

KITSAP COUNTY PUBLIC WORKS WASTEWATER DIVISION

JOHNSON WAY FLOW METER

NOVEMBER 2016

ISSUED FOR CONSTRUCTION



Volume 1 of 2

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ENGINEER'S CERTIFICATE

Kitsap County Public Works Wastewater Division

Johnson Way Flow Meter

The engineering material and data contained in the Plans and Specifications were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.



Tony Fisher, P.E.

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KITSAP COUNTY PUBLIC WORKS WASTEWATER DIVISION

JOHNSON WAY FLOW METER

VOLUME 1 OF 2

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2-01 Clearing, Grubbing, and Roadside Cleanup**2-01.2 Disposal of Usable Material and Debris**

*The third paragraph of Section 2-01.2 is deleted and replaced with the following:
(Local Agency SP)*

The Contractor shall dispose of all debris by disposal Method No. 2 or Method No. 3. Open burning is prohibited.

2-01.3 Construction Requirements

*Section 2-01.3 is supplemented with the following:
(Local Agency SP)*

Clearing and grubbing within the project limits shall be kept to the minimum that is absolutely necessary to prepare the project area for construction. Existing native vegetation adjacent to the project limits shall be protected from damage. To the extent possible, trees and brush shall be trimmed, rather than removed. Trimming of trees shall be done properly and neatly. Contractor shall review the areas to be cleared and grubbed with the Engineer and obtain acceptance prior to clearing and grubbing areas. Trees, bushes, shrubs or areas within or adjacent to the project limits that are shown on the Drawings to be saved or need/warrant protection shall be properly marked and protected from damage by the Contractor. Contractor shall give five (5) working days advance notice prior to performing any clearing and grubbing.

Contractor shall exercise care during clearing and grubbing to ensure that the activities do not damage the root systems of vegetation designated to be saved. The Contractor's operations shall be conducted so vehicles and equipment do not operate, haul, park, or perform other activities within the drip line of vegetation designated to be saved.

END OF SECTION 2-01

2-02 Removal of Structures and Obstructions**2-02.3(1) Removal of Foundations**

*Section 2-02.3(1) is supplemented with the following:
(Local Agency SP)*

The work of this section shall include removal of all structures and obstructions, including existing facilities to be decommissioned or abandoned, that lie wholly or partially within the project limits and that are either designated to be removed or interfere with construction of the project.

Some minor obstructions may not be shown or specifically noted on the Drawings. The Contractor shall review the project area and anticipate the need for removal and replacement of minor obstructions such as fencing, signs, etc. Major obstructions that are encountered which are not shown on the Drawings, or could not have been foreseen by visual inspection of the project area, should be brought to the Engineer's attention. The Engineer will make a determination if the obstruction adversely affects the Contractor's costs or schedule, and a proper adjustment to the Contract will be made in accordance with Section 1-04.

Waste material shall be disposed of in accordance with Section 2-01.2(2). Materials that can be recycled shall be recycled to the greatest extent possible.

2-02.3(3) Removal of Pavement, Sidewalks, Curbs, and Gutters

*Section 2-02.3(3) is revised to read as follows:
(Local Agency SP)*

In removing pavement, sidewalks, curbs, and gutters, the Contractor shall:

1. Make a vertical full depth saw cut between any existing pavement, sidewalk, curb, or gutter that is to remain and the portion to be removed. For Portland cement concrete pavement removal, a second vertical full depth relief saw cut offset 12 to 18 inches from and parallel to the initial saw cut is also required, unless the Engineer approves otherwise. For removal of bituminous pavement, asphalt planning equipment may be used in lieu of saw cutting provided that a clean vertical edge remains. Cutting with jack hammers or excavation equipment will not be permitted.
2. If the Contractor elects to pulverize the asphalt concrete pavement, the edge of the pulverized asphalt shall be set back at least 12-inches away from the final edge of the restored asphalt joint. The full depth of the existing asphalt concrete pavement shall be pulverized. Following the pulverization operation, the material shall be graded and compacted to form a smooth, uniform cross slope. The equipment used shall be capable of effectively pulverizing the existing asphalt concrete pavement for the full depth in one pass. Pulverization shall be performed in such a manner that disturbance of the subgrade is kept to a minimum. The pulverized material shall meet a 1-inch minus gradation. Prior to performing any paving operations and after the pavement has been pulverized, graded, and compacted, the edge of the existing asphalt shall be saw cut in a vertical manner to provide a clean neat joint.
3. The removed pavement, curb, gutter, and sidewalk shall become the property of the Contractor and shall be promptly removed and disposed of in accordance with Section 2-01.2(2).
4. The road surface shall be restored to a drivable surface before leaving every day, unless approved otherwise by the Engineer.
5. Contractor shall replace, at no expense to the Contracting Agency, any existing pavement designated to remain that is damaged by the Contractor's Work.

2-02.3(4) Abandonment or Removal of Piping, Structures and Appurtenances

*Section 2-02.3(4) is added as the following:
(Local Agency SP)*

The abandonment, removal, or demolition of existing sanitary sewers that are in service but scheduled for replacement under this Contract shall not begin until the flows have been diverted to the new sanitary sewer facilities and the existing sanitary sewer structures that are being replaced have been drained.

Utilities that impede the work or are damaged by the Contractor during construction shall be removed and, if designated to remain in services after the Work is complete, shall be replaced in kind. Contractor shall be responsible for establishing temporary bypass measures to maintain the utility service until the existing service is restored or its replacement service is in operation. Contractor will be responsible for obtaining all necessary permits and following all pertinent codes and regulations that pertain to the demolition of existing structures.

Removal of Piping, Structures, and Appurtenances – Where indicated on the Drawings or as required for the construction of the project, the Contractor shall excavate, remove and dispose of existing piping (storm drain, water main or sewer), structures (catch basins, manholes, vaults, wet wells, etc.) and appurtenances. Asbestos cement pipe shall be removed and disposed of in accordance with the requirements of the Northwest Clean Air Agency, Department of Labor and Industries, Washington Department of Occupational Safety and Health (DOSH) and the Occupational Safety and Health Agency (OSHA).

For sanitary sewer manholes that are designated to be removed, the upper 5 feet of the structures shall be removed, the bases demolished and the remaining interior volume of the structure backfilled with sand. The upper 5 feet shall then be backfilled with suitable material as specified in Section 7-08. All materials being removed shall be disposed of properly. Excavated areas shall be backfilled in accordance with Section 2-09.

The Contractor shall acquire and follow the requirements of all necessary permits.

Abandonment of Piping, Structures, and Appurtenances – Where indicated on the Drawings, existing piping (storm drain, water main or sewer) that is to be abandoned in-place shall be completely filled with controlled density fill. Excavations required to access the piping shall be backfilled in accordance with Section 2-09.

2-02.3(4) Removal of Existing Fence

*Section 2-03.3(4) is added as the following:
(Local Agency SP)*

The Contractor shall remove existing fences that impede construction progress. The work shall include removal of posts, fence fabric, rails, tension wires, cinch stays, and other associated appurtenances. Fence posts and footings shall be removed in their entirety. Close cutting of fence posts will not be permitted. Voids created by the removal of the fence post and footings shall be backfilled and compacted with select native material as approved by the Engineer. Once construction is complete and the disturbed areas are restored, Contractor shall reconstruct new fence to match the existing fence.

END OF SECTION 2-02

2-06 Subgrade Preparation**2-06.3(2) Subgrade for Pavement**

*Section 2-06.3(2) is supplemented with the following:
(Local Agency SP)*

Construct final subgrade only when the weather conditions will not detrimentally affect the quality of the finished work. Any portion of the work damaged by the effects of rain, wind, or other inclement weather conditions shall, at no additional cost to the Contracting Agency, be:

1. Aerated if excessively wet,
2. Moistened if excessively dry,
3. Reshaped and re-compacted to conform to the requirements of the plans and special provisions.

Fill and compact all depressions and holes.

Blading and rolling shall be done until the surface is smooth and free from waves and other irregularities. The subgrade elevations shall be such that they are within a tolerance of 0.1 feet and match/blend with the existing roadway features (driveways, curb and gutter, sidewalk, paving, etc.).

If the subgrade is damaged by the contractor's operations, the contractor shall repair, reshape, and recompact the subgrade as necessary at no additional cost.

Subgrade below structures shall be as specified in Section 2-09.

Subgrade below pipe shall be as specified in Section 7-08.

Subgrade below curb and gutter and sidewalks shall be moisture conditioned and compacted to a minimum of 95% maximum density.

Subgrade in non-classified areas shall be moisture conditioned and compacted to a minimum of 95% maximum density.

END OF SECTION 2-06

2-09 Structure Excavation**2-09.3(1)D Disposal of Excavated Material**

*Section 2-09.3(1)D is deleted and replaced with the following:
(Local Agency SP)*

All excavated material that is not used as backfill shall be removed and disposed of in accordance with Section 2-01.2(2).

2-09.3(1)E Backfilling

*Section 2-09.3(1)E is supplemented with the following:
(Local Agency SP)*

Trench (Subsequent) Backfill

Trench backfill material shall be as follows:

1. Within the pipe zone, gravel backfill for pipe zone bedding conforming to Section 7-08 shall be used and shall be compacted to at least 90 percent of the maximum density.
2. Outside the road prism, trench (subsequent) backfill shall be common borrow as specified in Section 9-03.14(3), except 100% shall pass the 4-inch square sieve. Trench (subsequent) backfill shall be compacted to at least 90 percent of the maximum density.
3. Within the roadway prism, trench (subsequent) backfill shall be select borrow as specified in Section 9-03.14(2), except less than 5 percent shall pass the No. 200 sieve and shall be non-plastic. Trench (subsequent) backfill shall be compacted to at least 95 percent of the maximum density.
4. Trench (subsequent) backfill shall be placed in layers not more than 6-inches thick. If the Contractor demonstrates his construction methods can achieve the specified compaction requirements on a consistent basis for each lift, then 12-inch thick layers may be used.
5. All densities shall be as determined by Section 2-03.3(14)D.

