume which cannot be removed by dozers, rippers or other ordinary mechanical equipment, but which require systematic drilling and blasting or the use of rock splitters, pneumatic hammers and wedges. The term "Rock Excavation" shall be understood to indicate a method of removal and not a geological formation.

204.01.03B - Common Excavation

Common excavation is defined as removal of all material not classified as rock excavation.

204.01.04 Trench Excavation

Trench excavation is defined as removal of all material encountered in the trench to the depths and widths as shown or as directed, and may be classified as either common or rock excavation.

204.01.05 Borrow Excavation

Borrow material is defined as material obtained from borrow sources lying outside of, separated from, and independent of planned excavation occurring within the project limits.

204.01.06 Embankment

Embankment is defined as furnishing, placing, and compacting embankment materials to the depth and configuration as shown.

204.01.07 Foundation Stabilization

Foundation stabilization is defined as the removal of unsuitable material in the bottom of an excavation and replacement with specified material for support of a roadbed, pipe, main, conduit, structure, or appurtenances thereto.

204.01.08 Pipe Bedding

Pipe bedding is defined as furnishing and placing of suitable material under and around the pipe in accordance with the appropriate standard plan.

204.01.09 Pipe Zone

Pipe zone is defined as the full width of trench from the bottom of bedding to a point 12 inches (304.80 mm) above top outside surface of the barrel of pipe as shown on Standard Plans ST-50 through ST-54, W-30 or W-31.

204.01.10 Trench Backfill

Trench backfill is defined as furnishing, placing, and compacting backfill material in the trench between the top of pipe bedding and bottom of pavement base, ground surface, or as directed. Trench backfill shall be classified as either common (Class C), granular (Class D), or controlled density (CDB).

204.02.00 Material

204.02.01 Borrow and Embankment Materials

Provide embankment and borrow materials of approved earth, sand, bank-run or river-run, gravel or rock, or combinations thereof, as specified or directed, free of peat, humus, muck, frozen ground, organic matter, or other materials detrimental to construction of firm, dense, and sound embankments.

Use all approved materials originating from required excavations as far as practicable in the formation of embankments and subgrade, and for bedding, backfilling, and other work as shown or directed. Maximum particle size shall be as shown or approved.

Backfill behind curbs and sidewalks and material for dressing up area between curbs and street right-of-way to be approved native topsoil. Must be free of organic matter and fragments which would interfere with smooth finish.

204.02.02 Foundation Stabilization

Use foundation stabilization consisting of gravel or crushed aggregate of approved clean well-graded granular material.

204.02.03 Pipe Bedding

204.02.03A - Rigid Pipes and Conduits

Use 1"-0 (25.40 mm-minus) crushed aggregate or Portland Cement concrete as shown on the appropriate standard plan or construction plans. Use sand where specified.

Crushed aggregate shall be as required for aggregate base material in **Section 303 - AGGREGATE BASES.**

204.02.03B - Flexible Pipes and Conduits

Use pipe bedding material as specified in special provisions.

204.02.04 Pipe Zone Backfill

Use pipe zone backfill material above the bedding consisting of imported or selected trench side material which is friable and free of vegetation, containing no frozen ground, rock, clay masses, clods, or other pieces of material larger than that allowed to be placed in the pipe zone of the particular pipe being installed. Pipe zone backfill for rigid pipes shall contain no material larger than 1 inch (25.40 mm) for all asbestos-cement pipe, and 1 1/2 inches (38.10 mm) for all other pipe.

Pipe zone backfill for flexible pipe shall be as specified.

204.02.05 Common Backfill Material - Class C

For common backfill material, above the pipe zone, use approved native material excavated from within limits of the project, free from vegetation and other deleterious material, and containing no frozen ground. Maximum particle size shall be as shown or approved, except for trench backfill, wherein the particle size shall not exceed 1/2 cubic foot (0.01416 m³) in volume.

204.02.06 Granular Backfill Material - Class D

Use granular material for backfill consisting of crushed aggregate from an approved source.

204.02.06A - Reserved

204.02.06B - Reserved

204.02.06C - Crushed Aggregate

Use crushed aggregate consisting of graded crushed gravel or crushed rock, free from organic material, with maximum particle size as shown or approved and conforming to requirements for aggregate base material in **Section 303 - AGGREGATE BASES.**

204.02.07 Impervious Backfill

Utilize impervious backfill material composed of particles at least 50 percent of which pass a No. 200 sieve, and with a plasticity index not less than 20.

204.02.08 Imported Topsoil

Conform to imported topsoil in **Section 207 - LANDSCAPING.**

204.02.09 Native Topsoil

Use approved topsoil from the site, properly stored and protected and free from grass, overburden and roots, sticks, hard clay, and stones which will not pass a 1 inch square (645.2 mm²) opening.

204.02.10 Reserved

204.02.11 Controlled Density Backfill (CDB)

Controlled density backfill (CDB) is a cementitious material mixed, transported, and delivered using normal ready mixed concrete operations. CDB is a mixture of aggregate (sand or coarse rock), cement, and water that is flowable and requires no compaction. The mixture shall be proportioned such that the 28-day strength is between 50 and 100 psi (22.68Kg and 45.36 Kg per mm²). The material shall be capable of setting up within 24 hours to support paving operations.

204.03.00 Construction

204.03.01 Excavation

Street Excavation:

Excavate for streets, curbs and road approaches to lines and grades shown and as staked.

Excavate for sidewalks and driveways where shown.

Protect existing facilities from damage when excavating.

Protect construction stakes and survey monuments.

Finish cut slopes smooth, uniform and compact.

When directed, overexcavate to remove unsuitable foundation material at the unit price bid for common excavation.

Backfill any unauthorized overexcavation, at no additional cost to City, in conformance with specifications for embankment.

Haul suitable excavated materials for direct placement in street embankments or fill grading areas as shown.

Dispose of excess and waste materials as shown, specified, or directed.

Stockpile or windrow topsoil as required later for curb backfill.

Incidental to excavation shall be the furnishing, installing, and removal of all shoring, sheeting, and bracing as required to support adjacent earth banks and structures, and for the safety of the public and of all personnel working in excavation.

204.03.02 Preservation of Existing Improvements

Conduct operations in such a manner that existing street facilities, utilities, railroad tracks, structures, and other facilities, which are to remain in place will not be damaged, as specified in **Section 105 - Control of Work**. Furnish and install cribbing and shoring or whatever means necessary to support material carrying existing facilities, or to support the facilities themselves, and maintain such supports until no longer needed.

Protect temporary facilities until they are no longer required. When no longer required, remove and dispose of as directed.

204.03.03 Excavation of Existing Improvements and Miscellaneous

Unless otherwise specifically provided for, excavation will include all existing improvements which lie within the limits of excavation and which is required to be removed for the construction of the project.

The volume of such improvements within the excavation limits will be included in the quantities for excavation.

When existing improvements have been or are to be abandoned and are found to interfere with construction, the interfering portions shall be removed and the remaining open portions securely sealed.

Payment for all work in this Section and repair of any damage will be considered incidental to the work and included under bid items for "Excavation" or "Excavation and Backfill", or other specified earthwork items.

204.03.04 Reserved

204.03.05 Limits of Excavation

Excavate to the depths and widths designated within .1 foot (30.48 mm) of planned grade, allowing for forms, shoring, working space, gravel or sand base, and finish topsoil where required. Do not excavate deeper than elevation shown without approval. Excavation carried below grade lines shown or established without approval shall be replaced with approved compacted material; overexcavation under footings shall be filled with concrete of strength equal to that of the footing; and cuts below grade shall be corrected by similarly cutting adjoining areas and creating a smooth transition, all at no additional expense to the City.

204.03.06 Slope Grading

Make slopes free of all exposed roots, unstable rock, and loose stones exceeding 3 inches (76.20 mm) in diameter. Shape tops of banks to circular curves with, in general, not less than a 6 foot (1.8288 m) radius, unless rock makes such work impractical. All surfaces shall be neatly and smoothly trimmed to within .1 foot (30.48 mm) of planned grade. Overexcavating and backfilling to the proper grade will not be accepted.

204.03.07 Foundation Stabilization

It is the Contractor's responsibility to alert the Engineer of possible unstable foundation material. If the Contractor encounters material that he/she suspects is unsuitable for supporting the foundations, piers, retaining walls, cribbing, sewers, pipes, or other facilities he/she shall immediately notify the Engineer so that the conditions can be evaluated. The Contractor shall not place concrete, pipe, or any facility to be constructed, on the unstable material until the unstable ground condition is evaluated and a decision made as to how to overcome the difficulty.

No additional compensation shall be due the Contractor for these delays beyond an adjustment to the contract completion date.

If the Engineer determines that unstable ground can be overcome by foundation stabilization, overexcavate to stable ground as approved and backfill to required grade with material conforming to **Subsection 204.02.02 Foundation Stabilization**. Compact in layers not exceeding 6 inches (152.40 mm) deep to required density and grade as approved.

If the Engineer determines that unstable ground cannot be overcome by foundation stabilization, such other method of stabilization determined by the Engineer may be the basis of additional compensation to the Contractor.

204.03.08 Common Excavation

Perform all excavation regardless of type, nature, or conditions of the material encountered. Method of excavation used is optional. Use hand methods for excavation that cannot be accomplished without endangering existing or new structures or other facilities.

When the precise location of subsurface structures is unknown, locate such structures by hand excavation prior to utilizing mechanical excavation equipment.

204.03.09 Rock Excavation and Explosives

204.03.09A - Depth of Excavation

Excavate to the depths designated or as shown on the appropriate standard plan. Correct overexcavation with compacted material or concrete as directed at no additional expense to the City. In trenches for sewers, water mains, or conduits, remove all material necessary to provide a minimum clearance of 6 inches (152.40 mm) under the pipe and replace with bedding material in conformance with **Subsection 204.02.03 Pipe Bedding**.

204.03.09B - Methods and Records Required

Before rock removal by systematic drilling and blasting or other methods will be permitted, expose the material by removing common material above it. Notify Engineer who, with Contractor or his/her representative, will measure the amount of material to be removed and will record the information. Then drill, blast, or break with power-operated tools specially designed for rock excavation, and excavate the material.

204.03.09C - Use of Explosives

Use explosives which are fresh, stable materials manufactured to the standards of the Institute of Makers of Explosives (IME), and conforming to applicable requirements of ORS Chapters 476 and 480.

Conform to applicable provisions of **Section 107 - Legal Relations and Responsibilities**.

Use of explosives shall be avoided as far as practicable. Such blasting as must be done shall be controlled in a manner which will avoid possible shattering or loosening of materials back of lines to which the excavations are to be made. All blasting shall be by an individual having a certificate of possession as set forth in ORS Chapter 480. Be responsible for any and all damages to property or injury to persons resulting from blasting, or accidental or premature explosions that may occur in connection with the use of explosives. Give adequate warning to all affected persons and adjacent property owners prior to blasting.

204.03.09D - Trench Blasting

When blasting rock in trenches, cover area to be shot with blasting mats or other approved type of protective material that will prevent scattering of rock fragments outside of the excavation.

The contractor shall comply with all requirements of O.S.H.A. for blasting rocks in trenches.

204.03.10 Disposal of Excess Materials

Excavated materials not suitable or not required for backfill or embankment as directed by Engineer, shall be deposited on one or both of the following sites: (A) at predesignated sites contained in the contract documents, and (B) sites supplied by Contractor. All costs for disposing of this excess material shall be included in

the bid item for "Excavation" or "Excavation and Backfill" as contained in the project proposal.

Broken pavement, curb, and other construction debris shall be disposed of in accordance with all applicable local, State and Federal regulations.

Waste Disposal Areas

- 1) If provided, as a convenience for Contractor's on site disposal of excess material from excavations.
- 2) Materials shall be earth and sod, free of vegetative matter and large rock fragments, and subject to approval.
- 3) Place, spread, and consolidate until firm.
- 4) Shape and grade for appearance and surface drainage.

Cleanup

- 1) Clean up site of work of all litter and construction debris caused by each of the rough grading and fine grading operations.
- 2) Remove from the site any materials judged unsuitable for placement in any of the fill areas. Comply with **Subsection 107.19.00 - Waste Sites**.

204.03.10A - Reserved

204.03.10B - Sites Provided by Contractor

All excess material not required for construction will be disposed of by Contractor at his/her option and he/she shall be entitled to receive any reimbursement that he/she can secure from sale of such material. Within the City of Keizer, no excess material shall be deposited on an unimproved dedicated street area without permission from Engineer, and no excess material shall be deposited on any private property without approval from the City.

204.03.11 Temporary Location of Excavated Materials

Place excavated material, suitable for embankment or backfills and not excess material, only within the construction easement, right of way, or approved working area. Pile in such a manner that it will cause a minimum of inconvenience

to the public. Furnish the Engineer a copy of written approval for each property owner prior to stockpiling material on private property.

When excavating provide free access to all fire hydrants, water valves, and meters, and leave clearance to enable free flow of storm water in all gutters, conduits, and natural watercourses.

204.03.12 Overexcavation for Roadways

Remove unsuitable subgrade material to such depths as directed. Excavation below subgrade shall be of the same classification as that above subgrade provided it is removed in the same operation.

When roadway excavation has been completed and it is required to move equipment back in to excavate unsuitable material, or where additional excavation depth requires special equipment because of the presence of shallow utilities or other unforeseen conditions, perform the work as directed and payment for excavation below grade will be made on the basis of Extra Work as provided in the **GENERAL CONDITIONS**. See **Section 301** for other subgrade work.

Excavate below grade and backfill to restore surface as directed, when required by negligence in work operations, at no expense to the City.