Native material may be suitable for trench (subsequent) backfill if it conforms to the requirements above and its moisture content is within three (3) percent of the optimum moisture content. Excavated material that does not meet these requirements shall be considered unsuitable material.

Suitable excavated native material shall be segregated from unsuitable excavated native material, stockpiled, and protected for subsequent use in other areas. The Contractor may, at his option, use import (subsequent) backfill material in lieu of suitable native material. All material that is in excess and cannot be incorporated into the Work shall be removed and disposed of in accordance with Section 2-01.2(2).

In any trench in which the compacted density falls below specified requirements, and further compaction cannot be achieved with the existing material, the backfill shall be deemed unsuitable and as such it shall be removed and replaced with suitable material or imported material that meets the trench backfill material requirements stated above. Unsuitable material shall be disposed of in accordance with Section 2-01.2(2).

Structure Fill and Backfill

The entire structural bearing prism, defined as the volume directly beneath the structure, extending downward and outward at a 1:1 slope from the outside base perimeter of the structure to undisturbed suitable native or compacted sub-grade, shall be gravel backfill for foundations as described in Section 7-08. Gravel backfill for foundations shall be placed under structures to the thickness shown on the Drawings or to a minimum depth of 12-inches and compacted as specified herein.

2-09.3(3)B Excavation Using Open Pits – Extra Excavation

*Section 2-09.3(3)B is supplemented with the following:
(Local Agency SP)*

Contractor shall use appropriate shoring for all trenches located within roadway areas in order to minimize the extents of the excavation, maintain verticality of the trench walls and prevent sloughing in addition to protecting workers. Contractor may elect to slope trench excavations for areas outside roadway areas provided the excavation does not:

1. Impact wetlands or other sensitive areas;
2. Encroach within 5.0 feet of a stream's bank;
3. Extend outside the project's limits; or
4. Jeopardize the integrity of any utility or facility within or beyond the project's limits.

END OF SECTION 2-09

END OF DIVISION 2

5-04 Hot Mix Asphalt**5-04.2 Materials**

*Section 5-04.2 is supplemented with the following:
(Local Agency SP)*

Asphalt binder shall meet the requirements for PG 64-22 as set forth in Section 9-02.1(4).

Hot Mix Asphalt shall meet the requirements for HMA Class ½-inch as set forth in Section 9-03.8(2).

Aggregate gradation shall meet the requirements for Aggregate Gradation Control Points ½-in. as set forth in Section 9-03.8(6).

Asphalt seal coat shall meet the requirements of an AR-4000 asphalt binder.

Temporary asphalt concrete shall be HMA Class ½ with PG 64-22 asphalt binder.

5-04.3(9) Spreading and Finishing

*Section 5-04.3(9) is supplemented with the following:
(Local Agency SP)*

The final HMA lift should not be placed for at least 6 to 8 weeks after the next to last lift, unless approved otherwise by Engineer, to allow sufficient time for any settlement of the backfill material in the trench to occur.

5-04.3(10) Compaction

*Section 5-04.3(10) is supplemented with the following:
(Local Agency SP)*

Each lift of HMA shall be compacted to a minimum of 92 percent of the maximum density as determined by AASHTO Test Method T 209. After completion of the finish rolling, the level of compaction will be determined as the average of not less than 5 nuclear density gauge tests taken on the day the mix is placed at randomly selected locations within each lot. The quantity represented by each lot shall be no greater than a single day's production or approximately 400 tons, whichever is less. Cores may be used as an alternate to the nuclear density gauge tests and shall be taken within 48 hours of the placement of the mix. HMA pavement not meeting the prescribed minimum density standard shall be removed and replaced with satisfactory material. The Contracting Agency has no intention of using composite pay factors.

5-04.3(18) Adjusting Utility Appurtenances

*Section 5-04.3(18) is added as follows:
(Local Agency SP)*

All utility covers and monument case covers located in any areas that are paved with HMA under this Contract shall be adjusted to the new grade by the Contractor after the new HMA has been installed.

5-04.3(21) Temporary HMA Pavement

*Section 5-04.3(21) is added as the following:
(Local Agency SP)*

All HMA pavements that are installed and subsequently removed by the Contractor shall be classified as temporary HMA pavement. Temporary HMA pavement shall be installed to a minimum depth of one (1) inch over at least 3 inches of crushed surfacing top course.

Contractor shall furnish, place, compact, and maintain temporary HMA pavement in such a manner so as to provide a suitable and safe driving surface for traffic and pedestrians until the removal and disposal of the temporary HMA pavement is required prior to the placement of the permanent HMA pavement.

Temporary HMA pavement shall be compacted with a roller or vibratory plate to provide a smooth driving

surface. "Wheel-rolling" is not acceptable. Temporary HMA pavement shall be provided on all trenches in streets that currently have asphalt paving.

Temporary HMA pavement that fails due to rutting, spalling, or other means, as determined by the Contracting Agency's Representative, shall be repaired by the Contractor at no cost to the Contracting Agency.

5-04.3(22) Permanent HMA Pavement

*Section 5-04.3(22) is added as the following:
(Local Agency SP)*

Permanent HMA pavement shall be installed over all trenches in existing roadways, asphalt driveways and other areas shown on the Plans. Contractor shall provide reference lines for vertical control on both outer edges of the traveled way of each roadway. Existing asphalt shall be ground at the transition joints to the new HMA pavement to a depth of ½ inch less than the HMA pavement and sloped back at 10:1 for a distance of at least 15 feet. The ground surface shall be thoroughly cleaned to remove all debris. Contractor shall keep all construction equipment off of cleaned surface until HMA pavement is placed. Apply an asphalt tack coat to the ground surface of the existing asphalt. Tack coat shall be allowed to set prior to any equipment running on it.

Permanent HMA pavement shall be installed after the temporary HMA pavement has been removed and the subgrade adjusted and prepared for the required depth of permanent pavement. All work associated with preparation of the trench and subgrades for permanent patch shall be inspected by the Engineer prior to the placement of any asphalt. Permanent HMA pavement depths shall be as noted on the Plans or shall match the existing asphalt depths, whichever is greater. A tack coat shall be applied to all asphalt and concrete surfaces adjoining the new asphalt.

All joints with existing asphalt shall be vertical and clean saw cuts. Surfaces shall be free of dust and debris and shall be washed at the direction of the Engineer to remove any fine particles. Previous saw-cut surfaces damaged during construction shall be re-sawn at no expense to the owner.

Seal the joint between the new HMA and the existing asphalt surface with an AR-4000 seal coat that is at least 12-inches wide, centered on the joint.

END OF SECTION 5-04

END OF DIVISION 5

6-02 Concrete Structures**6-02.1 Description**

*Section 6-02.1 is supplemented with the following:
(Local Agency SP)*

The work includes reinforced concrete pads and foundation elements.

6-02.3(1) Classification of Structural Concrete

*Section 6-02.3(1) is supplemented with the following:
(Local Agency SP)*

All structural concrete shall be Class 4000D, air entrained, unless noted otherwise. The maximum water-cement ratio shall not exceed 0.50 as computed in accordance with ACI 318 Section 4.1.

6-02.3(2)A Contractor Mix Design

*The last paragraph of Section 6-02.3(2)A is deleted and replaced with the following:
(Local Agency SP)*

Entrained air content shall be 4.5 percent at the point of placement, with maximum tolerance of +1 to -1.5 percent.

6-02.3(4)C Consistency

*The last paragraph of Section 6-02.3(4)C is replaced with the following:
(Local Agency SP)*

When a high range water reducer is used, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added. The minimum slump for concrete shall be 2 inches for slabs and walls, and 1 inch for footings. Slump shall be determined by ASTM C143, with tolerances per ACI 117.

6-02.3(5)A General

*Section 6-02.3(5) is supplemented with the following:
(Local Agency SP)*

Specimens used for AASHTO T22 Compressive Strength of Cylindrical Concrete Specimens shall use standard 6 inch diameter by 12 inch molds when the average of two cylinder breaks is used to determine compressive strength. If 4-inch diameter by 8-inch diameter molds are used, three specimens shall be taken and the average used to determine compressive strength.

6-02.3(5)E Point of Acceptance

*The first and second paragraphs of Section 6-02.3(5)E are deleted and replaced with the following:
(Local Agency SP)*

Determination of concrete properties for acceptance will be made based on samples taken at the discharge of the placement system for all placements.

6-02.3(5)H Sampling and Testing for Compressive Strength and Initial Curing

*The first paragraph of Section 6-02.3(5)H is deleted and replaced with the following:
(Local Agency SP)*

Sampling and testing of concrete for compressive strength shall be at not less than one composite sample for each 50 cubic yards, or fraction thereof, of each design mixture of concrete placed in any one day. The Contracting Agency or his designated representative may increase the frequency of sampling and testing to include any truck load. For minor placements, the Engineer may waive strength tests if, in the Engineer's judgment, adequate evidence of satisfactory strength is provided.