Overbreak is defined as that portion of any material which is excavated, displaced, or loosened outside and beyond slopes, lines, or grades as staked or re-established with exception of "Slides" as defined hereinafter, regardless of whether overbreak is due to blasting, to inherent character of any formation encountered, or to any other cause. Remove and dispose of all overbreak at no expense to the City.

204.03.13 Surface Removal and Replacement for Trenches

204.03.13A - Removal and Replacement of Topsoil

Where trenches within easements cross lawns, garden areas, pasture lands, cultivated field, or other areas on which reasonable topsoil conditions exist, remove all topsoil to a depth of at least 12 inches (304.80 mm) for full width of the trench to be excavated. Stockpile and protect from the elements all native topsoil in a location satisfactory to the property owner and do not mix with remaining excavated material. Replace removed topsoil in the top of backfilled trench to the depth removed.

Repair damage to adjacent topsoil caused by work operations. Remove all rock, gravel, clay, and any other foreign materials from surface; regrade, and add topsoil as required.

Use native topsoil as defined in **Section 204.02.09 Native Topsoil** except that the moisture content of the material shall be preserved at all times while stockpiled by suitable coverings or by minimizing the time of removal. All topsoil and sod adjacent to the trench shall be suitably protected from rutting or other damage with sheeting, by use of lightweight equipment or other approved means.

Payment for removing, stockpiling, and replacing topsoil in the trench is included in the bid item, Trench Excavation and Backfill, and no further compensation will be made unless directed by Engineer to place imported topsoil material.

204.03.13B - Removal and Replacement of Pavement, Curb, Driveways, and Sidewalk

Saw cut all asphalt pavement by a method approved by the Engineer prior to excavation of trenches.

Saw Portland Cement concrete pavement, curbs, and sidewalks to a minimum depth of 4 inches (101.60 mm) or half the concrete thickness, whichever is greater. Subsequent removal may be accomplished by using a jackhammer or drophammer, the type of drophammer to be approved by Engineer. Full depth cut by pavement saw can be done at option of Contractor, but at no additional cost to the City. Use of any machine utilizing a falling or swinging weight in the form of a headache ball will not be permitted.

Width of cut shall be a minimum of 12 inches (304.80 mm) wider than the width of the trench, and shall follow lines parallel to pipe or conduit centerline or as directed.

Replacement of pavement, curb, and sidewalk shall conform to the requirements of **Section 405 - Resurfacing**, or as specified on the construction plans.

204.03.13C - Removal and Replacement of Sod

Where directed by the Engineer, the Contractor shall soak, dislodge, roll and stockpile healthy sod for replacement after construction. Sod shall be removed in a minimum of 2 ½ inch thick (63.50 mm) by 5 foot long (1.524 m) sections for rolling. All sod shall be relaid on a damp soil surface a maximum of six hours after removal. Care should be taken to assure the uniform appearance of the area due to the bent of the grass and the successful rooting of the sod when complete.

204.03.14 Trench Excavation and Shoring

204.03.14A - Maximum Length of Open Trench

Except by permission of the Engineer, the maximum length of open trench where prefabricated pipe is used shall be 500 feet (152 m) or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is the less. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced.

Except by permission of the Engineer, the maximum length of open trench in any one location where concrete structures are cast in place will be that which is necessary to permit uninterrupted progress. Construction shall be pursued as follows: excavation, setting of reinforcing steel, placing of floor slab, walls, and cover slab or arch. Each shall follow the other without any one operation preceding the next nearest operation by more than 200 feet (60 m).

Failure by the Contractor to comply with the limitations specified herein may result in an order to halt the work until such time as compliance has been achieved.

A section of trench shall be considered as unfinished until excavation, construction, backfilling, compaction, gravel road restoration, Portland Cement concrete pavement, minimum of first lift of asphaltic concrete pavement, and cleanup operations have been completed. Cleanup of backfilled and construction area shall include resurfacing and cleaning of area so as to allow use of trench and adjacent construction area for normal use as required in **Section 208 - Restoration and Cleanup**.

204.03.14B - Trench Width

It is the intent of these Specifications that trench width at the ground surface be kept to a minimum necessary to install the pipe in a safe manner. In all cases, trenches must be of sufficient width to allow for shoring and permit proper joining of pipe and compaction of the backfill material along sides of the pipe. Minimum trench width, in the pipe zone, must provide a clear working space on each side of the bell pipe barrel.

Maximum pay width of trench at top of pipe as specified under **Subsection 204.04.00 Measurement and Payment**. When required by design, it will be shown on the plans. If maximum width shown is exceeded by Contractor without written authorization, Contractor will be required, at no expense to the City, to provide pipe of a higher strength designation, a higher class of bedding, or both, as

approved. All trenches shall be excavated with vertical walls unless otherwise specified.

Make the excavation for manholes and other structures wide enough to provide a minimum of 12 inches (304.80 mm) between sides of structure and sides of excavation.

Confine top width of trench to dedicated rights of way or construction easements. Special written agreements to extend width may be made by the Contractor with affected property owner, provided such agreement is first approved by Engineer.

204.03.14C - Grade

Excavate trench to lines and grades shown or as established by Engineer, with proper allowance for pipe thickness, pipe bedding and foundation stabilization. The subgrade upon which bedding is to be placed shall be firm, undisturbed and true to grade. If the trench is overexcavated, restore to grade with material of type specified for pipe bedding at no expense to the City. Place material over full width of the trench in compacted layers not exceeding 6 inches (152.40 mm) deep to established grade with allowance for pipe bedding.

204.03.14D - Shoring, Sheeting, and Bracing of Trenches

All trenches and excavations shall be adequately shored to prevent caving of the vertical sidewalls of the trench and to protect adjacent structures, utilities, property, workers, and the public. Maintain sheeting until pipe has been placed and backfilled at the pipe zone. Remove shoring and sheeting as backfilling is done, in a manner that will not damage the pipe or permit voids in the backfill. All sheeting, shoring, and bracing of trenches shall conform to safety requirements of the Federal, State, or local public agency having jurisdiction. The most stringent of these requirements shall apply.

Before beginning work, submit to the City for approval, all details of shoring intended to be used. This approval shall in no way relieve Contractor of responsibility for its safety and sufficiency.

When omitted from the proposal, there will be no separate payment for shoring, sheeting, and bracing of trenches, it being understood that the cost thereof is included and incidental to the contract unit prices for the various trench excavation and backfill items of work.

When listed separately in the proposal, payment for these items shall include all labor, equipment, and material required to place close sheeting or sheet piling

when and whichever is required and approved by the Engineer in order to prevent caving of vertical sidewalls, to protect existing utilities, traffic, and personnel.

Sheet piling will not be used except under abnormal construction situations where the trench walls won't stand long enough to place shoring after excavation. Payment for driven sheet piling shall be on the linear foot (meter) of trench basis at the price quoted in the proposal or at the price stipulated elsewhere in these contract documents.

Close sheeting and sheet piling are defined as specific shoring methods as defined in Sections 437-83-3416 through 437-83-3593 of the Oregon Occupational Safety and Health Code--Oregon Administrative Rules. There will be no separate payment for shoring which does not equal or exceed these methods, it being understood that the cost for such substandard methods (including trench box or bracing) is included in, and incidental to, the contracted prices for the various trench excavation and backfill items of work.

204.03.15 Dewatering

Furnish, install, and operate all necessary machinery, appliances, and equipment to keep excavations free from water during construction. Remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the pipe laying and until the backfill at the pipe zone has been completed. Dewater and dispose of water so as to prevent injury to public or private property, or nuisance or menace to the public. Drainage of trench water through the pipeline under construction is prohibited unless specifically approved by the Engineer. At all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage. Have available at all times competent workers for operation of the pumping equipment. Control surface runoff to prevent entry or collection of water in excavations. All excavations shall be kept free of water when concrete is being deposited or during placement of backfill.

Do not dispose of trench water into sanitary sewers.

Control ground water such that softening of the bottom of excavations or formation of quick conditions or boils during excavation shall be prevented. Design and operate dewatering systems so as to prevent removal of natural soils and so that ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

Before dewatering is started, submit to Engineer a statement of the method, installation, and details of dewatering system proposed to be used. Open and

cased pumps shall not be used as primary dewatering for excavations deeper than 3 feet (0.9144 m) below static water table unless authorized.

Release ground water to its static level in such a manner as to maintain the undisturbed state of natural foundation soils. Prevent disturbance of compacted backfill and flotation or movement of structures, water mains, sewers, and other utilities.

Dewatering shall be considered as incidental to, and all costs included in, the various contract pay items in the proposal.

204.03.16 Embankment

204.03.16A - Roadway Embankment

Preparation of Embankment Foundation. Prior to construction of embankments, excavate unstable material or unsuitable foundation material and dispose of as directed. Limit excavation to lines, grades, and cross sections shown or approved. Backfill basements, trenches, and holes which occur within embankment limits with approved material, which may include small pieces of broken concrete and masonry. Break concrete floors of basements as approved. Compact natural ground underlying embankments to the depth of grubbing or a minimum of 8 inches (203.20 mm), to density specified for the embankment material to be placed.

Embankment Construction. Place 12 inches (304.80 mm) of earth between any structure and large rock as directed by the Engineer.

In the immediate vicinity of curbs, walks, driveways, inlets, manholes, and similar structures, in holes, and where embankment and fill materials cannot be reached by normal compacting equipment, compact to specified density by approved methods.

Where embankments are constructed predominantly of rock fragments, place material in layers of the thickness as directed, by not greater than 3 feet (0.9144 m). Placing of individual rock fragments having dimensions greater than 3 feet (0.9144 m) will be permitted provided that they have no more than two dimensions greater than 6 feet (1.8288 m), that clearances between adjacent fragments provide adequate space for placing and compacting of material in horizontal layers as specified, and that no part comes within 4 feet (1.2192 m) of subgrade. Distribute and manipulate rock so that interstices between larger pieces are filled with smaller pieces, forming a dense and compact mass.

Exercise caution to ensure that embankment construction and fill does not move, endanger, or overstress any structure. Place and compact embankments at the end of bridges and extend a distance three times fill height from each bridge end prior to the time that work begins on the bridge ends. Do not construct embankments when embankment material foundation, or embankment on which it would be placed is frozen.

Compacting and Density Requirements. Density of compacted materials in place will be determined by AASHTO T 191, T 205, or T 238 and maximum density by ASTM 698.

Compact all embankments, fills, and backfills to a minimum density in place of 95 percent of maximum dry density according to ASTM D 698.

Roadbed cuts to a depth of 8 inches (203.20 mm) below established subgrade shall be compacted to a minimum density in place of 95 percent of maximum density.

Perform watering of materials to enhance compaction of embankments and backfills and to alleviate dust nuisance as specified in **Chapter 3 - STREETS**, or as directed.

Slide Removal and Repair. Remove slide material and reconstruct the slope as directed. Reconstruction will be paid for as extra work, unless due to negligence by Contractor.

Obtain materials to replace embankment slides from approved source. Repair slopes undercut at the base or destroyed in any manner due to negligence during the work by resloping parallel to the damaged slope or as approved, at no expense to the City.

204.03.16B - Pipeline Embankment

Where embankments are to contain water mains, conduits, or sewers, construct embankment to support pipe in accordance with details shown on the plans. Use excess excavated trench material suitable for embankment, or approved imported material when directed. When imported material is directed to be used it will be paid for as Granular Material.

Embankment shall be made in 8 inch (203.20 mm) lifts, with minimum compaction of 95 percent of maximum density for full depth of fill. Density in place and maximum density will be determined as specified in **Subsection 204.03.16A - Roadway Embankment**.

Additional Pipe Cover. In locations where insufficient pipe cover exists, place excess excavated trench material suitable for embankment over the pipe as shown or directed to provide a minimum cover of 3 feet (0.9144 m). Compact as required for underlying trench backfill.

204.03.16C - Embankment for Structural Foundations

Deposit approved materials free from roots, organic material, trash, and stones larger than 3 inch (76.20 mm) diameter in uniform lifts across the full width of embankment. Compact each lift to 95 percent of maximum density as determined by ASTM D 698.

204.03.17 Bedding

204.03.17A - Bedding for Rigid Conduits

Construct bedding in conformance with Standard Plans ST-50 through ST-54, W-30 or W-04. Approximate limits for various classes of bedding will be shown on the plans. Engineer shall have the authority to change bedding classifications and limits thereof as necessary during construction.

Class A bedding consists of a pipe cradle of Portland Cement concrete as specified on the appropriate standard plan. Bottom of trench shall be fully compacted before placement of pipe or cradle. Place concrete in such a manner that no dirt or foreign material becomes mixed with the concrete. Allow concrete sufficient time to reach initial set before any additional backfill material is placed in the trench. Conform to applicable provisions in **Subsection 403.03.01 Concrete Encasement for Storm Drain Pipe**.

Class B bedding consists of leveling the bottom of trench or top of foundation material and placing bedding material to the horizontal centerline (springline) of pipe. Bedding material shall be as specified hereinbefore and as shown on the appropriate standard plan. Bedding shall be placed in at least two lifts. Place first lift to provide minimum depth of bedding material smoothly to proper grade so that pipe is uniformly supported along the barrel. Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Bedding under pipe shall provide a firm, unyielding support along entire pipe length. Place subsequent lifts of not more than 6 inches (12.40 mm) thickness up to the horizontal centerline of the pipe. Bring lifts up together on both sides of pipe and carefully work under pipe haunches by slicing with a shovel, vibration, or other approved procedure.

Class C bedding shall conform to requirements for Class B bedding except that bedding material shall be placed only to approximately the lower quadrant of pipe as shown in Standard Plans ST-50 and W-30.

Class A, B, and C bedding shall be considered to include full width of excavated trench from the bottom of trench or top of foundation stabilization material to the top of bedding.

Particular attention must be given to the area from the flow line to horizontal centerline of pipe or top of bedding to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of pipe zone.

204.03.17B - Bedding for Flexible Conduits

Material for bedding for flexible conduits shall be as specified. Place in more than one lift. First lift shall provide a minimum of 4 inch (101.60 mm) thickness under any portion of the pipe and be placed before pipe is installed. Spread smoothly so that the pipe is uniformly supported along the barrel. Install subsequent lifts of not more than 6 inch (152.40 mm) thickness to the top of pipe zone and individually compact to 95 percent of maximum density as determined by ASTM D 698.

204.03.18 Pipe Zone Placement

Place specified pipe zone material carefully around the pipe in 6 inch (152.40 mm) layers and compact to 95 percent maximum density as determined by ASTM D 698. Prevent pipe from movement either horizontally or vertically during placement and compaction of pipe zone material.

When, in the Engineer's judgement, insufficient or unsuitable material exists at trench side for placement in the pipe zone, import and place approved material. There will be no separate payment for providing and placing approved imported backfill in the pipe zone above the bedding, it being understood that the cost thereof is included in the incidental to the contract unit prices for the various trench excavation and backfill items of work.

204.03.19 Storm Sewer Trench Backfill and Compaction

Place and compact backfill in conformance with Standard Plan ST-50, 51, 52, 53, or 54. Resurfacing shall be as specified in **Section 405** or as shown.

Engineer will sample excavated material to determine suitability of common material for backfill use. If common material is found to be compactable and within tolerance range of moisture content, use of the common material for

backfilling may be directed by the Engineer. Take reasonable precautions to prevent approved excavated material from becoming wet and exceeding the critical moisture limits; if approved common material does become wet and exceeds the critical moisture limits through negligence, replace with granular material at no expense to the City. When common material is not approved or available for backfill, import and place granular material backfill or CDB, as specified.

Backfill trench above the pipe zone to the specified grade, or as shown on the plans. Compact to a minimum of 90 percent of maximum density as determined by ASTM D 1557 (AASHTO T 180) proctor.

Excavate test pits in the backfill as directed by Engineer for the purpose of testing the backfill compaction. At the option of Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift. All costs in connection with excavating test pits and from standby time during field density test shall be considered as incidental to backfill and shall be included in unit prices bid for the various items involved.

The Contractor may be required to have a manufacturer's representative come to the job site to give advice.

If required density has not been obtained, remove the backfill from trench, replace with approved backfill, and recompact as many times as it is necessary to obtain the required densities. Should routine field density tests indicate that specified compaction densities are not being obtained because of soil types or any other reason, the Engineer may recommend changes.

Where CDB is used, backfill the portion of the trench above the pipe zone with CDB material. No compaction of the CDB is required. Allow the CDB material to set up for a minimum of 24 hours prior to final pavement replacement.

Whenever temporary steel plates are installed over the street cut, they shall be capable of carrying a minimum of H-20 loading. The steel plates shall have a minimum of 12 inches (304.80 mm) bearing on all sides of a cut. The steel plates shall be anchored to minimize shifting. All steel plates shall have their edges shimmed with cold mix asphalt.

Any subsequent settlement of trench during the maintenance period shall be considered to be the result of improper compaction and shall be promptly corrected as required under **Subsection 108.12.00 in the GENERAL CONDITIONS.**

Where topsoil existed prior to excavation, replace the native topsoil in the top 12 inches (304.80 mm) of trench. Compact and mound to match the ground surface adjacent to trench after settlement. Maintain surface of backfilled trench level with existing grade until the end of the contract maintenance period.

In paved and graveled areas maintain surface of the backfilled trench level with the adjacent and existing grade with 1 inch-minus (25.40 mm-minus) crushed aggregate material, or cold mix asphalt pavement if directed, until the final pavement replacement is completed or the entire project is accepted by the City. Place cold mix asphalt in conformance with **Section 405 - Resurfacing.**

Maintain backfilled trench surface between any two successive manholes until the following operations have been completed and approved by the Engineer.

1. Service connections installed, backfilled, and compacted.
2. Construction of manholes and appurtenances.
3. Hydrostatic or air testing.
4. Cleanup and restoration of all physical features.
5. Utilities restored to their original condition or better.
6. All work required between the two manholes accomplished.

Do not undertake final pavement replacement until all items outlined above have been completed and approved.

Maintenance of backfilled trenches is considered as incidental to this item of work, and payment for such maintenance will be considered as included in payment for excavation and backfill.

Compaction of backfilled trenches is included as part of the backfilling procedure, and payment will be considered to be incidental to the item for excavation and backfill.

204.03.20 Water Course Undercrossings

Backfill undercrossing of water courses with approved impervious material in the top 2 feet (0.6096 m) of stream bed and 2 feet (0.6096 m) into stream banks. Compact to a minimum of 95 percent of maximum density as determined by ASTM D 698. Payment for water course undercrossing will be considered as

incidental to other pay items of work, or may be paid for as a lump sum amount bid for construction between stations as shown on the design drawings.

204.03.21 Riprap

When specified and shown, construct filter blanket and/or riprap as required in **Section 610 - Slope Protection**.

204.03.22 Waterline Trench Backfill and Compaction

Maintain a cover of 36 inches (914.40 mm) from the top of pipe to finished grade, unless otherwise directed or shown. (See Standard Plan W-30 or W-31).

Conform to applicable requirements contained in **Subsection 204.03.19 Storm Sewer Trench Backfill and Compaction**, with the following exceptions:

204.03.22A - Maintenance of Backfilled Trench

Maintain backfilled trench surface between any two successive valves until the following operations have been completed and approved by Engineer:

1. Service connections installed and backfilled.
2. Valves, valve boxes, and hydrants installed.
3. Hydrostatic testing.
4. Flushing and sterilization.
5. Cleanup and restoration of all physical features.
6. Utilities restored to their original condition or better.
7. All work required between the two valves accomplished including restoration of surface to specified condition.

204.03.23 Structural Backfill and Compaction

204.03.23A - Moisture Control

Insofar as practicable, maintain optimum moisture content required for compaction, as determined by ASTM D 698, throughout each lift of the fill. Add any required moisture to material which is not predominantly granular by nature, preferable at the site of excavation. Add moisture to granular backfill by sprinkling or spraying during compaction operation. Do not compact nongranular material if it is significantly above optimum moisture content. Aerate by such processes as scarifying, blading, or discing.

204.03.23B - Common Backfill Around Structures

Place backfill around concrete structures only after the concrete has attained two-thirds of its specified compressive strength. Remove all form materials and trash from the excavation before placing and backfill.

Place common backfill in all areas, unless otherwise shown or directed. Place backfill around piers and columns on all sides to approximately the same elevation at the same time. Backfill in front of abutments and walls shall be placed first to prevent the possibility of forward movement. Take special precautions to prevent any wedging action against the concrete. Deposit material from the excavation in lifts. Compact each lift to at least 95 percent of its maximum density at optimum moisture content, as determined by the applicable method of ASTM D 698, before placing the next lift. Jetting or puddling will not be permitted. Make adequate provision for thorough drainage of all backfill.

Earth-moving equipment shall not be operated within 5 feet (1.524 m) of walls of concrete structures unless approved. Compact backfill adjacent to concrete walls with pneumatic tampers or other approved equipment that will not damage the structure.

204.03.23C - Common Backfill Not Around Structures

Place common backfill (Class C) to lines and grades shown to produce a rough grade in areas containing no structures, paving, utilities, or similar appurtenances. Material shall be deposited in lifts. Each lift shall be compacted to at least 90 percent of its maximum density at optimum moisture content, as determined by the applicable method of ASTM D 698, before placing next lift. Contractor may be required to furnish compaction tests to the City.

204.03.23D - Granular Backfill Around Structures

Place imported granular backfill in lifts. Compact each lift to 95 percent of its maximum density, as determined by ASTM D 698, Method D, before placing next lift.

204.03.23E - Granular Backfill Under Footings and Slabs

When shown, natural ground shall be graded and prepared as approved, and crushed granular backfill placed under footings, slabs and other structures. Deposit material in lifts and compact to 95 percent of its maximum density as determined by ASTM D 698, Method D.

204.03.23F - Granular Backfill Under Facilities

When shown, place imported granular backfill in previously excavated areas under piping, sidewalks, curbs, and similar structures and facilities. Place material in lifts and compact each lift to 95 percent of its maximum density as determined by ASTM D 698, Method A.

204.03.23G - Sand Backfill

Use sand backfill wherever shown or directed, and for drainage blanket under vapor barriers, where such barriers are used beneath concrete slabs. Place material in lifts and compact each lift to 95 percent of its maximum density as determined by ASTM D 698, Method D.

204.04.00 Measurement and Payment

204.04.01 Common and Unclassified Excavation

All common excavation and unclassified excavation will be measured on a cubic yard (m³) basis, or on a linear foot (meter) basis for trench excavation and backfill when so shown in the proposal, all in original position prior to excavation. The quantity measured for payment will include only material excavated from within the limits defined herein. Any additional excavation outside of these limits, unless ordered in writing by Engineer, shall be considered as having been made for Contractor's benefit and will be considered as incidental to the work.

Included in street excavation shall be all costs of excavation, subgrade preparation, finishing slopes, water, compaction, curb backfill, disposal of materials cleanup and related work.

204.04.01A - Structural Excavation

Horizontal limits for measuring excavation shall be the sides of the trench or pit, except that no measurement or payment for excavation will be made for material removed outside vertical planes 1 foot (0.3048 m) outside and parallel to the neat lines of footings or bases for structures, or as shown.

Bottom limit for measurement shall be the elevation designated for the bottom of footing or base for the structure.

Upper limit for measurement shall be the ground surface at the site of work immediately prior to beginning work or the bed of the stream as it exists at the time excavation is started, with the following exceptions: (1) where excavation

for the structure comes within the limits of roadway excavation areas, the upper limit shall be the planes of the bottoms and side slopes of those areas; or (2) where excavation for the structure comes within the limits of embankment to be constructed as a part of the contract, such embankment shall be constructed prior to construction or installation of the structure and upper limit shall be the planes of the new embankment at elevation designated for embankment construction.

If ordered by Engineer, in writing, additional excavation below elevations shown will be measured the same as set forth herein, except that the upper pay limit will be the elevation shown for bottoms of footings or bases of the structure, and lower pay limit will be the elevation established by Engineer for bottoms of footings or bases of the structure.

No measurement or payment will be made for excavations made below elevations established by the Engineer for bottoms of footings or bases of structures nor for any other unauthorized excavation.

204.04.01B - Roadbed and Slope Excavation

Pay quantities shall be computed to the neat lines of cross sections as staked or as otherwise directed.

204.04.01C - Trench Excavation and Backfill

Measurement by the Cubic Yard (m³).

Volume for trench excavation and backfill will be computed upon the following basis for length, width, and depth of trench:

Length. Length will be the entire horizontal distance on a linear foot (meter) basis measured along centerline of trench, including measurement through valves, fittings, couplings, manholes, or structure locations, except that the measurement through such structures will be deducted if the proposal contains a separate provision for payment of this item that is applicable to those structures.

Measurement will be from center-to-center of valves, fittings, couplings, manholes, structures, or end of pipe, whichever is applicable.

Width. Width upon which sewer excavation will be calculated will be based on the outside diameter of the pipe barrel as follows:

Size of Pipe	Pay Width of Trench
6" thru 8" (152.40-203.20 mm)	2.5 feet (0.7620 m)
10" thru 24"(457.20-609.60 mm)	Outside diameter plus 18" (457.20 mm)
27" thru 36"(685.80 -914.40 mm)	Outside diameter plus 24" (609.60 mm)
42"(1066.8 mm) and larger	Outside diameter plus 30" (762.00 mm)

Width for calculating excavation payment for water mains and conduits shall be the same as for storm sewer.

Depth. Depth will be the vertical measurement from the invert of storm sewer pipe, or from bottom of trench for water mains and conduits, to the original ground or paved surface. Bottom of trench for water mains and conduits shall include all extra excavations required for placement of pipe bedding. Depth of trench will be measured at intervals of 25 feet (7.62 m) along the centerline or trench between linear pay limits as specified herein, unless physical conditions necessitate a change that is mutually acceptable to both Engineer and Contractor. Average depth between measuring points will be the depth used for computing depth of trench between measuring points. Pay depth shall not exceed depth shown on the plans, unless authorized by Engineer.

Measurement by the Linear Foot (meter).

When contained in the proposal, quantities for trench excavation and backfill will be measured on a linear foot basis for type and depth of backfill used, with depth being measured from original ground or paved surface to invert of pipe.

For storm sewers and storm drains, depth figures shown in the proposal are inclusive to the nearest 0.1 foot (2.54 mm), that is, a trench depth measured as 11.9 feet (3.6271 m) will be paid for at the unit price for excavation 10 to 12 feet (3.0480 m to 3.6576 m) deep. A trench depth measured as 12.0 feet (3.6576 m) will be paid for at the unit price for excavation 12 to 14 feet (3.6576 m to 4.2672 m) deep. Depths measured at less than 6 feet (1.8288 m) will be included in the base depth of range of zero to 6 feet (0.0 m to 1.8288 m). Depth of trench will be measured at intervals of 25 feet (7.62 m) along centerline of the trench, beginning at the center of the downstream manhole, or end of pipe and the average depth between measuring points will be the depth used for computing the depth of trench between measuring points. The unit price bid per linear foot (meter) for mainline and service line trench excavation and backfill for the type and depth shown shall be full payment for all work including excavation, bedding, and pipe zone material, imported backfill or native backfill as required, compaction,

importing of common material needed to make up for trench settlement, top soil, seeding and placing sod as required, aggregate surfacing as required, disposal of excess material, dewatering, sheeting and shoring, utility protection, restoration, and clean-up. Measurement for payment will be along the horizontal centerline of the pipe for the type and depth of backfill used, with depth being vertically measured from original ground or paved surface to invert of pipe. Removal and disposal of the existing pipe and/or liner pipe shall be included in and incidental to the various contract unit prices for trench excavation and backfill.