6-02.3(5)L Concrete With Non-Conforming Strength

Section 6-02.3(5)L is deleted and replaced with the following:
(Local Agency SP)

Strength will be considered deficient and concrete will be rejected when the Work fails to comply with requirements which control the strength of the structure, including but not limited to the following conditions:

1. Concrete strength failing to comply with contract requirements.
2. Reinforcing steel size, quantity, strength, position, or arrangement at variance with contract requirements.
3. Concrete elements which differ from the required dimensions or location.
4. Curing not in accordance with contract requirements.
5. Inadequate protection of concrete from extreme temperature and other environmental conditions during early stages of hardening and strength development.
6. Mechanical injury, construction fires, accidents, or premature removal of formwork resulting in deficient strength.

When strength of the structure is considered deficient, the following actions may be required by Engineer:

1. Structural analysis or additional testing, or both.
2. Core tests.
3. If testing is inconclusive or impractical or if structural analysis does not confirm the safety of the structure, load tests may be required and their results evaluated in accordance with ACI 318.
4. Concrete work rejected by structural analysis or by results of a load test shall be reinforced with additional construction when required by Engineer, or replaced.
5. The Contractor shall document all repair work proposed to bring strength-deficient concrete work into compliance with Contract Documents, and submit the documentation to Engineer for acceptance.

Durability of concrete will be considered deficient and the concrete work will be rejected when it fails to comply with the requirements which control durability of the structure, including but not limited to the following conditions:

1. Strength failing to comply with contract requirements.
2. Materials for concrete not conforming to contract requirements.
3. Concrete not conforming to air entrainment requirements or the total air content limits
4. Curing not in accordance with contract requirements.
5. Inadequate protection of concrete from detrimental temperature and other detrimental environmental conditions during early stages of hardening and strength development.

When durability of the structure is considered to be deficient, the following actions may be required by the Engineer:

1. Obtain and test samples of the ingredient materials used in the concrete.
2. Obtain samples of concrete from the structure by coring, sawing, or other acceptable means.
3. Laboratory evaluation of concrete and concrete materials to assess the ability of concrete to resist weathering action, chemical attack, abrasion, or other deterioration, and to protect reinforcement and embeddings from corrosion.

4. Repair or replace concrete rejected for durability deficiency as directed by Engineer.
5. Document repair work to bring concrete work into compliance with Contract Documents and submit the documentation to Engineer for acceptance.

6-02.3(12)C Water Stop Joints

*Section 6-02.3(12)C is added as the following:
(Local Agency SP)*

The work and materials specified in this Section include requirements for water stops.

Contractor Submittals

Submit the following Project Data:

1. **SAMPLES:** Submit to the Engineer for acceptance, samples of all the materials and water stop sections proposed for use on the work. All water stop sections must conform to the shapes and sizes specified. The samples shall be clearly marked to show the manufacturer's name and product identification. The samples shall be submitted along with the manufacturer's and all laboratory test data required to show compliance with cited reference standards and requirements specified herein.
2. **CERTIFICATES:** Certification from a recognized independent testing laboratory attesting that the material submitted will meet or exceed each and all of the physical and chemical characteristics specified herein and in the references cited herein.

Quality Assurance

WATER STOP INSPECTION: All water stop placements shall be inspected and accepted by the Contracting Agency's Representative or by a Special Inspector retained by the Contracting Agency before concrete may be placed on either side of a water stop joint.

All field joints in water stops shall be inspected for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which will pass said inspection, and all faulty material shall be removed from the site and disposed of by the Contractor.

The following defects shall be grounds for rejection:

1. Offsets at joints greater than 1/32 inch (0.8 mm), or 15% of material thickness at any point, whichever is less.
2. Exterior crack at welded joint in outer surface, due to incomplete bond, which is deeper than 1/32 inch (0.8 mm), or 15% of material thickness at any point, whichever is less.
3. Any combination of offset or exterior crack which will result in a new reduction in the cross-section of the water stop excess of 1/32 inch (0.8 mm), or 15% of material thickness at any point, whichever is less.
4. Misalignment of joint which results in a longitudinal misalignment of the water stop in excess of ½ inch in 10 feet (12 mm in 3 m).
5. Porosity in the welded joint as evidenced by visual inspection.
6. Bubbles or inadequate bonding which can be detected with a pen-knife test. (If while prodding the entire joint on each side with the point of a pen knife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.)
7. Nail holes in the middle 2/3 of the water stop material.
8. Dirt, oil, grease, paint, concrete laitance, or other foreign material on the water stop.

Storage and Handling

All water stops shall be stored out of direct sunlight so as to permit free circulation of air around the water stop material. In the event any PVC water stop is installed in the concrete on one side of a joint and will remain unembedded in concrete on the opposite side of the joint for more than 2 days, suitable precautions shall be taken to shade and protect the exposed water stop from the direct rays of the sun during the entire exposure and until the water stop is embedded in the concrete on both sides of the joint.

Hydrophilic water stop material shall be kept in dry storage prior to use, and shall be kept dry after installation until concrete is placed. Water stop which has started to swell from moisture contact shall not be installed in the work.

Products

Water stops shall be of the size and type indicated on the Contract drawings and as specified in Section 9-24 PLASTIC WATER STOPS.

Preformed hydrophilic strip type water stops shall be manufactured solely for the purpose of preventing water from traveling through construction joints. Hydrophilic type water stops shall be manufactured by Hydrotite CJ by Greensteak Plastics, Synko Flex or Volclay Water Stop, Rx.

Installation of Water Stops

All water stops shall be fully continuous for the extent of the joint. Splices necessary to provide such continuity shall be accomplished in conformance to printed instructions of manufacturer of the water stop.

Contractor shall pay particular attention to removing all obstructions such as concrete, nails, etc., from joints when movements of floor, wall and roof sections can be expected under prestressing, temperature and other conditions.

The Contractor shall take suitable precautions and means to support and protect the water stops during the progress of the work and shall repair or replace at his own expense any water stop damage during the progress of the work.

All water stops shall be stored so as to permit free circulation of air around the water stop material. In the event any water stop is installed in the concrete on one side of a joint and will remain unembedded in concrete on the opposite side of the joint for more than 2 days, suitable precautions shall be taken to shade and protect the exposed water stop from the direct rays of the sun during the entire exposure and until the water stop is embedded in the concrete on both sides of the joint.

The water stop shall be correctly positioned in the forms prior to concrete placement so that the center of the water stop is centered on the joint unless otherwise detailed on the Contract Drawings.

In cases where preformed expansion joint material is used in conjunction with the water stop, allowance shall be made for equal water stop embedment on each side in the concrete.

Water stop shall be held in place in the forms by use of a split form or other approved method that will positively hold the water stop in the correct position and to the correct alignment.

Horizontal water stops shall be bent up during placing of concrete until the concrete has been brought to the level of the water stop; additional concrete shall then be placed over the water stop, after which the concrete shall be thoroughly vibrated.

All horizontal and vertical water stops which are not accessible during pouring shall be tied off in two directions every 12 inches in such a manner that bending over one way or another is prevented.

A hog-ring or nail may be driven through both ends of the water stop to facilitate placing and tying of water stops to reinforcing steel forms or form-ties.

Splices in Elastomeric Water Stops

Splices in the continuity or at intersections around the water stops shall be performed by heat-sealing the adjacent water stop sections in accordance with the manufacturer's printed recommendations. It is essential that:

1. The material not be damaged by heat sealing.
2. The splices have a tensile strength of not less than 75 percent of the unspliced materials tensile strength.
3. The continuity of the water stop ribs and centerbulbs shall be maintained. Maintain continuity at bends in the plane of the water stop by using miter cuts so ribs and centerbulbs remain aligned.

Butt joints of the ends of two identical water stop sections may be made while the material is in place in the forms.

All joints in water stop involving more than two ends jointed together, and all joints which involve an angle cut, alignment change, or the joining of two dissimilar water stop sections shall be fabricated by the Contractor prior to placement in the forms, allowing not less than 18-inch-long (450 mm) strips of water stop material beyond the joint. Upon being inspected and approved, such prefabricated water stop joint assemblies shall be installed in the forms and the ends of the 18-inch (450 mm) strips shall be butt-welded to the straight-run portions of water stop in place in the forms.

All water stops shall be properly spliced, and joints shall be checked for strength and pinholes after splicing.

Handling of Hydrophilic Water Stop

Confine water stop within the concrete joint, with a minimum 2-inch concrete cover to the exterior joint surface, unless otherwise indicated or recommended by the manufacturer.

Exposed water stop must be kept dry before concrete pour. If swelling occurs prior to confinement, replace with new material.

Use nails or adhesive as recommended by the manufacturer to secure water stop to hardened concrete to hold it securely in place during concrete placement of second pour.

Splices for Hydrophilic Water Stop

BENTONITE TYPE: Butt ends of water stop together. Do not overlap.

MODIFIED CHLOROPRENE RUBBER: Butt ends of water stop together and glue with Manufacturer's recommended adhesive.

Concrete Placement around Water Stop

Special care shall be used in placing concrete around water stops by careful working, routing, and vibrating to ensure that all air and rock pockets have been eliminated.

Installation of Retrofit Water Stop

Existing concrete shall be cleaned and roughened by bush hammer in areas to receive retrofit water stop. The water stop shall be bonded to the prepared concrete with epoxy adhesive and mechanically anchored with stainless steel battens and concrete screws or anchors in accordance with Manufacturer's installation instructions.