There will be no additional compensation for potholing existing utilities it being understood the cost is included in and incidental to the various contract unit prices for trench excavation and backfill.

For water mains and conduits, measurement and payment shall include all excavation from original ground or paved surface to bottom of pipe and all extra excavation required to provide space for pipe bedding and shall also include any incidental excavation and backfill necessary to widen trench for installation of branch-line fittings and appurtenances. The unit price bid per linear foot (meter) for trench excavation and backfill for the type and depth shown shall be full payment for all work, including excavation, bedding and pipe zone material, imported backfill in the street, and common backfill off the pavement, compaction, importing of common material needed to make up for trench settlement, topsoil seeding and placing sod as required, aggregate surfacing as required, disposal of excess material, dewatering, sheeting and shoring, utility protection, restoration, and clean-up.

There will be no additional compensation for potholing existing utilities or for extra depth involved in deflecting pipe to avoid conflict with other utilities, it being understood that the cost therein is included in and incidental to the various contract unit prices for trench excavation and backfill.

Length of all trenches will be measured horizontally along center of pipe or conduit from center-to-center of valves, fittings, couplings, manholes, structures, or end of pipe or conduit, whichever is applicable. Measurement through structures will be deducted if the proposal carries a separate item of structure excavation applicable to the structures.

Measurement and payment for trench excavation and backfill shall include all work specified herein, or not specifically paid for in other pay items.

The pay length of short trenches for the purpose of working pits used for repair work shall be the horizontal distance as measured on the ground surface, but shall not exceed dimensions shown on the plans.

The pay length of short trenches for the purpose of pipe repairs where called for on the plans shall be the same length as the pipe repaired or replaced and shall not exceed dimensions shown on the plans unless otherwise approved by the Engineer.

Alternate Basis of Payment for Open Trench Installations:

Pipe and conduit shall be measured along the longitudinal axis between the ends as laid and shall include the actual pipe in place and shall not include the inside dimensions of structures. Catch basin connections shall be measured from the inside face of the catch basin to the inside face of conduit or structure to which connection is being made.

The price per linear foot (meter) for pipe and conduit in place shall be considered full compensation for all wyes, tees, bends, monolithic catch basin connections, and specials shown on the plans; the removal of interfering portions of existing sewers, storm drains, and improvements; the closing or removing of abandoned conduit and structures; the excavations of the trench; the control of ground and surface waters; the preparation of subgrade; placing and joining pipe; backfilling the trench; permanent resurfacing; and all other work (excluding temporary resurfacing) necessary to install the pipe or conduit, complete in place.

Payment for structures such as manhole, junction structures, lamp holes, and catch basins shall be made at the price bid for each structure and shall be full payment for each structure complete in place, including excavations, backfill, constructing inverts, furnishing and installing castings, restoration of the street surface and all other work, excluding temporary resurfacing, necessary to complete the work.

204.04.02 Hard Surface Removal and Replacement for Trenches

Measurement and payment for the removal and replacement of Portland Cement concrete pavement, asphaltic concrete pavement and surfacings, curbs, driveways and sidewalks shall conform to the provisions of **Section 405 - Resurfacing**.

204.04.03 Rock Excavation

204.04.03A - Structural Rock Excavation

Rock excavation will be measured on a cubic yard (m³) basis for the actual quantity removed within the limits of excavation as defined for common and unclassified excavation. Quantity for payment shall be the amount approved by Engineer.

204.04.03B - Roadbed and Slope Rock Excavation

Rock excavation will be measured on a cubic yard (m³) basis for the actual quantity removed within the limits of excavation as defined for common and unclassified excavation. Quantity for payment shall be the amount approved by Engineer.

204.04.03C - Trench Rock Excavation

Rock excavation will be measured on a cubic yard (m³) basis as follows:

Length. Length will be the entire horizontal distance where rock is encountered, measured on a linear foot (meter) basis along centerline of trench.

In sewer trenches, manholes and other structures will be excluded and will be measured separately. Measurement will commence at the first location where rock is encountered and continue to the point where rock terminates.

In trenches for conduits and water mains, valves, fittings, couplings, or structure locations will be included in the linear measurement, unless the proposal carries a separate item that is applicable to the structures.

Width. For sewers, water mains, and conduits, the width for payment of trench rock excavation shall conform to applicable provisions of **Subsection 204.04.01C - Trench Excavation and Backfill.**

Depth. Measurement for depth will be the vertical distance from top of rock to a depth that is 6 inches (152.40 mm) below the sewer pipe, water main, or conduit. Depth will be measured at intervals of 25 feet (7.62 m) along centerline of trench, beginning at the first location that rock is encountered, and the average depth between measuring points will be the depth used for computing depth of rock.

Payment for rock excavation will be based on the unit price per cubic yard (m³) stated in the proposal and will be paid in addition to the payment for trench excavation and backfill. Payment for rock excavation shall include full compensation for all work necessary to excavate the rock material. No payment will be made for rock excavated below required grade or outside the widths mentioned above.

Rock excavation quantities for storm sewer manholes and other storm sewer structures shall be computed from the actual profile depth as above, multiples by the area within a line parallel to and 1 foot (0.3048 m) outside of the actual dimensions of the manhole or structure base.

204.04.04 Embankment

Measurement for embankment compacted in place will be made on a cubic yard (m^3) basis, in place. Computation of volume for payment will be based on field measurement of the actual number of cubic yards (m^3) constructed and accepted, complete within limits shown or directed; where applicable, this shall be within neat lines of the staked cross section.

Included in the price bid for embankment shall be all costs associated with importing material for the purpose of bringing the street section to the required grade. Basis for payment for imported fill material will be in-place measurement. No payment to be made for unauthorized overexcavation.

No measurement or payment will be made for quantities required due to subsidence or settlement of ground or foundation, for settlement of materials within the embankment or for shrinkage, settlement, washout, slippage, or loss regardless of cause, subject however to the provisions of **Section 105 - Responsibility of Contractor**.

No deduction will be made for piers, columns, pipes, or miscellaneous construction features constructed within embankment limits.

Payment shall constitute full compensation for all work and all materials used, whether obtained from the site of work or imported, complete as specified.

Trench excavation, bedding, and backfill placed in the completed embankment will be paid for separately for the particular item and class of construction.

204.04.05 Foundation Stabilization

204.04.05A - Structural and Roadway

Measurement for this item will be made on a cubic yard (m^3) basis. Measurement will be based upon individual trip tickets of actual truck measure in cubic yards (m^3) furnished to and validated by Engineer for material actually used.

204.04.05B - Trench

Measurement for this item will be made on a cubic yard (m^3) in place basis. Volume will be computed upon the following basis for length, width, and depth of trench:

Length and Width. Length and width shall conform to pay limits for common and unclassified trench excavation and backfill as contained in **Subsection 204.04.01C - Trench Excavation and Backfill**. Length shall include only the actual linear footage (meter) of foundation stabilization used in the trench.

Depth. Depth measured will be the actual depth placed as directed below the level of bottom of bedding. Depth will be measured at intervals of 25 feet (7.62 m) along centerline of trench, and the average depth between measuring points will be the depth used for computing the depth of foundation stabilization between measuring points.

Payment for this item shall constitute full compensation for all work necessary to furnish materials at trench side; for placing and compacting it in the trench; and in sewer trench, it shall include the extra depth of trench excavation required below pipe bedding grade to provide for a stable foundation for the pipe. Extra depth required for this item in water main or conduit trenches is included in payment for common trench excavation.

204.04.05C - Trench-stipulated

A stipulated price may be contained in the proposal for contract pay item "Foundation Stabilization" along with an estimated quantity. The City has not made any subsurface investigation in the area of this project to determine the soil characteristics. In the event soil conditions are encountered which require this pay item, the unit price for it is preestablished, and by submittal of a proposal on this project, Bidders acknowledge the sufficiency of this unit price. Bidders shall not change the typewritten figure shown for this item and shall include the amount shown for this item in their total project bid.

Payment for any quantity of foundation stabilization in the proposal, which is actually needed in the field and authorized by the Engineer will be paid in addition to the payment for common trench excavation and common backfill or common trench excavation and granular backfill. When payment is authorized for this stipulated price pay item, such payment shall include full compensation for all labor, equipment, materials, and incidentals necessary for safe adequate completion of pipeline construction and/or reconstruction in full conformance with these specifications.

204.04.06 Bedding for Storm Sewers, Water Mains, and Conduits

There will be no separate payment for bedding sewers, storm drains or water mains including all excavation required below the pipe invert for the purpose of placing bedding, in accordance with the plans, appropriate standard plan, and

other subsections of these Standard Construction Specifications, it being understood that the cost thereof is included in and incidental to the contracted prices for the various items of work (by size and bedding type) under the headings of Storm Drain Pipe (See **Subsection 402.04.01**) and Water Pipe (See **Subsection 501.04.01**).

204.04.07 Backfill

204.04.07A - Structural

Unless shown in the proposal, all backfill of the type specified shall be considered as incidental to and included in the pay item for the appurtenant structure or facility.

If structural backfill is specified as a pay item and shown in the proposal, measurement will be on a cubic yard (m^3) basis. Horizontal and upper limits shall be measured the same as set forth in **Subsection 204.04.01A**, for material actually placed between outside surface of the structure or facility and horizontal limits as defined. Lower limit shall be a plane at the bottom of the completed footings or structure, or lower outside surface of other facilities. Any backfill outside of these limits will be considered as incidental, and all costs in connection with such backfill shall be included in the pay items shown in the proposal.

204.04.07B - Pipe Zone Backfill

There will be no separate payment for pipe zone backfill, it being understood that the cost thereof is included in and incidental to the contract prices for the various trench excavation and backfill items of work.

204.04.07C - Granular Trench Backfill Material

Payment for this item will be made when imported granular material is specified or when directed by the Engineer to be placed in the trench or pipe line embankment.

Work under this item for granular backfill material will be measured on a cubic yard (m^3) basis. Volume will be computed upon the following basis for length, width, and depth of granular backfill:

Length and Width. Length and width shall conform to pay limits for common and unclassified trench excavation and backfill as contained in **Subsection 204.04.01C**.

Depth. Depth of granular backfill will be the actual vertical depth placed as directed.

Measurement of the volume in cubic yards (m^3) will be determined by subtracting the volume of the pipe based on the outside pipe barrel diameter from the volume of granular backfill calculated by using the pay limits contained hereinabove.

204.04.07D - Controlled Density Backfill (CDB) Material

Payment for this item will be made when CDB is specified or when directed by the Engineer to be placed in the trench or pipeline embankment.

Work under this item for CDB material will be measured on a linear foot (m) or cubic yard (m^3) basis. For the cubic yard (m^3) basis, the volume will be computed upon the following basis for length, width, and depth of CDB:

Length and Width. Length and width shall conform to pay limits for common and unclassified trench excavation and backfill as contained in **Subsection 204.04.01C**.

Depth. Depth of CDB will be the actual vertical depth placed as directed. Depth will be measured above the pipe zone.

Measurement of the volume in cubic yards (m^3) will be determined by using the pay limits contained hereinabove.

204.04.08 Riprap and Filter Blanket

Approved material for riprap and filter blanket will be measured on a cubic yard (m^3) or ton (metric ton) basis only when listed in the proposal as a separate bid item, or when directed by Engineer.

Measurement of the material in the hauling vehicle will be made by the Engineer at the point of delivery. Payment will be made for the actual volume or tonnage (metric ton) measured. No payment will be made on loads not checked and approved by Engineer.

Payment for riprap and filter blanket shall include all work necessary to furnish and place the material complete. When not listed in the proposal, payment for riprap and filter blanket shall be incidental to other items of work.

204.04.09 Imported Topsoil

Measurement and payment for imported topsoil will be made on a cubic yard (m³) basis and only when listed in the proposal as a separate bid item, or when directed by Engineer to be imported and placed as directed.

Measurement of the material in the hauling vehicle will be made by the Engineer at the point of delivery. Payment will be made for the actual volume measured. No payment will be made on loads not checked and approved by Engineer.

Payment for imported topsoil shall constitute full compensation for all work necessary to furnish materials on site, placing material, and for full compaction in place.

204.04.10 Shoring and Cribbing Incidental

Shoring and cribbing, including all work and materials expended in furnishing, placing, and removing such shoring and cribbing necessary to complete the excavation shall be considered incidental to the pay item for excavation.

204.04.11 Dewatering Incidental

Dewatering shall be considered as incidental to and included in the pay item for excavation.

204.04.12 Withheld Progress Payments

If the work limits specified in **Subsection 204.03.14A - Maximum Length of Open Trench**, are exceeded, all progress payments will be withheld until resumption of main line sewer construction is authorized by the Engineer.

Contractor will not be entitled to anticipated profits, interest, or any other additional payment as a result of the withheld progress payment, nor will the necessary changes in the work schedule, due to the violation of **Subsection 204.03.14A** be cause for extension of contract completion time.

204.04.13 Payment

Payment will be made for any or all of the following items when listed as pay items in the proposal for any particular contract.

Pay Item	Unit of Measure
Asphalt and Concrete Removal and Replacement	C.Y. (m ³) or S.Y. (m ²) or L.F. (m)
Unclassified Excavation	C.Y. (m ³)
Common Excavation	C.Y. (m ³)
Rock Excavation	C.Y. (m ³)
Common Trench Excavation and Common Backfill	C.Y. (m ³) or L.F. (m)
Common Trench Excavation and Granular Backfill	C.Y. (m ³) or L.F. (m)
Common Trench Excavation and Controlled Density Backfill	C.Y. (m ³) or L.F. (m)
Borrow Excavation	C.Y. (m ³)
Embankment	C.Y. (m ³)
Foundation Stabilization	C.Y. (m ³)
Pipe Bedding Class A for (size) pipe	C.Y. (m ³) or L.F. (m)
Pipe Bedding Class B for (size) pipe	C.Y. (m ³) or L.F. (m)
Pipe Bedding Class C for (size) pipe	C.Y. (m ³) or L.F. (m)
Structural Backfill	C.Y. (m ³)
Granular Backfill Material	C.Y. (m ³)
Riprap	C.Y. (m ³) or Ton (metric ton)
Filter Blanket	C.Y. (m ³)
Imported Topsoil	C.Y. (m ³)
Close Sheet piling	L.F. (m) (of trench) or Lump Sum
Sheet Piling	L.F. (m) (of trench) or Lump Sum

205 - Materials

205.01.00 Description

This Section covers certain types of materials and their use that are common to appropriate forms of construction contained throughout Chapters 3 through 6 of these Standard Construction Specifications.

205.02.00 Material

205.02.01 General

Unless specified otherwise in the contract documents or standard plans, materials contained herein will be used in required work.

205.02.02 Portland Cement Concrete

Use concrete, expansion joint filler, reinforcing steel and aggregates to conforming to current ODOT specifications.

Use Minor Structure Concrete (MSC) conforming to ODOT specifications, Section 00440, 3300 psi (22.7535 MPa) at 28 days, 4-7% AEA, 5 inch (127.00 mm) slump, ½ inch (12.70 mm) max. size coarse aggregate for in kind pavement replacement of sidewalks, driveways, etc. (Concrete for thrust blocking is specified under Thrust Blocking.)

High early strength concrete (Type III cement) will be used when patching trenches in Portland Cement concrete pavement.

For precast curbs and traffic barriers, use Class 4000 - - 1 1/2 concrete.

Use Type II cement concrete for all sewer and water main construction and appurtenances thereto.

Portland Cement concrete shall be sampled and tested in accordance with the following ASTM test methods:

Sampling Fresh Concrete	C 172
Obtaining Drilled Cores	C 42
Molding and Curing Specimens	C 31
Compressive Strength	C 39
Flexural Strength	C 78
Slump	C 143
Air Content	C 173 or C 231
Unit Weight Yield	C 138
Setting of Mortar	C 191 or C 266

205.02.03 Cement Mortar

Use either standard premixed mortar conforming to ASTM C 387, or mortar proportioned with one part Portland Cement to two parts clean, well-graded sand which passes a 1/8 inch (3.1750 mm) screen and which conforms to AASHTO M 45. Admixtures may be used, but do not exceed the following percentages of cement by weight: hydrated lime, 10 percent, and diatomaceous earth or other inert materials, 5 percent. Testing shall conform to the ODOT test for mortar strength.

205.02.04 Cement Grout

205.02.04A - Type "A" Grout

Utilize grout which consists of one part Portland Cement and three parts clean and well-graded sand. Use minimum amount of water to produce a thick, creamy consistency.

205.04.04B - Type "B" Grout

Where "B" type grout is specified, use a mixture consisting of one part Portland Cement, five parts of clean and well-graded sand, and seven parts pea gravel, by volume.

205.02.05 Steel Reinforcement

Use steel deformed bars conforming to ASTM A 615, Grade 40, except that longitudinal bars in continuously reinforced concrete pavement shall be Grade 60. See **Section 603 Reinforcement**.

205.02.06 Dowels

Utilize steel dowels which conform to ASTM A 306 Grade 70. Where specified, dowels shall be coated with plastic or other approved material for bond prevention. See **Section 603 Reinforcement**.

205.02.07 Structural Joint Material

Use preformed and poured joint fillers conforming to requirements of **Subsection 602.02.06 Joint Materials**. For joints in Portland Cement concrete pavement, curbs, gutter, driveways, sidewalks, and pathways, refer to **Chapter 3 - STREETS**.

205.02.08 Curing Materials for Portland Cement Concrete

Conform to one or more of the following requirements for curing materials; choice of method to be used is dependent on weather and existing conditions:

White Burlap -- Polyethylene Sheets	AASHTO M 171
Waterproof Paper	AASHTO M 171
White -- Pigmented Liquid Membrane-Forming Compound(1)	AASHTO M 148
White Polyethylene Film	AASHTO M 171
Burlap Cloth (Jute or Kenaf)	AASHTO M 182

(1) Required for PCC curbs, but do not use on bridges or box culverts.
Test in accordance with the ODOT modified procedure.

205.02.09 Epoxy Cement

Epoxy cement shall be a two-compound epoxy resin adhesive conforming to requirements of AASHTO M 235.

205.02.10 Portland Cement

Furnish one or more of the following types as specified:

Type I - For general use when special properties of other type cements are not required.

Type IA - Air-entraining cement for same uses as Type I, where air-entrainment is desired.

Type II - For use when moderate sulfate resistance or moderate heat of hydration is desired.

Type IIA - Air-entraining cement for same uses as Type II, where air-entrainment is desired.

Type III - For use when high early strength is desired.

Type IIIA - Air-entraining cement for same use as Type III, where air-entrainment is desired.

Portland Cement shall conform to AASHTO M 85 for low alkali cement except as follows:

1. Total alkali content (sodium and potassium oxide calculated as $\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) shall not exceed 0.6 percent.

2. Types I, IA, III, or IIIA must contain a maximum of 10 percent tricalcium aluminate.
3. Time-of-setting tests shall be by either the Gillmore Test or the Vicat Test or both, as Engineer may elect.

When not otherwise specified, use Type I. Contractor, at his/her option, may use Type III Portland Cement (high early strength) in lieu of Type I in the identical quantity specified for the latter.

Differing brands or types of cement, or the same brand or type of cement from different plants must not be mixed during use nor be used alternately without prior written approval. Cement may be sampled either at the plant or site or work at option of Engineer.

The Contractor is referred to **Subsection 602.02.04** for use of admixtures.

205.02.11 Water

Water used in all work must be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product. Use water conforming to AASHTO T 26 for mixing and curing Portland Cement concrete, mortar, or grout. Water of known potable quality may be used without test.

205.02.12 Aggregates

205.02.12A - General

Base rock and leveling rock to be either 1"-0 (25.40 mm-0) or 3/4"-0 (19.05 mm-0) crushed rock, as Contractor may elect, conforming to current ODOT specifications.

Furnish gradation, plasticity, sand equivalent, and abrasion test data on intended rock source materials to Engineer when specifically requested.

Aggregates shall be subject to approval at the source or at the actual stockpile from which the aggregate is taken for incorporation in the work. During production of the aggregate, provide samples of each size for testing if requested by Engineer. On the basis of testing, modify, or adjust crushing and screening operations to bring each separate size of aggregate within gradings, proportions, and quantities as specified.

In all stages of production, transporting, and stockpiling, handle aggregates in such a manner as will prevent the segregation of materials and the intermingling of separate gradings or kinds of aggregates, as far as practicable.

Grading of designated aggregate sizes shall conform to the requirements of appropriate forms of work contained within applicable Sections throughout these Standard Construction Specifications.

205.02.12B - Coarse Aggregates

Coarse aggregate shall be natural or crushed rock or gravel which is retained on a No. 4 sieve and reasonably free from flat, elongated, soft or disintegrated pieces, vegetable material, or other deleterious matter occurring in a free state or as a coating on the stone.

Use crushed rock or crushed gravel for coarse aggregate in aggregate bases and all asphalt construction requiring coarse aggregate in aggregate bases and all asphalt construction requiring coarse aggregate. Total deleterious matter shall not exceed 2 percent by weight.

Use crushed rock, natural gravel, or other approved inert materials of similar characteristics, or combinations thereof, for coarse aggregate in Portland Cement concrete. Do not allow amount of deleterious substances in Portland Cement concrete to exceed the following amounts:

Lightweight Pieces	0.25% (by weight)
Friable particles	0.25% (by weight)
Material passing No. 200 sieve	1.00% (by weight)
Wood waste	0.05% (by weight)

Use coarse aggregates having weighted percentages of loss which do not exceed 12 percent by weight when subjected to five alternations of the sodium sulfate soundness test (AASHTO T 104).

Fracture of Gravel. When crushed gravel is furnished, it shall have at least one mechanically fractured face on not less than the following percentages (by weight) of the material retained on a No. 4 sieve.

Type of Use	Percentages
Asphalt Concrete Pavement (Chapter 3)	60
Asphalt Surface Treatment (Chapter 3)	90
Asphalt Treated Bases (Chapter 3)	65
Portland Cement Concrete (Chapter 6)	60
Aggregate Bases (Chapter 3)	50*
Aggregate Bases (Chapter 3)	70**

* 1 ½"-0 (38.10 mm-0) and larger

** Smaller than 1 ¼"-0 (31.75 mm-0)

Durability. The source material from which coarse aggregate is produced shall meet the following qualifying test requirement:

Test	Test Method	Requirements
Degradation: Passing No. 20 sieve	ODOT Test Method 208	30% Max.
Sediment Height	ODOT Test Method 208	3" Max.
Abrasion	AASHTO T 96	35% Max.

Also, other sampling and testing of coarse aggregate shall be in accordance with the following methods:

Sampling	AASHTO T 2
Materials Passing No. 200 sieve	AASHTO T 11
Sieve Analysis	AASHTO T 27
Soundness	AASHTO T 104
Friable Particles	AASHTO T 112
Lightweight Pieces	AASHTO T 113
Fracture	ODOT Test Method 213

205.02.12C - Fine Aggregate

Use fine aggregate consisting of finely crushed rock or gravel, fine sand, and other finely divided natural and inert mineral matter, thoroughly washed, and reasonably free of clay, loam, shale, alkali, vegetable matter, and other deleterious matter occurring either free or as coating on the particles. Do not mix fine aggregate from different geological sources, and do not store in the same pile nor use alternately in the same class of construction or mix.

Portland Cement concrete shall contain fine aggregate which has a deleterious material content not exceeding the following limits:

Friable particles	1% (by weight)
Lightweight particles	1% (by weight)
Material passing No. 200 sieve	4% (by weight)

When this fine aggregate for Portland Cement concrete is subject to five alternations of the sodium sulfate soundness test (AASHTO T 104), weighted percentage of loss must not exceed 10 percent by weight.

Asphalt cement concrete and surface treatments shall contain fine aggregate having a weighted loss of not more than 15 mass percent when sodium sulfate is used or 20 mass percent when magnesium sulfate is used in five cycles of the soundness test. Total deleterious matter shall not exceed 2 percent by weight.

Use fine aggregates which meet the durability requirements for coarse aggregates contained hereinbefore, and which meet the following liquid limit and plasticity index requirements:

Quality	Test Method	Requirement
Liquid Limit	AASHTO T 89	NP or 33 Max. *
Plasticity Index	AASHTO T 90	NP or 6 Max. *

* When tested as specified, both the liquid limit and plasticity index test results shall conform to the following:

Percent of Material Passing No. 40 Sieve	Liquid Limit (Maximum)	Plasticity Index (Maximum)
	AASHTO T 89	AASHTO T 90
0.0 to 5.0, inclusive	33	6
5.1 to 10.0, inclusive	30	5
10.1 to 15.0, inclusive	27	4
15.1 to 20.0, inclusive	24	3
20.1 to 25.0, inclusive	21	2
Over 25.0	21	0 to N.P.

Sampling and testing fine aggregate shall conform to the following methods:

Sampling	AASHTO T 2
Material passing No. 200 sieve	AASHTO T 11
Organic impurities	AASHTO T 21
Sieve analysis	AASHTO T 27
Mortar strength	ASTM C 109
Soundness	AASHTO T 104
Friable particles	AASHTO T 112
Lightweight pieces	AASHTO T 113
Sand equivalent	AASHTO T 176

205.02.13 Asphalt Materials

205.02.13A - General

Unless otherwise specified herein or in applicable Subsections, types and grades of material shall conform to the current Oregon State Highway Division's Specifications for Asphalt Materials obtainable from the Engineer of Materials, ODOT, Salem, Oregon 97310.

205.02.13B - Asphaltic Concrete

Hot Mix - Use AR 4000 or PBA-2 asphaltic cement as recommended for the Pacific Coast states.

Cold Mix - Use MC 250 liquid asphalt, or CRS-2 cationic emulsified asphalt.

Asphaltic Concrete - Class "B" or Class "C" mix conforming to current ODOT specifications, and to the Department's publication "Standard Specifications for Asphalt Materials", available from the Engineer of Materials and Research, in Salem.

205.02.13C - Prime Coat

Use MC 250 liquid asphalt or CRS-2 cationic emulsified asphalt.

205.02.13D - Seal Coat

Use CRS-2 cationic emulsified asphalt.

205.02.13E - Tack Coat

Use AR4000 or PBA-2 asphaltic cement.

Tack coat - RS-1 conforming to current ODOT specifications.

205.02.13F - Slurry Seal

Use CQS 1-h cationic emulsified asphalt.

Joint seal - RS-1 or RS-2 conforming to ASTM D 977 for "Emulsified Asphalt".