6-02.3(14) Finishing Concrete Surfaces

*Section 6-02.3(14) is supplemented with the following:
(Local Agency SP)*

Unless noted otherwise on the plans, all concrete surfaces exposed to public view shall receive Class 1 surface finish. All other surfaces shall receive Class 2 surface finish.

6-02.3(16) Plans for Falsework and Formwork

*Section 6-02.3(16) and its subsections are deleted.
(Local Agency SP)*

6-02.3(17) Falsework and Formwork

*Section 6-02.3(17) and its subsections are deleted and replaced with the following:
(Local Agency SP)*

6-02.3(17)B Materials Handling

All materials and equipment shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability or appearance.

6-02.3(17)C Form Materials**Form Facing Materials**

Materials for form faces in contact with concrete shall meet the requirements of Specification Section 6-02.3(14) and the following requirements, unless otherwise specified in the Contract Documents.

1. For Finish on Backfilled Surfaces, no form facing material is specified.
2. For Class 1 or Class 2 Finish, use plywood, tempered concrete-form-grade hardboard, metal, plastic, paper or other acceptable materials capable of producing the desired finish for form-facing materials. Form facing materials shall produce a smooth, uniform texture on the concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, patches, dents or other defects that will impair the texture of concrete surfaces. Furnish panels in largest practicable sizes to minimize number of joints.

Form Ties

Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.

Provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 inch from the outer concrete surface. Provide form ties which will not leave a hole larger than 1-inch diameter in the concrete surface.

Provide tie cones at each end.

Ties shall positively secure the wall to the required dimension and hold the wall to that dimension prior to and during concrete placement.

The use of tie wires as form ties will not be permitted.

Snap Ties

Snap ties, if used, shall not be broken until the concrete has reached the design concrete strength. Snap ties, designed so that the ends must be broken off before the forms can be removed, shall not be used.

Ties for liquid containment structures and walls below grade shall have a neoprene water stop, factory applied at the center of the tie.

Taper Ties

Taper ties with plastic or rubber plugs of an approved and proven design may be used. The plugs shall be driven into the hole with a steel rod, placed in a cylindrical recess made therefore in the wall. At no time shall plugs be driven on the flat area outside the cylindrical recess. Plugs shall be A-58 Sure Plug as manufactured by Dayton Superior.

Formwork Release Agent

Use commercially manufactured form release agent that prevent formwork absorption of moisture, prevent bond with concrete, do not stain the concrete surfaces, and do not leave residual matter on

surface of concrete or adversely affect proper bonding or subsequent application of other material applied to concrete surface.

For concrete surfaces of reservoirs, tanks, or channels used for conveyance, treatment or storage of water for eventual potable use, form release agents shall be listed in National Sanitation Foundation Standard 61, "Drinking Water System Components – Health Effects."

6-02.3(17)D Performance and Design Requirements

Design and engineering of formwork and formwork supports shall be the responsibility of the Contractor, and the Contractor's attention is directed to Section 1-06 Control of Material. Designs of formwork and preparation of formwork drawings shall be under the supervision of a professional engineer licensed in the state where the work will be done.

Design formwork for construction loads, lateral pressure and requirements of the applicable building code, and for construction sequence shown on the Contract Drawings, if applicable. Design formwork to withstand the pressure resulting from placement and vibration of concrete and to maintain specified tolerances. The design assumptions for form pressure and rate of fill limitations for wall forms shall be stated on the formwork drawings. Wall forms shall be designed so wall sections can be poured full height between joints shown on the Contract Drawings without horizontal cold joints.

Do not use earth cuts as forms for vertical or sloping surfaces unless required or permitted by Contract Documents.

Maximum deflection of facing materials reflected on concrete surfaces exposed to view shall be 1/240 of the span between structural members of the formwork, except for architectural concrete.

Locate and detail formed joints to the following requirements:

1. Locate and form construction joints that least impair strength of the structure. In general, locate construction joints in the middle third of the spans of slabs, beams, and girders. When a beam intersects a girder within this region, offset the joint in the girder a distance equal to or greater than twice the width of the beam. Locate joints in walls and columns at the underside of floors, slabs, beams, or girders and at the top of footings or floor slabs. Make joints perpendicular to the main reinforcement. Any construction joints not shown on the Contract Drawings shall require the approval of the Engineer.
2. Provide keyways where indicated on Contract Drawings. Where longitudinal keyways are indicated on the Contract Drawings, make them a minimum of 1½-inch deep in joints in walls and between walls and slabs or footings.
3. Provide construction and contraction (control) joints where indicated on the Contract Documents. The location of control joints other than those indicated on the Contract Documents shall be submitted for acceptance.

For a Class 1 or Class 2 finish, set the facing materials in an orderly and symmetrical arrangement, and keep the number of seams to a practical minimum. Support facing material with studs or other backing capable of maintaining deflections within specified tolerances.

6-02.3(17)E Form Fabrication and Manufacture

Formwork shall be tight to prevent loss of mortar from concrete. Provide watertight formwork when architectural concrete is specified.

Place ¼-inch-minimum chamfer strips in the corners of formwork to produce beveled edges on permanently exposed surfaces unless otherwise specified. Do not bevel reentrant corners or edges of formed joints of concrete unless otherwise specified in the Contract Documents.

Provide temporary openings at the base of the column and wall formwork and at other points where necessary to facilitate cleaning and inspection. Inspect formwork and remove deleterious material immediately before concrete is placed.

Fabricate embedded form ties so ends or end fasteners can be removed with minimum spalling at the faces of concrete.

After the ends or end fasteners of form ties have been removed, terminate the embedded portion of ties not less than 2 diameters, or twice the minimum cross-section dimension of the tie, from the formed concrete surface. In no case shall this distance be less than $\frac{3}{4}$ inch.

Locate water stops in joints where indicated on Contract Drawings. Use pieces of premolded water stop with a maximum practicable length to create the minimum number of end joints. Make joints in water stops in accordance with the manufacturer's recommendations. Ensure that joints develop effective watertightness equal to the continuous water stop material, permanently develop not less than 50% of the strength of the parent section and permanently retain flexibility.

6-02.3(17)F Construction and Erection of Formwork

At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view over the hardened concrete in the previous placement.

Ensure formwork is held firmly against hardened concrete to prevent offsets or loss of mortar at construction joints and to maintain a true surface.

Unless otherwise specified in Contract Documents, construct formwork so concrete surfaces will conform to tolerance limits of ACI 117. The class of surface as given in ACI 117 shall be as follows:

- | | | |
|----|---------------------------|---------|
| 1. | Walls and elevated slabs: | Class A |
| 2. | Footings: | Class C |

Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in the formwork after concrete has taken its initial set. Brace formwork securely against lateral deflection and lateral instability.

To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete. Set formwork and intermediate screed strips for slabs accurately to produce designated elevations and contours of the finished surface prior to removal of formwork. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds when the finish specified requires the use of such equipment.

When formwork is cambered, set screeds to a like camber to maintain required concrete thickness.

Fasten form wedges in place after final adjustment of forms and prior to concrete placement.

Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement of the formwork system during concrete placement.

The Contractor shall form for and leave all openings in the concrete work where required for the installation of his own work and/or for the work of others. He shall carefully examine all drawings for the need of such openings, and in failing to provide openings as shown on the Drawings, he shall cut them at his own expense. Except as otherwise noted or specified, all such openings shall be filled with concrete, after the work to be installed therein has been completed. Construct formwork for wall openings to facilitate removal and to counteract swelling of wood formwork.

Provide runways for moving equipment and support runways directly on the formwork or structural member without resting on the reinforcing steel.

Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of adjoining work prior to concrete placement.

Position and support expansion joint material, water stops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.

Clean surfaces of formwork and embedded materials of mortar, grout, and foreign material before concrete is placed.

Cover surfaces of formwork with an acceptable material that will prevent bond with the concrete. A field-applied formwork release agent or a factory-applied liner may be used. If a formwork release agent is

used, apply to the surfaces of the formwork in accordance with the manufacturer's recommendations before placing reinforcing steel. Do not allow formwork release agent to puddle in the forms. Do not allow formwork release agent to contact reinforcing steel or hardened concrete against which fresh concrete is to be placed.

Cleanouts and Access Panels

Temporary openings shall be provided at the bottom of the wall forms to facilitate cleaning and inspection prior to placing concrete.

Shavings, chips and all refuse shall be removed and the forms shall be broom-cleaned before any concrete is placed. Cleanout openings will not be permitted in exposed concrete without the Engineer's approval.

6-02.3(17)G Removal of Falsework and Forms

When finishing is required, remove formwork as soon as removal operations will not damage concrete, and subject to specification requirements for strength of concrete required for removal of formwork.

Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform needed repairs or treatment required at once and follow immediately with specified curing.

Loosen wood formwork for wall openings when this can be accomplished without causing damage to concrete.

Tie-rod clamps to be entirely removed from the wall shall be loosened 24 hours after concrete is placed, and form ties may be removed at that time.

Do not damage concrete during removal of formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing.

Unless otherwise specified, leave formwork and shoring in place to support the weight of concrete in beams, slabs, and in-place structural members until concrete has reached $f'c$, in accordance with 3.04. If a lower compressive strength is proposed for removal of formwork and shoring, submit detailed plans for review and acceptance. When shores and other vertical supports are arranged to allow the form-facing material to be removed without loosening or disturbing the shores and supports, the facing material may be removed at an earlier age unless otherwise specified.

Form Removal Safety

Forms shall be removed in a manner to ensure complete safety of the structure. In no case shall supporting forms or shoring of slabs or other suspended members be removed until members have acquired sufficient strength to support safely their weight and the load thereon.