205.03.00 Construction

205.03.01 Reserved

205.04.00 Measurement and Payment

Measurement and payment of material will conform to the specific Section within these Specifications which is applicable to the type of work specified.

206 - Adjustment of Incidental Structures to Grade

206.01.00 Description

This Section covers the work necessary for adjusting tops of manholes, sumps, catch basins, inlets, valve boxes, meter boxes, monument boxes, and similar structures to required elevation and/or horizontal alignment, complete.

206.02.00 Materials

206.02.01 General

Materials used in adjustment of incidental structures may be materials salvaged from the existing installation and brought to a condition approved for reuse, or materials conforming to the requirements of related work referred to herein or elsewhere in the applicable these Specifications.

206.03.00 Construction

206.03.01 Excavation and Backfill

Excavation shall be unclassified and shall include whatever materials are encountered to the depths as shown or as directed.

Saw cut around structure to be adjusted when new concrete pavement has been completed. Do not jack hammer for concrete pavement cutting. Replace pavement to previous density and grade.

Backfill shall be done in accordance with the applicable requirements of **Section 204 Excavation, Embankment, Bedding and Backfill**.

206.03.02 Salvage of Frames, Covers, and Grates

Metal frames, covers, grates, and fittings may be salvaged from structures to be adjusted or abandoned, and if of suitable size and condition, may be reused in the work. Items damaged or unfit for reuse, as determined by Engineer, shall be replaced with similar items which are comparable in all respects with those with which they are to replace and which are adequate for the intended purpose.

Salvaged components to be reused shall be cleaned of foreign material by solvents, sand-blasting, or other approved methods that will not harm the component but will restore it to a nearly new condition as approved.

Any metal components, castings, etc. not to be reused on the project shall revert to the City and the Contractor shall deliver them to the City's Shop at 641 Chemawa Road, Keizer, Oregon, immediately upon removal from the site at which said component was installed.

206.03.03 Raising Tops of Masonry Structures

After existing frames, covers, and grates have been removed, exposed top surface on which new mortar or concrete is to be placed shall be chipped away to a depth of at least 1/4 inch (6.35 mm) to expose firm concrete and the new surface shall be cleaned by brushing and shall be moistened with water at the time of placing new concrete thereon. New concrete shall then be placed to required grade and cured at least three days, after which the frame shall be seated in fresh mortar and brought to proper grade. Masonry of bricks or concrete blocks shall be raised with new bricks, blocks, mortar, or combinations thereof or with Portland Cement concrete, as conditions may require or permit. Concrete boxes may be lifted and placed on precast concrete box extensions, on new brick or on cast-in-place concrete as may be suitable.

Mortar for building up existing masonry shall not be placed to a depth of more than 2 inches (50.80 mm). Concrete shall not be placed to a depth of less than 3 ½ inches (88.90 mm). To conform to these requirements, existing shells, or walls of structures to be raised shall be cut down as necessary to provide space for the new construction.

Fabricated metal rings or plates may be furnished and used in adjustment work, provided the metal and its fabrication design is at least equal to pertinent characteristics of strength and support required for the covers or grates to be replaced, that uniform bearing of bearing surfaces is assured, and positive provision is afforded against displacement when in service.

206.03.04 Lowering Tops of Masonry Structures

Where the top of an existing masonry structure is to be lowered, the masonry portion of the structure shall be exposed to required depth, cut off or removed to an elevation below that established for the bottom of metal frame or cover which is to be reset on masonry and shall then be built up with mortar, concrete, brick, or concrete blocks, or with metal rings or plates to required elevation and top design. Joining of new material to old, minimum thicknesses of new mortar and concrete, limitations, curing, and other details shall be as set forth herein.

206.03.05 Adjusting Metal Structures

Metal inlets, valve boxes, meter boxes, monument boxes, and other like structures shall be raised or lowered to grade normally by resetting the entire structure on firm foundation. In the case of raising the structure to a point where it would not enclose or protect its contents, add metal extensions of like design below the original structure. Contractor may replace the structure with a new structure of adequate design as approved. Salvaged structures not reused on the project shall become the property of the City.

206.03.06 Adjusting Manholes, Catch Basins, and Similar Structures

Conform to applicable Sections of **Chapter 4 - STORM SEWERS and DRAINS.**

206.04.00 Measurement and Payment

206.04.01 Measurement and Payment Incidental

When no pay item is listed in the proposal, all work will be considered as incidental to the other pay items and no separate payment will be made.

206.04.02 Measurement as Units in Place

When listed in the proposal, measurement will be the actual number of manholes, sumps, catch basins, inlets, valve boxes, meter boxes, monument boxes, and other like structures adjusted under this Section, measured as units in place, completed and accepted. Separate measurement will be made of each specific type or of each separate grouping of types of structures for which separate items are shown in the proposal. Required earthwork, backfill, replacement of base drains, stone bases, pavements, and other miscellaneous work will be considered as incidental to the adjusting work and no separate measurement thereof will be made.

206.04.03 Payment as Units in Place

When listed in the proposal, the accepted units in place will be paid for at the applicable contract unit price per each for the particular pay items listed below and shown in the proposal.

Pay Item	Unit of Measurement
1. Adjusting Manholes	Each
2. Reconstructing Concrete Manholes	Each
3. Adjusting Inlets	Each
4. Adjusting Boxes	Each

Items 1 and 2 above refer to manholes, sumps and like structures designed to permit human entry and working space therein and to confine and control flow of pipe-conveyed liquid; which structures are herein collectively referred to as manholes.

Item 1 above applies to manholes, regardless of the kind of materials of which they are composed and regardless of design, type, or depth, which have had the tops thereof adjusted as specified; except as Item 2 is applicable as hereinafter provided.

Item 2 above refers to monolithic concrete manholes which, in having their tops adjusted as specified, have necessarily had their entire existing domes destroyed and new domes constructed, or had their entire existing top slabs destroyed and new slabs constructed, or precast manholes which have necessarily had adjustments made below the cone.

Item 3 above refers to inlets and catch basins, defined as structures designed to receive surface water through grates and orifices and to discharge said waters under control through pipes and is applicable to such structures regardless of their designs, types, or sizes.

Item 4 refers to valve boxes, meter boxes, monument boxes, and other like structures, which are comprised of a box-like body and removable cover provided for the protection of and access to meters, valves, markers, monuments, shut-offs, and similar items. If a protective coating is required on the new metal used in the work, the coating shall be provided as an incidental item without separate or additional compensation.

207 - Landscaping

207.01.00 Description

This Section covers the work necessary for: (A) finish grading, addition of topsoil, fertilizer and weed control, establishment of lawns or grass areas by sod or seeding, and maintenance of lawn or grass areas, complete; (B) mulching, fertilization, and planting of ground cover, establishment of nursery stock, such as

trees, shrubs, and small plants and maintenance of ground cover and nursery stock, complete; and, irrigation system and subsurface drainage, complete.

207.02.00 Materials

207.02.01 Plants

Names of plants conform to standardized names of the American Joint Committee on Horticultural Nomenclature. Names of varieties not included therein conform to names generally accepted in the nursery trade. Provide plants which are nursery grown with habit of growth that is normal for the species, sound, healthy, vigorous, and free from insects, diseases, and injuries and equal to or exceeding measurements specified, measured before pruning with branches in normal position. Provide sizes and methods of handling according to the code of standards recommended by the AAN.

207.02.02 Seed

Provide tested grass or legume seed from blue tag stock and from the latest crop available. Deliver each variety in standard containers labeled in accordance with Oregon State laws and U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Provide with label showing seed variety, percentage of purity, germination, maximum weed content, date of test within nine months of date of delivery, and as set forth in the General Seed Certification Standard by the Oregon State University Certification Board. Mold or evidence of container having been wet or otherwise damaged will be cause for rejection of each lot of seed.

Grass seed may be delivered to the project as a mixture provided each variety of grass seed in the mixture is identified and labeled as specified.

207.02.03 Sod

Provide grass sod from certified or approved source, strongly rooted and free of pernicious weeds.

207.02.04 Imported Topsoil

Where imported topsoil is specified in the contract documents, provide natural, fertile, friable topsoil, representative of local productive soil, and 90 percent free of clay lumps or other foreign matter larger than 2 inch (50.80 mm) diameter, not frozen or muddy, with pH 5.0 to 7.0, and not less than 3 percent humus as determined by loss on ignition of moisture-free samples dried at 100 degrees C. Gravel portion, particles larger than 2 mm, shall not exceed 15 percent of total

volume. Imported topsoil shall be free of quack grass, horsetail, and other noxious vegetation and seed. Should such regenerative material be present in the soil all resultant growth, both surface and root, shall be removed by Contractor within one year of acceptance of the work at no expense to the City.

207.02.05 Sand

Conform to requirements of **Subsection 205.02.12C** for fine aggregate.

207.02.06 Peat

Use peat consisting of natural residue formed by decomposition of reeds, sedges, or mosses from freshwater site, free from lumps, roots, and stones, absorbing at least four times its dry weight of water, organic matter not less than 90 percent on a dry weight basis, and maximum moisture content at time of delivery of 65 percent by weight.

207.02.07 Lime

Provide a lime composed of ground dolomitic limestone not less than 85 percent total carbonates and magnesium, ground so that 50 percent passes 100 mesh sieve and 90 percent 20 mesh sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing 100 mesh sieve.

207.02.08 Subdrains

Conform to requirements for **Subsection 402.03.04 in 4 - STORM SEWERS AND DRAINS**. Clay drain tile, 4 inch (101.60 mm) diameter, conforming to ASTM C 4, may also be used. Use separator of approved 1 pound (0.4536 kg) density superfine fiberglass.

207.02.09 Irrigation and Watering Systems

207.02.09A - Pipe

Use copper pipe, Type K soft copper, conforming to ASTM B 88, with commercially pure wrought copper solder joint fittings. Make joints with 95-5 wire solder, ASTM B 32, grade 95 TA. The use of cored solder will not be permitted.

When using PVC pipe (SDR-PR), conform to ASTM D 2241, and use fittings of PVC with deep socket dimensions conforming to ASTM D 2466.

207.02.09B - Gate Valves

Install the following gate valves: to and including 3 inch (76.20 mm) with bronze bodies, 4 inch (101.60 mm) and larger with either bronze disc faces, conforming to ASTM B 62.

207.02.09C - Pressure Reducing Valves

Use adjustable, heavy duty bronze, with approved stainless steel or monel strainer to permit quick cleaning or replacement without dismantling or removing the valve from the line and with integral or independent union.

207.02.09D - Control Valves

Provide manual control valves of brass or bronze for underground installation, with cross or slot type handle for operation with a standard key, removable bonnet and stem assembly, adjustable packing gland, rising stem to assure full opening of valve, renewable disc-type washer seat, and integral or independent union.

Use electrically operated control valves of bronze, brass or stainless steel, normally closed type, open or close time greater than four seconds, capable of manual control during power failure, approved flow control device. Provide with a motor assembly or operating parts removable without disturbing the valve body, all waterproof for underground burial, and with integral or independent union for supply line connection.

207.02.09E - Quick-coupling Valves

Supply one-piece or two-piece body type, locking cap, body of approved heavy duty brass or bronze, watertight before and after the coupler is inserted, and designed so that the valve seat is closed before the coupler is removed. Provide valve couplers, keys, and hose swivels of compatible design to quick-coupling valves.

207.02.09F - Risers

Connect sprinkler heads and quick-coupling valves to galvanized steel pipe water supply lines with galvanized steel pipe risers. Heads and valves connected to plastic pipe water supply lines shall, in addition, be provided with an approved swing joint.

207.02.09G - Vacuum Breakers

Install bronze-bodied machined valve seat, with working pressure rating to 150 psi (1.03425 MPa). Provide pressure type vacuum breaker as an assembly consisting of vacuum breaker, two gate valves, check valve union, and nipples, as approved.

207.02.09H - Backflow Preventers

Use either reduced pressure or double check valve assemblies, as shown, of a type and size approved by the City's Water Department.

207.02.10 Fertilizer

Fertilizer shall conform to the recommended content as provided for in **Subsection 207.02.02 Soil Test**, hereinafter. Furnish fertilizer in moisture-proof bags marked with weight and the manufacturer's certified analysis of the contents showing the percentage for each ingredient. Furnish fertilizer in a dry condition free from lumps and caking, in granular or pelletized form, of standard commercial grade conforming to all State and Federal regulations and to the standards of the Association of Official Agricultural Chemists. Fertilizer may be furnished in bulk form if an approved transfer hopper is provided.

207.02.11 Mulch and Ground Covers

Use one or more of the following types of mulch:

1. Organic mulch of clean ground pine bark graded so that 50 percent consists of particles larger than 1/4 inch (6.35 mm) but not exceeding 1 inch (25.40 mm) and 20 percent will pass a No. 10 sieve.
2. Stone mulch of screened washed bank gravel with rounded pebbles. Submit sample for approval of color and size.
3. Fiber-glass mulch of approved commercial grade fiber-glass yarn mat.
4. Straw mulch of threshed straw of oats, wheat, or rye, free from seed of noxious weeds or clean salt hay.
5. Fiber mulch of heavy, twisted jute mesh, weighing 1 pound (0.4536 kg) per square yard (0.8361 m²), with opening between strands approximately 1 inch square (645.20 mm²).

6. Spray mulch of a verdyol complex, with nontoxic, 100 percent organic water soluble powder binding agent with silva fiber used in hydraulic seeding operations.