Care shall be taken by the Contractor to assure that newly unsupported portions of the structure are not subjected to heavy construction or material loading. Additional shores or bracing shall be provided, as required to adequately support the members during the construction period.

All responsibility involved in the removal of forms, shores, and bracing shall rest with the Contractor, and he shall be solely responsible for accidents to persons and property of any nature.

Reuse of Forms

All parts of removed forms, reserved for reuse shall be inspected, cleaned and repair. Any part or panel which has been dented, deformed or otherwise rendered unfit for reuse shall be discarded.

6-02.3(17)H Reshoring and Backshoring

When reshoring and backshoring is permitted or required, submit for acceptance a plan of reshoring and backshoring procedures and operations prior to their use.

While reshoring or backshoring are underway, do not permit any construction load on new construction.

During reshoring and backshoring, do not allow concrete in beam, slab, column, or any structural member to be loaded with combined dead and construction loads in excess of the loads permitted by Engineer for the concrete compressive strength at the time of reshoring or backshoring.

Place reshores and backshores in sequence with stripping operations.

Tighten reshores and backshores to carry the required loads without overstressing the concrete members. Leave them in place until tests required by the specifications for strength of concrete required for removal of formwork, indicate that the concrete compressive strength has attained the minimum value specified.

For floors supporting shores under newly placed concrete, either leave in place the original supporting shores or install reshores and backshores. The shoring system and the supporting slabs shall resist the anticipated loads. Locate reshores and backshores directly under a shore position or as indicated on formwork shop drawings.

In multi-story buildings, extend reshoring over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads.

6-02.3(17)I Strength of Concrete Required for Removal of Formwork

When removal of formwork or reshoring is based on concrete reaching a specified compressive strength, concrete will be presumed to have reached this strength when test cylinders, field cured along with the concrete they represent, have reached the compressive strength specified for removal of formwork or reshoring. Mold cylinders in accordance with ASTM C31/C31M, and cure them under the same conditions for moisture and temperature as used for the concrete they represent. Test cylinders in accordance with ASTM C39/C39M.

Alternatively, when specified or permitted, use of the following methods for evaluating concrete strength for formwork removal is permitted. Submit sufficient data using job materials to demonstrate correlation of measurements on the structure with the compressive strength of laboratory-cured molded cylinders or drilled cores. Correlation data for each alternative method for determining strength shall be submitted for acceptance.

1. Tests of cast-in-place cylinders in accordance with ASTM C873. This is limited to slabs with concrete depth from 5 to 12 inches.
2. Penetration resistance in accordance with ASTM C803/C803M.
3. Pullout strength in accordance with ASTM C900.
4. Maturity method in accordance with ASTM C1074.

Minimum Stripping Time

Form removal for elevated slabs and beam or girder soffits shall only occur after the required concrete compressive strength has equaled the specified 28-day compressive strength as described herein, but in no case less than 7 days.

Form removal for columns, walls, and side forms of beams, girders, or footings shall be not less than 12 hours.

6-02.3(17)J Field Quality Control

Establish and maintain survey controls and benchmarks in an undisturbed condition until final completion and acceptance of the project.

Variations from plumb and designated building lines shall not exceed the tolerances specified in ACI 117.

6-02.3(17)K Installation of Embedded Items

The Contractor shall notify all trades when construction is ready for the setting of anchor bolts, inserts, sleeves, conduits, and other built-in equipment, in order that such material shall be set at the proper time. Before placing concrete, care shall be taken to determine that all items to be embedded in concrete are

accurately located, firmly secured in place and protected from damage or displacement until securely held by the concrete.

All items shall be thoroughly cleaned, free from rust, scale, dirt, grease or other coating. Any wood used for removable keys shall be thoroughly dampened before concrete is placed against the wood. The Contractor shall be responsible for any displacement of the items caused by his workers.

Electrical conduit may be embedded in concrete, provided the following conditions are met. Conduit runs which cannot satisfy these conditions shall be done at the Contractor's expense.

1. Outside diameter of conduit shall not exceed 1/3 of the concrete thickness.
2. Conduit shall not be placed closer than 3 diameters on center.
3. Conduit shall not be embedded in structural concrete slabs less than 4 inches thick.
4. Only 2 conduits may cross at any point. The sum of the outside diameter of the crossing conduits shall not exceed 1/3 of the concrete thickness.
5. A 1½-inch-minimum concrete cover shall be provided for conduits in structural concrete slabs.
6. Conduit shall not be located between bottom of reinforcing steel and bottom of concrete slab.
7. Conduit is generally not permitted in beams or girders.
8. Aluminum conduit shall not be embedded in concrete.
9. Reinforcing steel and/or post-tensioning ducts shall not be repositioned to clear conduit. Adjust conduit positions to clear reinforcement.

06-02.3(18) Placing Anchor Bolts

*Section 6-02.3(18) is supplemented with the following:
(Local Agency SP)*

Anchor bolts shall be either drilled anchors or cast-in-place as shown on the Plans.

Drilled anchors shall either be epoxy adhesive type or expansion type, torque-controlled, 316 stainless steel, Hilti, Powers Fasteners, Rawl, Covert or approved equal. Hole diameter shall be in accordance with manufacturer's instructions.

Epoxy for adhesive anchors or dowel embedment shall be a non-sag, two-component epoxy resin conforming to ASTM C881/C881M-02, Type I, IV, or V; Grade 3, Class D, E, or F as required for application between concrete temperatures of 40 and 90oF.

Rapid setting epoxies shall not be used.

All anchors shall be male-type projecting anchors, unless female-type anchors are specifically called out otherwise. Provide minimum embedment depths shown on the Contract Drawings, but in no case less than IBC minimums for the size called out. Connected work shall not bear on threads.

Cast-in-place anchor bolts shall conform to ASTM F1554 Grade 36 unless noted otherwise on the plans. Headed stud type. "L" or "J" bolts shall not be used.

Submit catalog data for all items covered by this section to be incorporated in the Work.

All drilled anchors shall be tensioned using torque wrenches to not less than 50%, or more than 90% of rated allowable capacity after installation, in accordance with Manufacturer's instructions.

All cast-in-place anchors shall be tensioned to not less than 10,000 psi, or more than 20,000 psi tensile stress based on the root area of the thread.

06-02.3(24) Reinforcement

Section 6-02.3(24) and its subsections are deleted and replaced with the following:
(Local Agency SP)

6-02.3(24)A Not Used**6-02.3(24)B Materials Delivery, Storage and Handling**

Prevent bending, coating with earth, oil or other material, or otherwise damaging the reinforcement.

For handling coated reinforcement, use equipment having contact areas padded to avoid damaging the coating. Lift bundles of coated reinforcement at multiple pick-up points to prevent bar-to-bar abrasion from sags in the bundles. Do not drop or drag coated reinforcement. Store coated reinforcement on cribbing that will not damage the coating.

6-02.3(24)C Materials

REINFORCING BARS: Bars used as reinforcement shall be deformed except spirals and welded wire fabric, which may be plain unless otherwise designated on the Contract Drawings. Reinforcement shall be grade 60 unless otherwise indicated on the Contract Drawings and shall conform to one of the following:

1. ASTM A615/A615M
2. ASTM A706/A706M
3. ASTM A970/A970M
4. ASTM A996/A996M, rail steel bars shall be Type R.

COATED REINFORCING: Reinforcing bar coatings, when required, shall be zinc or epoxy, as indicated on the Contract Drawings.

1. Zinc-coated (galvanized) reinforcement shall conform to ASTM A767/A767M. Repair all coating damage due to shipping, handling and placing in accordance with ASTM A780. The maximum amount of repaired damaged areas shall not exceed 2 percent of the surface area in each linear foot of each bar.
2. Epoxy-coated reinforcement bars shall conform to ASTM A775/A775M or ASTM A934/A934M as specified in the Contract Documents.
3. Coatings shall be applied in plants that are certified in accordance with the Concrete Reinforcing Steel Institute (CRSI) Certification Program or an equivalent program acceptable to the Engineer.
4. Repair damaged areas with patching material conforming to ASTM A775/A775M or ASTM A934/A934M as applicable and in accordance with the material manufacturer's written recommendations. Repair coating damage due to shipping, handling and placing. The maximum total damaged areas shall not exceed 2 percent of the surface area in each linear foot of each bar. Fading of the coating color will not be cause for rejection of epoxy-coated reinforcing bars.

STAINLESS STEEL BARS: Stainless steel bars shall conform to ASTM A955/A955M.

BAR MATS: Bar mats shall conform to ASTM A184/A184M.

WIRE: Use plain or deformed wire as indicated on the Contract Drawings. Plain wire may be used for spirals.

1. Plain wire shall conform to ASTM A82.
2. Deformed wire size D4 and larger shall conform to ASTM A496.

3. Epoxy-coated wire shall conform to ASTM A884/A884M. The maximum total damaged areas, including areas repaired at the manufacturing facility, shall not exceed 2% of the surface area in each linear foot or each wire. Repair all damaged areas.
4. For wire with a specified yield strength f_y exceeding 60,000 psi, f_y shall correspond to a strain of 0.35 percent.

WELDED WIRE REINFORCEMENT: Use welded wire reinforcement specified in Contract Documents and conforming to one of the following specifications:

1. Plain Welded Wire Reinforcement: ASTM A185, with welded intersections spaced not farther apart than 12 inches in the direction of principal reinforcement.
2. Deformed Welded Wire Reinforcement: ASTM A497/A497M, with welded intersections spaced not farther than 16 inches in the direction of principal reinforcement.
3. Epoxy-coated Welded Wire Reinforcement: Conform to ASTM A884/A884M.
4. For welded wire reinforcement with a specified yield strength f_y exceeding 60,000 psi, f_y shall correspond to a strain of 0.35 percent.