207.02.12 Tie Downs

Use one or more of the following materials as the need arises:

1. Eye-bolt masonry anchors of galvanized steel, with approved lead shield or flush shell for setting into masonry joint or concrete.
2. Wood stakes, 2 inch (50.80 mm) by 2 inch (50.80 mm) by 96 inch (2436.40 mm), clear straight cedar, or approved.
3. Wire for guys, or for fastening trees to stakes, of 12 gauge, pliable galvanized steel.
4. Hose for guy wire encasement, of 2-ply reinforced rubber garden hose, minimum ½ inch (12.70 mm) diameter new or used.
5. Turnbuckles, zinc-coated, with a 6 ½ inch (165.10 mm) lengthwise opening, 3/8 inch (9.525 mm) diameter threaded openings fitted with screw eyes.
6. Wrapping material of first quality, burlap, minimum 8 ounce (226.80 g) weight, 6 inches (152.40 mm) to 10 inches (254.00 mm) in width.

207.02.13 Soil Sterilant

Use granular calcium cyanamide, manufactured for use as a herbicide, or other approved sterilant.

207.03.00 Construction

207.03.01 General

Conform to manufacturer's and supplier's recommendations and instructions and to accepted practices in the industry.

207.03.02 Soil Test

if directed by Engineer, have a soil test performed before the project schedule is submitted. The test may be performed by any Oregon State University County

Extension Agent or by any other approved soils testing laboratory. The soils analysis shall provide a chemical analysis of the soil and recommendations for soil improvement for the crop to be grown. The recommendations shall be used to select the particular fertilizer and soil improvement chemicals to be used prior to planting.

207.03.03 Lawns and Grass

207.03.03A - Project Schedule

Within 20 calendar days of the date specified for commencement of work, submit for approval a time schedule indicating dates for beginning and completion of the following operations:

1. Delivery of materials
2. Preparation of seedbed
3. Planting grass
4. Maintenance

207.03.03B - Delivery, Handling, and Storage

Deliver sod immediately on lifting and after lawn bed is prepared for planting. Protect sod from drying by covering during delivery to protect from sun and wind. Store materials only in areas of site designated.

If sod is not laid within two days of delivery, spread out flat with grass side up in cool place and keep moist. Rolled or stacked sod that becomes yellow will not be accepted.

207.03.03C - Preparation of Subgrade

After rough grading is completed and before topsoil is spread, apply lime and/or superphosphate as determined by soil analysis. Conform to manufacturer's recommendations for applying lime and superphosphate simultaneously, and schedule application or applications accordingly.

307.03.03D - Subsurface Drainage

Lay tiles on firm bed of gravel with minimum fall of 0.5 percent and located as detailed on drawings. Minimum depth of 24 inches (609.60 mm) and no deeper than required to produce minimum fall. Tiles butted so that space between does not exceed more than 1/4 inch (6.35 mm). Cover joints of tiles with fiberglass

mat to prevent infiltration of soil, and backfill trenches with gravel to within 4 inches (101.60 mm) of subgrade.

Place other drain materials in conformance with the applicable requirements for Perforated Pipe Underdrains in **Subsection 402.03.04**. Complete backfilling of trenches with a 4 inch (101.60 mm) layer of coarse sand and tamp for compaction, as approved.

207.03.03E - Topsoil and Finish Grading

Spread topsoil and soil conditioner over the prepared rough grade using a rubber tired tractor with grader blade or equivalent, weighing maximum of 3 ½ tons (3.1752 metric ton); thoroughly mix the applied materials to a depth of 8 inches (203.20 mm) with a disc or cultivator over the entire area in two directions at right angles. Rake topsoiled area to a uniform grade so that all areas drain, as shown or as approved. Remove all trash and stones exceeding 2 inches (50.80 mm) in diameter from area to a depth of 2 inches (50.80 mm) prior to preparation and planting grass.

207.03.03F - Soil Sterilant

Thoroughly water area to be treated one day prior to application of soil sterilant. Apply specified soil sterilant at rate recommended by Manufacturer or as specified. Water thoroughly after application and keep soil moist to a depth of one inch (25.40 mm) for three weeks. Three weeks after soil sterilant application, rake lightly immediately before seeding or sodding.

When required by the soil test, apply lime uniformly at rate required with a mechanical spreader. Lime application shall be included in the schedule for approval.

207.03.03G - Seeding

Plant grass seed only at times when local weather and other conditions are favorable to the preparation of the soil and to the germination and growth of grass seed. Sow grassed areas evenly with a mechanical spreader at a rate of one pound (0.4536 kg) per 300 square feet (27.87 m²), roll with cultipacker to cover seed, and water with fine spray. Method of seeding may be varied, as approved, however, responsibility to establish a smooth, uniformly grassed area will not be waived.

207.03.03H - Sodding

Before sod is laid, correct soft spots and irregularities in grade of prepared bed, as approved. Lay so that no voids occur and tamp or roll, brush or rake screened topsoil with no lumps or stones larger than 3/4 inch (19.05 mm) over sodded area. Water sod thoroughly. Complete sod surface true to finished grade even and firm. On slopes steeper than 1 to 2, fasten sod with wooden pins 6 inches (152.40 mm) long driven through sod into soil flush with top of sod at approved intervals.

207.03.03I - Mulching and Protection

Mulch all areas with a slope greater than 5 percent by spreading a uniform light cover of straw mulch over the seeded area at a rate of 1 ½ tons (1.3608 metric ton) per acre (4047 m²).

Mulch all areas with a slope steeper than 20 percent by placing fiber mulch in strips paralleling the slope to completely cover newly seeded areas. Pin mulch to ground with 4 inch (101.60 mm) long wire staples at 5 foot (1.524 m) intervals immediately after seeding.

Mulch all areas with a slope steeper than 25 percent with spray mulch applied at a rate of 15 gallons (56.775 L) per 1,000 square feet (92.90 m²) after wetting the ground with water penetrating at least 1 inch (25.40 mm) deep.

Protect new seeded area from pedestrian traffic. Unless otherwise approved, erect a fence of 2 inch (50.80 mm) by 2 inch (50.80 mm) posts 4 feet (1.2192 m) high spaced 10 feet (3.048 m) on center and strung with jute, hemp, or a single strand of No. 12 gauge wire marked with cloth strips at 3 foot (0.9144 m) intervals between posts.

207.03.03J - Maintenance

Begin maintenance immediately after each portion of lawn is planted and continue for eight weeks after all lawn planting is completed.

Water to keep surface soil moist. Repair washed out areas by filling with topsoil, fertilizing, and seeding. Replace mulch on banks when washed or blown away. Repair fence, mow to 2 inches (50.80 mm) after grass reaches 3 inches (76.20 mm) in height, and mow frequently enough to keep grass from exceeding 2 ½ inches (63.50 mm). Weed by local spot application of selective herbicide only after first planting season when grass is established.

207.03.03K - Lawn Guarantee

If, at the end of the 8 week lawn maintenance period, a satisfactory stand of grass has not been produced, immediately renovate and reseed the unsatisfactory portions of lawn, or when approved, reseed at the beginning of the next planting season. If a satisfactory stand of grass develops by June 1 of the following year, the lawn will be accepted. If the lawn is not accepted, a complete replanting will be required during the ensuing planting season following the requirements specified hereinbefore.

A satisfactory stand is defined as a lawn or section of lawn that has:

1. No bare spots larger than 3 square feet (0.2787 m²).
2. Not more than 10 percent of total area with bare spots larger than 1 square foot (0.0929 m²).
3. Not more than 15 percent of total area with bare spots larger than 6 inches square (3871.20 mm²).

207.03.03L - Inspection for Acceptance

Submit a written notice eight weeks after the start of maintenance on the last section of completed lawn, and within 15 days of such written notice the Engineer will make an inspection of the lawn to determine if a satisfactory stand of grass has been produced. If a satisfactory lawn has not been established, another inspection will be made after written notice from the Contractor that the lawn is ready for inspection following the next growing season.

207.03.04 Trees, Shrubs, and Ground Cover

207.03.04A - Delivery, Preparation, and Storage

Dig plants designated as balled and burlapped in the contract documents with firm, natural balls of earth of diameter and depth sufficient to encompass the fibrous and feeding root system required for full recovery of plant. Firmly wrap balls with burlap and bind with twine, cord, or wire mesh. Where necessary to prevent breaking or cracking of ball during process of planting, or where the tree exceeds 4 inches (101.60 mm) in diameter, secure ball to a platform.

Dig bare root plants to remove earth with the least possible injury to fibrous root system. Cover roots with thick coating of mud by puddling or wrapping in wet

straw, moss, or other suitable packing material immediately after digging for protection until delivery.

Furnish container grown plants with self-established root systems sufficient to hold earth together after removal from container but not root-bound, grown for at least three months in container with inside diameter shown.

If plants are not in dormant state, spray with anti-desiccant to cover foliage as recommended by manufacturer, prior to digging plants. During shipment, protect plants with tarpaulin or other approved covering to prevent excessive drying from sun and wind.

Cover balls of balled and burlapped plants, and containers of container grown plants which cannot be planted immediately upon delivery with moist mulch to protect from drying. Plant or heel-in bare root plants immediately upon delivery. Water plants as necessary to prevent drying until planted. Do pruning only at time of planting.

Open and separate all bundles of heeled-in bare root plants before the roots are covered. Avoid leaving air pockets among roots.

Acceptable trees for the City are:

Hedge Maple, Rocky Mountain Glow Maple, Norway Maple & Varieties (Var.), Sycamore Maple, Red Maple & Var., Sugar Maple & Var., Jacquemontii Birch, Golden Catalpa, Columnar Hornbeam, Pacific Dogwood, Beech & Var., White Ash & Var., Raywood Ash, Green Ash & Var., Thornless Honey Locust & Var., Moraine Sweetgum, Arnold Tuliptree, London Plane Tree & Var., Kobus Magnolia, Sargent Cherry, Kwnazan Cherry, Flowering Pear & Var., Swamp White Oak, Scarlet Oak, Pin Oak, English Oak & Var., Red Oak, Shumard Oak, Salem Linden, Chinese Elm, and Green Vase Zelkova.

Acceptable shrubs for the City are:

Mugo Pine, Otto Luyken English Laurel, Azaleas & Var., Firethorn & Var., Cotoneaster & Var., Redtwig Dogwood, Compact Japanese Holly, Oregon Grape, Nandina & Var., Broom & Var., and Rhododendron & Var.

Acceptable ground covers are:

Kinnikinnick, Salal, Ivy & Var., St. Johnswort, Juniper & Var., Japanese Spurge, Santa Cruz, and Pyracantha.

Acceptable bulbs for the City are:

Iris var.

207.03.04B - Soil Conditioning

After the specified chemical analysis report for topsoil is received, prepare topsoil mixture for plant pits and beds by thoroughly mixing approved topsoil with soil conditioner materials, fertilizer, and lime. Thoroughly mix with rotary mixer or other approved method in following proportions:

Topsoil Classification by Clay Content	Required Mixture			Parts By Volume	
	Topsoil	Sand	Peat	Fertilizer*	Lime*
Clay 5-10 Percent	4	0	1	½ LB/CY	1 LB/CY
Clay 10-15 Percent	2	2	1	½ LB/CY	1 LB/CY
Clay 15-25 Percent	2	4	1 ½	½ LB/CY	1 LB/CY

*Adjust in accordance with soil test chemical analysis report.

(½ LB/CY is 0.2268 kg/0.7646 m³) - (1 LB/CY is 0.4536 kg/0.7646 m³)

Store and protect topsoil mixture and other materials at designated area of the site. Protect topsoil mixture from excessive leaching by covering with tarpaulin if stored for more than six weeks.

207.03.04C - Planting Procedures

Within 20 calendar days after the date specified for the commencement of work, submit time schedule for approval indicating dates for commencement and completion of the following operations:

1. Tagging of plants in the nurseries
2. Survey and staking of plant locations
3. Delivery of topsoil and other materials
4. Digging and preparation of plant pits and beds
5. Delivery of trees to the site
6. Delivery of other plants to the site
7. Planting of trees
8. Planting of other plants
9. Guying, staking, and mulching
10. Completion of work for start of guarantee period

At least 20 days before start of the guarantee period, submit a schedule of proposed maintenance operations indicating the number of man-hours contemplated for each operation by season during autumn, winter, spring, and summer.

Within three weeks of the award of contract, begin to prepare topsoil for plant pits. Thereafter conduct planting operations under favorable weather conditions during next season or seasons which are locally normal for such work.

Locate new planting where shown, except make approved adjustments where obstructions below ground are encountered or where changes have been made in the construction. Place no planting, except ground cover, closer than 18 inches (477.20 mm) to pavements and structures. Dig plant pits and have soil mixture for planting ready before plants are delivered. Excavate circular pits with vertical sides a minimum of 1 foot (0.3048 m) greater than the diameter of the ball. For trees, shrubs, and vines excavate pits to depth sufficient to accommodate ball or roots when plant is set to finished grade. Place 3 inches (76.20 mm) of compacted soil mixture in the bottom of pit. Set plants upright and face as approved to give the best appearance or relationship to adjacent structures. Do not pull burlap from under balls. Remove wire and surplus binding from top and sides of balls. Spread roots in normal position. Cut all broken or frayed roots off cleanly. Place prepared soil mixture and compact carefully to avoid injury to roots and to fill voids. When hole is nearly filled, add water as necessary and allow to soak away. Fill hole to finished grade and form shallow saucer around plant by placing ridge of topsoil around edge of pit 2 feet (0.6096 m) greater than diameter of ball. After ground settles, fill with additional soil to level of finished grade.

Plant trees before surrounding smaller plants and covers are placed. Position trees as shown or, where spacing dimensions or locations are not clear, as approved.

Plant shrubs on centers as shown, with spacing adjusted if required to evenly fill bed using specified quantity of plants.

Plant shrubs on centers as shown, with spacing adjusted if required to evenly fill bed using specified quantity of plants.