WIRE REINFORCEMENT SUPPORTS: Unless otherwise specified or permitted, use wire reinforcement supports complying with Class 1, maximum protection, or Class 2, moderate protection as indicated in the CRSI Manual of Standard Practice, Chapter 3. Coated wire reinforcement supports shall conform to the following:

1. EPOXY COATED WIRE REINFORCEMENT SUPPORTS: Use wire reinforcement supports coated with dielectric material, including epoxy or other polymer, for a minimum distance of 2 inches from the point of contact with epoxy-coated reinforcement.
2. ZINC-COATED REINFORCEMENT: Use galvanized wire reinforcement supports or wire reinforcement supports coated with dielectric material.

PRECAST CONCRETE REINFORCEMENT SUPPORTS: Precast concrete supports for supporting reinforcement shall not be less than 4 square inches having a compressive strength equal to or greater than the specified compressive strength of the concrete being placed.

ALL-PLASTIC BAR SUPPORTS: All-plastic bar supports may be used for horizontal and vertical reinforcing steel. They may have a snap-on action or other method of attachment. All-plastic supports shall be non-porous and chemically inert in concrete. All-plastic bar supports shall have rounded seatings so as not to punch holes in the formwork and shall not deform under load when subjected to normal temperatures encountered in use, nor shall they shatter or severely crack under impact loadings when used in cold weather.

All-plastic bar supports shall have at least 25% of their gross plane area perforated, and shall not be placed closer than 12 inches apart along a bar.

TIE WIRE: No. 16 American Wire Gauge or heavier, black annealed per ASTM A82.

6-02.3(24)D Fabrication

REINFORCEMENT: Bend all reinforcement cold unless heating is specifically authorized in the Contract Documents or by the Engineer. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

WELDING: When welding of reinforcement is required or permitted, make all welds in conformance with ANSI/AWS D1.4. Do not weld crossing bars (tack welding) for assembly of reinforcement, supports, or embedded items. After completing welds on zinc-coated (galvanized) or epoxy-coated reinforcement, repair coating damage in accordance with requirements specified above. Coat welds and steel splice members used to splice reinforcement with the same material used for repair of coating damage.

6-02.3(24)E Placement

When concrete is placed, reinforcement shall be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided the minimum nominal dimensions, nominal weight and the minimum average height of deformations of a hand-wire-brushed test specimen are not less than the applicable ASTM specification requirements.

TOLERANCES: Place, support, and fasten reinforcement as shown on the Contract Drawings. Do not exceed the placing tolerances specified in ACI 117 before concrete is placed. Placing tolerances shall not reduce cover requirements except as specified in ACI 117.

REINFORCEMENT RELOCATION: When necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement, conduits or embedded items, submit the resulting arrangement of reinforcement for acceptance.

CONCRETE COVER: Minimum concrete cover for reinforcement, unless otherwise indicated in the Contract Drawings, shall be as indicated below:

	Minimum Cover (inches)
Slabs & Joists	
Top & bottom bars for dry conditions	
#11 bars and smaller	¾
#14 and #18 bars	1½
Formed concrete surfaces exposed to earth, water or weather, and over or in contact with sewage and for bottoms bearing on work mat, or slabs supporting earth cover.	
#5 bars and smaller, W31 or D31 wire and smaller	1½
#6 through #18 bars, W45 or D45 wire	2
Footings and Base Slabs	
At formed surfaces and bottoms bearing on concrete work mat	2
At unformed surfaces and bottoms in contact with earth	3
Top of footings	same as slabs
Over top of piles	2

For bundled bars, minimum concrete cover shall be equal to the equivalent diameter of the bundle but need not be greater than 2 inches, except the minimum cover shall not be less than specified above. The equivalent diameter of the bundle shall be based on a single bar of a diameter derived from the equivalent total area.

Tolerances on minimum concrete cover shall meet the requirements of ACI 117.

REINFORCEMENT SUPPORTS: Size and spacing of reinforcement supports shall conform to the CRSI Manual of Standard Practice. Reinforcement shown on the Contract Drawings shall not be relocated to serve as bolsters for other bars. The Contractor shall provide additional bars if necessary to support the reinforcement shown on the Contract Drawings.

Horizontal bars in slabs shall be supported at intervals not greater than 48 inches.

Unless otherwise approved by the Engineer, use the following reinforcement supports:

1. Place reinforcement supported from the ground or mud on precast concrete reinforcement supports.
2. Place non-coated reinforcement supported from formwork on reinforcement supports made of concrete, metal or plastic.
3. Place zinc-coated (galvanized) reinforcement supported from formwork on wire reinforcement supports, which are galvanized, coated with dielectric material, or made of dielectric material.
4. Reinforcement and embedded steel items used with zinc-coated (galvanized) reinforcement shall be zinc-coated (galvanized) or coated with non-metal materials.
5. Place epoxy-coated reinforcement supported from formwork on coated wire reinforcement supports, or on reinforcement supports made of dielectric material. Coatings or materials shall be compatible with concrete.
6. When precast reinforcement supports with embedded tie wires or dowels are used with epoxy-coated reinforcement, wires, or dowels shall be coated with dielectric material.
7. Reinforcement used as supports with epoxy-coated reinforcement shall be epoxy-coated.
8. In walls reinforced with epoxy-coated reinforcement, spreader bars shall be epoxy-coated. Proprietary combination bar clips and spreaders used in walls with epoxy-coated reinforcement shall be made of corrosion-resistant material or coated with dielectric material.
9. Fasten epoxy-coated reinforcement with tie wires coated with epoxy or other polymer.

WELDED WIRE REINFORCEMENT: For slabs on grade, extend welded wire reinforcement to within 2 inches of the concrete edge. Lap edges and ends of welded wire reinforcement sheets a minimum of one-mesh spacing. Welded wire reinforcement may extend through contraction joints only where permitted. Support welded wire reinforcement during placing of concrete to assure required positioning in the slab. Do not place welded wire reinforcement on grade and subsequently raise into position in concrete.

COLUMN DOWELS: Furnish and use templates for placement of column dowels unless otherwise permitted.

Make splices as indicated on the Contract Drawings unless otherwise approved by the Engineer. Mechanical splices for reinforcement not shown on the Contract Drawings may be used when approved by the Engineer. Reinforcement coating shall be removed in the area of the mechanical splice if so required by the splice manufacturer. After installing mechanical splices on zinc-coated (galvanized) or epoxy-coated reinforcement, repair coating damage and areas of removed coating in accordance with 6-02.3(24)C. Coat exposed parts of mechanical splices used on coated bars with the same material used for repair of coating damage.

FIELD BENDING OR STRAIGHTENING: When permitted, bend or straighten reinforcement partially embedded in concrete in accordance with the following procedures.

Reinforcing bar sizes No. 3 through No. 5 may be bent cold the first time provided reinforcing bar temperature is above 32°F. For other bar sizes, preheat reinforcing bars before bending as follows:

1. **Preheating.** Apply heat by any method which does not harm the reinforcing bar material or cause damage to the concrete. Preheat a length of reinforcing bar equal to at least 5 bar diameters in each direction from the center of the bend, but do not extend preheating below the surface of the concrete. Do not allow the temperature of the reinforcing bar at the concrete interface to exceed 500°F. The preheat temperature of the reinforcing bar shall be 1100 to 1200°F. Maintain the preheat temperature until bending or straightening is complete. Measure the preheat temperature by temperature measurement crayons, contact pyrometer, or other acceptable method. Do not artificially cool heated reinforcing bars until the temperature of the bar is less than 600°F.

2. **Bend Diameters.** Minimum inside bend diameters shall conform to the requirements of the table below unless otherwise permitted. In addition, beginning of the bend shall not be closer to the concrete surface than the minimum diameter of bend.

<u>Bar Size</u>	<u>Minimum Inside Bend Diameter</u>
#3 through #8	6 bar diameters
#9, #10 and #11	8 bar diameters
#14 and #18	10 bar diameters

REPAIR OF BAR COATINGS: After field bending or straightening zinc-coated (galvanized) or epoxy-coated reinforcing bars, repair coating damage per Section 6-02.3(24)C.

FIELD CUTTING OF REINFORCEMENT: Reinforcement shall not be cut in the field except when specifically permitted.

1. When zinc-coated (galvanized) reinforcing bars are cut in the field, coat the ends of the bars with a zinc-rich formulation used in accordance with the manufacturer's recommendations, and repair any coating damage in accordance with Section 6-02.3(24)C.
2. When epoxy-coated reinforcing bars are cut in the field, coat the ends of the bars with the same material used for repair of coating damage, and repair any coating damage in accordance with Section 6-02.3(24)C. Do not flame-cut epoxy coated reinforcement.

REINFORCEMENT THROUGH EXPANSION JOINT: Do not continue reinforcement or other embedded metal items bonded to concrete through expansion joints. Dowels bonded on only one side of a joint and water stops shall extend through the joint.

WORKER SAFETY: Workers placing reinforcing steel shall wear safety equipment and harnesses as required by state occupational safety regulations.

END OF SECTION 6-02

END OF DIVISION 6

**DRAINAGE STRUCTURES, STORM SEWERS, SANITARY
SEWERS, WATER MAINS, AND CONDUITS**

DIVISION 7

7-05 Manholes, Inlets, Catch Basins, and Drywells

7-05.1 Description

*Section 7-05.1 is supplemented with the following:
(Local Agency SP)*

This work shall also include the packaged metering manhole.

7-05.1(1) Submittals

*Section 7-05.1(1) is added as the following:
(Local Agency SP)*

The Contractor shall submit the following information in accordance with Section 1-06 and as specified herein.

1. Manufacturer's technical data and information for all manholes and the packaged metering manhole to verify conformance, including hatches, frames and covers, steps, ladders, grating, wall penetrations, joint seals, grout, and waterproofing as applicable.
2. Shop drawings, including detailed diagrams showing all critical dimensions, principal parts and materials.
3. Cement concrete mix design.
4. Structural design calculations.
5. Other data and information to verify conformance.

7-05.1(2) Quality Assurance

*Section 7-05.1(2) is added as the following:
(Local Agency SP)*

Contractor shall submit structural design calculations and shop drawings stamped by a professional structural engineer registered in the State of Washington for acceptance based on the Basis of Rational Design. This requirement will extend to the structural design of all manholes and the packaged metering manhole and their associated parts and appurtenances. Reinforcement and thickness shall be not less than required by ASTM C478 or by THE WSDOT Standard Plans.

Contractor shall comply with the requirements of the Washington Department of Occupational Safety and Health (DOSH) for this work associated with the manhole coatings. Surface preparation, coating and painting shall conform to the applicable requirements of the NACE and SSPM as published by SSPC.

Tnemec products are listed as the standard of quality, in terms of performance and characteristics for the manhole coatings. Other manufacturer's products will be considered subject to meeting the listed quality, performance and characteristics of the standard/product(s) for the particular application and compliance with the specifications. Substantiating technical data is required. Submit request for substitution in accordance with the Special Provisions. Substitutions which decrease the film thickness, solids by volume, or the number of coats will not be considered. All requests for substitutions shall include test reports that demonstrate the product(s) meet or exceed the performance and characteristics of the listed standard/product(s). Testing shall demonstrate that the product(s) also meet or exceed the performance and characteristics for liquid/submerged environment (wastewater immersion) as well as the gas or vapor/unsubmerged environment (hydrogen sulfide gas and sulfuric acid).

Coating applicator shall have a minimum of 10 years experience in the application of similar products. Provide references for a minimum of five (5) different projects completed in the last three (3) years with similar products and scope of work. Include name and address of project, size of project in value (painting), contact person and contact information.

Coating manufacturer's authorized representative shall provide a written statement attesting that the applicator has been instructed on proper preparation, mixing and application procedures for coatings specified as well as the applicator's qualifications.

Contractor shall comply with the coating system manufacturer's specifications, directions and recommendations for best results in the use of each of their products for each condition. If results are at a variance with these specifications, report the discrepancy to the Engineer for decision.

The coating system manufacturer shall provide a qualified representative to visit the site from time to time during the coating operations if requested by the Engineer. The manufacturer's representative shall provide a written report of the observations, findings and any clarifications or directions provided to the Contractor.

7-05.1(3) Reference Standards

*Section 7-05.1(3) is added as the following:
(Local Agency SP)*

Where referenced, the latest edition of the following design standards and references shall apply:

1. AASHTO Standard Specification for Highway Bridges
2. AASHTO LRFD Bridge Design Specifications
3. ASTM A193 – Stainless Steel Anchor Bolts
4. ASTM C443 Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
5. ASTM C478 Precast Reinforced Concrete Manhole Sections
6. ASTM C857 Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
7. ASTM C858 Underground Precast Concrete Utility Structures
8. ASTM C1619 Elastomeric Seals for Joining Concrete Structures
9. ASTM D 256 – Izod Impact Strength
10. ASTM D 570 – Water Absorption Rate
11. ASTM D 638 – Tensile Strength
12. ASTM D695 – Compressive Properties of Rigid Plastic
13. ASTM D 696 – Coefficient of Linear Expansion
14. ASTM D 790 – Flexural Properties
15. ASTM D792 – Density and Specific Gravity at 230 C
16. ASTM D2563-0 – Visual Defects
17. ASTM D 2583 – Indentation Hardness
18. ASTM D2584 – Resin, Glass & Filler Content
19. ASTM D3753-12 – Polyester Manholes
20. ISO1438/1-1980 – Open Channel Flow Measurement
21. OSHA 1910.27 - Fixed Ladders
22. ACI 318 Building Code Requirements for Structural Concrete

Composition of the packaged metering manhole laminate shall be in accordance with the recommendations shown in the Quality Assurance Report for Reinforced Thermoset Plastic (RTP) Corrosion Resistant Equipment prepared under the sponsorship of the Society of the Plastics Industry, Inc. (SPI), and the Material Technology Institute (MTI) of the Chemical Process Industry for "Hand Lay-UP

Laminates," and shall meet the specifications for Type I, Grade 10 laminates shown in Appendix M-1 of said report.

Manufacturer shall be experienced in the design and manufacture of specific packaged metering manholes and accessories for a minimum period of 10 years. Manufacturer shall provide warranty for 2 years against failure due to corrosion.

7-05.1(4) Delivery, Storage, and Handling

*Section 7-05.1(4) is added as the following:
(Local Agency SP)*

Ship all packaged metering manholes with suitable packaging to protect products from damage. Protect packaged metering manhole flanges, tabs and accessories from damage. Packaged metering manhole shall be stored on a smooth flat surface, free of sharp objects, and if laid horizontally, shall be placed in such a way as to avoid structural damage.

7-05.2 Materials

*Section 7-05.2 is supplemented with the following:
(Local Agency SP)*

Coating for Sanitary Sewer Manholes	9-05.50(6).
Flexible Boot-Type Seals/Connectors	9-05.50(7).
Rigid/Mechanical Type Seals/Connectors	9-05.50(8).
Flexible Couplings	9-05.50(11).
Manhole Steps and Grab Bars	9-05.50(12).
Packaged Metering Manhole (PMM)	9-05.50(13).

7-05.2(1) Standard Products

Although the use of standard products by fabricators is generally intended by this specification, some customization is likely to be required and the fabricators may need to modify products as necessary to conform to these specifications. This may involve revisions to dimensions, forms, reinforcement, concrete mix, and other variations from the fabricator's standard fabrication practice. The Contractor is cautioned to be aware of and advise suppliers of this requirement to avoid misunderstandings and delays in product acceptance.

7-05.2(2) Design Standards

Manholes shall be designed for AASHTO H20 loading. Wheel load distribution shall be in accordance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specifications.

Bottom pressure shall be calculated with and without groundwater assuming maximum live load over the top slab. If the top of the manhole is large enough to allow full axle or multiple axle wheel loads, then full axle or multiple axle wheel loads shall be used to calculate maximum live load.

Base sections shall be assumed to be subject to full hydrostatic load from groundwater with a surface elevation equal to the top of the manhole at its center at grade. Base section bottom slabs shall be as required by the Contractor's design calculations, but in no case less than 6 inches thick.

If the dead weight of the manhole sections and any backfill that bears on the manhole are insufficient to provide a safety factor against buoyancy uplift of at least 1.50, the base slab shall be extended beyond the outside wall of the base section sufficiently to mobilize sufficient net weight of backfill to provide the required safety factor when added to the dead weight of the structure and top slab backfill.

The uplift force due to buoyancy shall be calculated as the volume of water displaced by the submerged portion of the structure times the unit weight of water. Only the weight of backfill soil within the footprint of the base slab shall be counted as part of the resisting force. Unless stated otherwise in the soils report, a buoyant soil weight of 60 pcf shall be assumed for the unit weight of soil below the groundwater level. The dry weight of soil shall be used above the groundwater level, and shall be assumed to be not less than 125 pcf. The weight of any pavement shall be based on an assumed unit weight for concrete or

asphalt pavement of 150 pcf. Resistance associated with soil friction on the sides of the structure shall not be included in the computation of the safety factor.

The packaged metering manhole (PMM) fabrication, flume, engineering and customer support shall all be provided by the same company. Outsourcing any of these components is not acceptable. To assure quality control and single source accountability the same manufacturer shall fabricate and fully assemble the PMM and all components. Manufacturer shall have a qualified Engineer on staff with at least 5 years experience with hydraulic measurement packaged metering manholes.

7-05.3 Construction Requirements

*The third paragraph of Section 7-05.3 is revised to read as follows:
(Local Agency SP)*

The cover or grating of a manhole, vault, catch basin, or inlet shall not be grouted to final grade until the final elevation of the pavement, gutter, ditch, or sidewalk in which it is to be placed has been established, and until permission thereafter is given by the Engineer to grout the cover or grating in place. Covers shall be seated properly to prevent rocking. Leveling and adjustment devices that do not modify the structural integrity of the metal frame, grate, or cover, and do not void the originating foundry's compliance to these specifications and warranty are allowed. Leveling and adjusting devices that interfere with the backfilling, backfill density, grouting, and asphalt density will not be allowed. The hardware for leveling and adjusting devices shall be completely removed when specified by the Project Engineer. Mortar or high strength, non shrink grout shall be placed from the top 2 inches of the top cone to up and over the lip of the manhole frame. The minimum thickness of the mortar or grout shall be 8 inches.

*Section 7-05.3 is supplemented with the following:
(Local Agency SP)*

Where piping enters through precast concrete units, the Contractor shall carefully coordinate the locations of the piping penetrations with the precast manufacturer to include the necessary block outs. Piping penetrations shall be properly reinforced and shall not compromise the reinforcing or structural integrity of the structure. Pipe penetrations shall not be made within 6 inches of joints. If appropriate provisions have been made in the design, pipe penetrations may be core drilled in the field after installation of the structure and piping, subject to review and acceptance by the Engineer. The ends of all pipes shall be trimmed flush with the walls.