Plant hedges on centers as shown. Excavate trenches a minimum of 4 inches (101.60 mm) deeper and 12 inches (304.80 mm) wider than spread of roots or diameter of balls. Make adjustments to spacing if necessary to fill trench evenly with the quantity of plants shown.

Plant ground covers in beds having minimum 8 inch (203.20 mm) of prepared soil mixture. Treat ground cover beds after preparation for planting, but before any

plants are installed within bed area, with soil sterilant to destroy weed seeds. Apply according to manufacturer's directions delaying planting for the recommended minimum period to allow dissipation of herbicide. Space plants as shown. Mulch and water immediately after planting.

Plant bulbs in ground cover beds to recommended depths for each bulb type as shown.

Provide trees and planting beds with 2 inch (50.80 mm) layer of organic mulch within two days after planting and keep at this depth throughout maintenance period. Cover beds with stone mulch where shown to a depth of 4 inches (101.60 mm). Mulch to entirely cover area of saucer around each tree.

Use four guys equally spaced as shown for all trees greater than 4 inches (101.60 mm) in diameter.

Use three guys equally spaced as shown for all trees 4 inch (101.60 mm) in diameter or less.

Where shown, wrap trunks of trees spirally from ground line to height of second branches. Make all wrappings neat and snug and hold material in place by raffia cord at top and bottom.

207.03.04D - Drainage of Pits and Beds

Furnish subsoil drainage where shown. Dig trenches with vertical sides and smooth bottoms a minimum of 12 inches (304.80 mm) wide and 6 inches (152.40 mm) below tree balls, or 18 inches (457.20 mm) below finished grade at highest end of drain. Bed drain tile firmly, lay true to grade with minimum slope of 0.008 feet per foot (0.2032 mm/25.40 mm) and connect to approved outlet or discharge at grade. Make joint gaps maximum of 1/8 inch (3.175 mm) and cover with fiberglass separator to prevent ingress of soil. Cover entire tile line with 4 inch (101.60 mm) layer of crushed stone. Cover crushed stone with fiberglass separator and backfill with well compacted soil.

207.03.04E - Pruning and Repair

At completion of planting work, prune and repair injuries to all plants. Limit amount of pruning to minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of planting operation. Do not change natural habit or shape of plant. Make cuts flush, leaving no stubs. On all cuts over 3/4 inch (19.05 mm) in diameter and bruises or scars on bark,

trace the injured cambium back to living tissue and remove. Smooth and shape wounds so as not to retain water. Coat with approved tree wound paint.

207.03.04F - Paving Tree Pits

Set paving material on 2 inch (50.80 mm) sand bed as shown. Fill joints with sand by sweeping sand over surface and watering to settle. Sand in finished joints shall be flush with surface of brick.

207.03.04G - Plant Guarantee

Guarantee all plants for a minimum of one year to be alive and in vigorous growing condition at the end of guarantee period. Guarantee period shall extend one year from date of Acceptance of Work as defined in **Subsection 108.11.00**. Remove unsatisfactory plants and replace with plants of the same kind, quality, and size as originally provided as specified. Guarantee all plant replacements to be alive and in vigorous growing condition one year after replacement. Bear all costs of replacement except for replacements resulting from removal, loss, or damage due to occupancy of project in any part, vandalism, or acts of neglect on part of others. Replace plants that die during a season unfavorable for planting, during the first month of the next favorable planting season.

207.03.04H - Maintenance

Begin maintenance immediately after each plant is installed and continue to maintain until the end of the guarantee period defined hereinbefore.

Perform the following operations: Watering as often as required to maintain capillary water within 2 inches (50.80 mm) of the soil surface around plants; weeding of plant beds; planting saucers and plant pockets to keep free of weeds using approved selective herbicide according to the manufacturer's directions for use, and/or weeding by hand methods; mulching monthly to replenish mulch and keep at required 2 inch (50.80 mm) minimum depth; tightening and repairing guys to keep trees erect and supported without damage to bark; resetting plants to proper grades or upright position, restoration of planting saucers; and, seasonal spraying to control disease or insect pests that may impair plant vigor.

Replace plants required by the plant guarantee on a regular monthly basis, except during the months of December, January, and February.

207.03.04I - Final Acceptance

Submit notice in writing within 20 days of the date for final inspection at the end of the maintenance period and an inspection will be arranged within 15 days of this date. Final acceptance will be made provided the terms of the plant guarantee have been met and the project site is in the condition specified in **Subsection 207.03.04 Maintenance**, herein.

207.03.05 Irrigation Systems

207.03.05A - General

Install components of the irrigation system as shown and as recommended by the equipment manufacturers. All sprinkler runouts shall be evenly graded to the drain points shown. Piping beneath paved areas shall have a minimum cover of 30 inches (762.00 mm). Construct irrigation system in areas to receive topsoil after topsoil is spread, compacted, and rough graded. Steel pipe or copper tubing may be bedded using excavated material. Bed PVC pipe in sand, as shown and backfill to a minimum of 2 inches (50.80 mm) above the pipe with sand. Determine the final number and location of sprinkler heads after grading is complete, to provide complete coverage of all sprinkled areas. Flush out system thoroughly before installing sprinkler heads. Adjust flow on each head for proper coverage.

207.03.05B - Reserved

207.03.05C - Copper Tubing

Cut tubing square and remove burrs. Clean both inside of fittings and outside of tubings with steel wool and muriatic acid before seating. Take care to prevent annealing of fittings and hard-drawn tubing when making connections. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted.

207.03.05D - PVC Pipe

Cut, make up, and install PVC pipe in accordance with the manufacturer's recommendations, as approved. Lay PVC pipe using the practice of snaking from one side of the trench to the other, one cycle per 40 feet (12.192 m) or less. Use strap wrenches for tightening threaded plastic joints. Take care not to over tighten fittings. Do not lay PVC pipe when the temperature is below zero degrees Fahrenheit (-17.78°C). Take precautions recommended by the manufacturer when the temperature is below 40 degrees Fahrenheit (4.44°C). Sprinklers and valves

shall be installed in accordance with the manufacturer's recommendations, as approved.

207.04.00 Measurement and Payment

207.04.01 Unit Price Basis

When so listed in the proposal, payment for the landscaping items listed will be made on a unit price basis for the number of items actually placed and accepted.

207.04.02 Lump Sum Basis

When so listed in the proposal, measurement and payment will be made at the contract lump sum pay item for landscaping, complete.

208 - Restoration and Cleanup

208.01.00 Description

This Section covers the work necessary to restore and clean up the site, and remove all construction equipment, refuse and unused materials of any kind resulting from project activities.

Additional requirements pertaining to site restoration and cleanup are contained in the **GENERAL CONDITIONS, Subsection 105.21.00.**

Lawns, planting, mulching and topsoil shall conform to the requirements of **Section 207 - Landscaping.**

208.02.00 Materials

Provide all materials required to accomplish the work as specified.

208.03.00 Construction

208.03.01 Surface Dressing

Slopes, sidewalk areas, planting areas, and roadway shall be smoothed and dressed to the required cross section and grade by means of a grading machine insofar as it is possible to do without damaging the work or existing improvements, trees, and shrubs. Supplement machine dressing by hand work as directed.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. Grade all areas true to line and grade as shown and as approved. Where the existing planting is below sidewalk and curb, fill and dress the area to the walk regardless of limits shown. Wherever fill material is required in the planting area, make finish surface high enough to allow for final settlement.

208.03.02 Removal of Materials

Remove and dispose of all excavated or construction materials, equipment, and trash of all kinds resulting from the work. Where brush and trees beyond the limits of the project have been disturbed, remove and dispose of or restore same as directed, at no expense to the City.

208.03.03 Cleaning Drains

Clean all drainage facilities such as inlets, catch basins, culverts, and open ditches of all excess material or debris which is the result of the work, as approved.

208.03.04 Cleaning Paved Surfaces and Appurtenances

Clean all pavement surfaces, whether new or existing within the limits of the project. Clean existing improvements such as curbs, gutters, walls, sidewalks, castings for manholes, monuments, water gates, lamp poles, vaults, signs, and other similar installations as approved.

Flush the street with a pressure type flusher as approved. Hand broom or flush all sidewalks as directed.

208.03.05 Restoring Planted Area

Hand-rake and drag all former grassed and/or planted areas leaving disturbed areas free from rocks, gravel, clay, or any other foreign material and ready, in all respect, for seeding. The finished surface shall conform to the original surface, be free-draining and free from holes, rough spots, or other surface features detrimental to a seeded area.

208.03.06 Restoring Mobilization, Borrow, and Disposal Areas

Clean all properties which were disturbed during construction of the project. Dispose of all uprooted stumps, felled trees, brush, excess excavation, rock, discarded materials, rubbish, and debris. Remove all plant, equipment, tools, and supplies and put the property occupied in a neat, clean, and orderly condition, in equal or better condition to that existing before move in.

208.03.07 Removal of Signs

Do not remove warning, regulatory, guide, or project signs prior to formal acceptance, except as directed.

208.03.08 Restoring Curbs, Sidewalks, and Driveways

Repair or replace all curbs, sidewalks, driveways, and other structures damaged during construction of the work.

208.04.00 Measurement and Payment

208.04.01 Lump Sum Basis

When listed in the proposal as a separate pay item, payment for restoration and cleanup will be made on a lump sum basis.

208.04.02 Incidental Basis

When neither specified nor shown in the proposal for separate payment, all restoration and cleanup will be considered incidental work for which no separate payment will be made.

209 - Mailbox Relocation

209.01.00 Description

This work shall consist of removing, maintaining in temporary locations during construction, and reinstalling in permanent locations, all mailboxes affected by construction work in accordance with these specifications and in conformity with the plans.

209.02.00 Materials

209.02.01 Concrete

Concrete in collars shall be either a commercially mixed or field mixed concrete consisting of clean rock or gravel, sand, water, and 470 pounds (213.192 kg), or 5 sacks, of Portland Cement per cubic yard (0.7646 m³).

209.02.02 Reinforcement

Reinforcement in collars shall conform to the requirements of **Section 603**.

209.02.03 Tube Frame

The tube support frame shall conform to:

- 1) the requirements of ASTM A 500 Grade B and shall be galvanized in conformance to ASTM A 386, Class B-1; or,
- 2) the tensile requirements of ASTM A 53 Grade B and shall be galvanized with a minimum 0.9 oz. per square foot (25.515 g/0.0929 m²) coating as measured by ASTM A 90 on the exterior surface followed by a chromate conversion coating and a cross link polyurethane acrylic coating. A zinc base corrosive resistant interior coating shall also be applied; or,
- 3) the equivalent.

209.02.04 Mounting Bracket

The mounting bracket shall be of the design shown on the plans or an approved equal.

209.02.05 Galvanizing

The mounting brackets, angles, adapter plates, and hardware shall be galvanized in conformance to AASHTO M 232.

Any damage to galvanized surfaces such as the cut end of the tube support frame, drill holes, and elsewhere shall be repaired by painting with one coat of a Zinc Dust - Zinc Oxide Primer.

209.02.06 Mounting Socket

The post mounting socket shall be the Flush V-Wing Socket manufactured by Foresight Industries of Cheyenne, Wyoming, or approved equal.

209.02.07 Mailbox

Mailboxes will be furnished by others.

209.03.00 Construction

Beginning at the start of construction all mailboxes affected by the work shall be protected and maintained at locations accessible to the delivery agent and as handy as possible to the person or persons being served. This may require removing and relocating the mailboxes more than once to maintain service throughout construction. When construction is completed the mailboxes shall be reinstalled on new supports in their permanent locations in conformance to the details shown of ODOT Standard Drawing No. 2136.

The mounting brackets furnished shall be of the proper size to fit each existing mailbox.

When multiple supports are furnished for fewer than five mailboxes, Contractor shall furnish and mount on the support additional Size 1 mounting brackets for the empty spaces.

If the original (prior to construction) support for the mailbox is something that the property owner desires to retain, it shall be placed by the Contractor on the owner's property adjacent to the work. Otherwise, the original mailbox support shall be disposed of by the Contractor.

209.04.00 Measurement and Payment

The quantities to be paid for will be the actual number of each kind of mailbox supports and the number of concrete collars, regardless of size installed in permanent locations as specified.

The accepted quantities will be paid for at the contract unit price per each for the following pay items:

1. Single mailbox supports
2. Multiple mailbox supports
3. Mailbox concrete collars

Payment when made as above set forth will be complete compensation for all labor, materials, equipment, tools, and incidentals involved in removing existing mailbox supports, providing temporary installations as necessary, installing new supports, with either 2'-0" (0.6096 m) or 2'-6" (0.762 m) angle legs as required, in permanent locations and concrete collars where required and installing owner-furnished mailboxes as specified.

210 - Mailbox Installation

210.01.00 Description

The work shall consist of installing new mailboxes.

210.02.00 Materials

Materials shall comply with the appropriate subsections of **Section 209 Mailbox Relocation**.

210.03.00 Construction

Construction shall be in accordance with Standard Plan ST-24.

210.04.00 Measurement and Payment

The quantities to be paid for will be the actual number of each kind of mailbox supports and the number of concrete collars, regardless of size installed in permanent locations as specified.

The accepted quantities will be paid for at the contract unit price per each for the following pay items:

1. Single mailbox supports
2. Multiple mailbox supports
3. Mailbox concrete collars

Payment when made as above set forth will be complete compensation for all labor, materials, equipment, tools, and incidentals involved in removing existing mailbox supports, providing temporary installations as necessary, installing new supports, with either 2'-0" (0.6096 m) or 2'-6" (0.762 m) angle legs as required, in permanent locations and concrete collars where required.