Grade rings shall be used for final adjustment of manhole frame height to match surface grades, and shall be mortared into place. Maximum allowable dimension from the top of the eccentric cone or vault top slab to the top of the casting shall be 22 inches. A minimum of one adjustment ring shall be installed between the top cone and the manhole frame. Contractor shall minimize the number of grade rings.

Manhole riser sections shall be minimized to the extent practicable to reduce the number of joints. Joints shall not be located closer than 6 inches to openings for pipes. Provide reinforcement around openings for pipe or duct penetrations per ACI 318.

7-05.3(5) Coatings for Manholes

*Section 7-05.3(5) is added as the following:
(Local Agency SP)*

Unless otherwise specified, concrete surfaces to be coated shall be allowed to age for at least 28 days and allowed to dry to the moisture content recommended by the coating manufacturer. Moisture content may be tested with a Delmhorst Instrument Company moisture detector, or equivalent. In addition, the surfaces shall be brush treated with a 10 percent muriatic acid solution and thoroughly flushed with water after 10 minutes. Loose concrete and laitance shall be removed by sandblasting and chipping, and voids and cracks shall be repaired. Surfaces shall be cleaned with clear water by washing and scrubbing to remove foreign and deleterious substances prior to coating. Coating system shall not be applied until the Engineer has inspected the surface to be coated.

Coating materials shall be delivered to the job site in their original, unopened containers. Each container shall bear the manufacturer's name brand, batch number, date of manufacture, storage life, and special

directions. Paints shall be stored in a weather tight space where the temperature is maintained within the storage temperature range recommended by the paint manufacturer, but in no case where the temperature is lower than 40°F or greater than 100°F. Contractor shall monitor the paint material storage facility with a high-low recording thermometer device. The paint material storage facility shall be separate from the storage facilities used for storing painting equipment and used for storing containment waste and construction generated waste. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site and not used.

7-05.3(6) Packaged Metering Manholes

*Section 7-05.3(6) is added as the following:
(Local Agency SP)*

Packaged metering manholes too large to ship in one piece shall be shipped in flanged and match-drilled sections along with stainless steel fasteners for onsite assembly. Verify dimensions are correct and project conditions are suitable for installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

Thoroughly clean and remove all shipping materials prior to setting. Install products in accordance with engineer's specifications, local codes, general comments below and the Manufacturer's recommendations.

Care shall be taken in the handling, storage and placement of the packaged metering manholes in preparation for installation. Contractor shall become familiar with recommended handling and installation procedures used with fiberglass metering manholes to insure the manhole is not damaged, and the flume is installed in a manner that is consistent with obtaining good open channel flow results.

Slinging shall be accomplished using nylon or other fabric material. Under no circumstances shall cable or chain slings be used in direct contact with fiberglass surfaces.

The packaged metering manholes shall be installed level end-to-end and side-to-side, and shall remain level throughout installation. The flume is factory installed in the Metering Manhole so that it is absolutely level from front to back and from side to side, and must remain level after installation.

The site shall be excavated wide enough to accommodate the manhole and to provide a safe working environment for workers. The contractor shall provide a level concrete slab with a smooth troweled surface. Pad elevation shall be as shown on the drawings, and positioned so that the invert of manhole piping matches that of the pipeline. Prior to manhole placement the slab shall be cleaned of all sharp objects and debris.

The foam pad supplied with the manhole shall be placed in the proper position.

If the pipe is already in place the neoprene boots and s/s bands shall be slipped onto the pipe ends before lowering manhole onto concrete slab. The neoprene boots can be slipped over pipe ends and the stainless steel clamps tightened securely. Under no circumstances shall petroleum lubricants of any type be used to install neoprene boots.

The packaged metering manholes shall be lowered onto pad in accordance with the manufacturer's written recommendations. Flume level shall be checked and the packaged metering manhole adjusted if necessary. After the level is confirmed all anchor bolts shall be securely tightened.

All open spaces under the flume shall be filled with grout to provide adequate structural support.

Care shall be taken when backfilling to avoid uneven backfill loads on the FRP manhole and flume. Groundwater or surface water runoff shall not be allowed to accumulate in the open excavation around a manhole that has not been completely backfilled. Backfill materials shall be placed evenly around the packaged manhole in approximately 12 inch lifts. Backfill around the flume and up to 12 inches above the flume shall be sand.

Contractor shall finish to grade using precast concrete risers to construct chimney of required height between the access hatch frame and cover and the packaged manhole. Mortar bed and first grade ring shall be firmly supported on flat, bearing shoulder of the packaged manhole.

Contractor shall complete a Certificate of Proper Installation and provide copies to the Owner, Engineer, and Manufacturing Facility.

Hatch design and construction requirements shall be coordinated with precast structure suppliers. Access hatch shall be incorporated into the concrete placement. Hatches shall be coordinated with ladder location and requirements for entry.

Access hatches shall be installed in accordance with manufacturer's instructions and recommendations and as shown on the Drawings. In paved areas, unless otherwise shown on the drawings or directed by the Engineer, hatches shall be flush with the finish grade. In non-paved areas, unless otherwise shown on the drawings or directed by the Engineer, hatches shall be 6-inches above finished grade.

Fiberglass reinforced plastic (FRP) grating shall be installed over the flume inside the PMM to provide a walking surface and to prevent debris from falling into the flume. Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins, and their catalysts and hardeners shall be crated or boxed separately and notes as such to facilitate their movement to a dry indoor storage facility.

All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Adhesives, resins and their catalysts are to be stored in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

Contractor shall furnish and install all ancillary parts and products necessary to hold the grating safely in place. Provide shop drawings of fabricated gratings and accessories clearly showing material sizes, types, styles, part or catalog numbers, and complete details for the fabrication and installation of components. Submittals shall also include, but not be limited to, structural design data, structural properties data, corrosion resistance tables, certificates of compliance, test reports as applicable, and design calculations for assembled systems.

END OF SECTION 7-05

7-08 General Pipe Installation Requirements**7-08.2 Materials**

*Section 7-08.2 is supplemented with the following:
(Local Agency SP)*

Trench (subsequent) Backfill	2-09.3(1)E
Controlled Density Fill	2-09.3(1)E
Gravel Backfill for Foundations	9-03.12(1)A Class B.
Detectable Marking Tape	9-15.18

7-08.3 Construction Requirements**7-08.3(1)A Trenches**

*The second, third, and fourth paragraphs of Section 7-08.3(1)A are deleted and replaced with the following:
(Local Agency SP)*

Trench widths shall be as shown on the Drawings and as specified in Section 2-09. Trenches shall be excavated to the depth and grade as shown on the Drawings with allowance for pipe thickness and bedding. Trenches must be of sufficient width in the pipe zone to permit proper installation and bedding of the pipe and to provide the required compaction of backfill.

The trench subgrade or foundation shall be undisturbed native material that is firm, stable and uniform along the pipe. Remove all ledgerrock, boulders, stones, and clods/lumps larger than 2-inches in maximum dimension that are within 6-inches of the pipe. Replace any material that is removed with gravel backfill for pipe zone bedding or gravel backfill for foundations compacted to a density at least equal to the undisturbed trench bottom.

Detectable marking tape shall be installed over all gravity sewer mains.

7-08.3(1)C Bedding the Pipe

*The second paragraph of Section 7-08.3(1)C is revised to read as follows:
(Local Agency SP)*

Pipe zone bedding shall be as shown on the Drawings and shall be placed in loose layers and compacted to at least 90 percent of its maximum density. Bedding shall be placed, spread, and compacted before the pipe is installed so that the pipe is uniformly and properly supported along the barrel. The pipe shall then be placed on the prepared subgrade, and the bedding material shall be worked carefully under the pipe haunches and compacted. Lifts of not more than 6-inches shall be placed and compacted along the sides and top of the pipe to the height shown on the Drawings.

7-08.3(1)D Dewatering

*Section 7-08.3(1)D is added as the following:
(Local Agency SP)*

General Requirements

The Contractor is responsible for the design, implementation, operation and maintenance of the dewatering system needed to complete the work based on the time of year and proposed construction methods and techniques. The Contractor shall determine the appropriate type and design that is required for a given location, situation and conditions. The Contractor shall also be responsible for making the determination as to whether or not dewatering can be performed or the extent of the dewatering that can be accomplished without impacting structures/facilities and/or stream flow given the soil, groundwater, site conditions and shoring method. Watertight shoring and/or other measures may be required to avoid adversely impacting structures/facilities, stream flow or other sensitive areas. Under no circumstances shall dewatering operations affect nearby structures or other facilities.

The Contractor shall design the dewatering system(s) using accepted methods of design and engineering consistent with sound modern practices. The Contractor shall have, or shall employ the services of qualified hydro-geologist(s), engineer(s), and/or subcontractor(s) for the design, installation, operation and maintenance of the dewatering system(s).

Before commencement of any dewatering, the Contractor shall obtain acceptance of his dewatering plan by the Engineer. The plan shall also address how typical problems or issues that could arise will be dealt with and handled. Review by the Engineer of the method, installation, and operation and maintenance details submitted by the Contractor shall not in any way be considered to relieve the Contractor from full responsibility for a complete, proper and adequate design and performance of the system in controlling the water and protection of structures/facilities, stream flow, wetlands, or other sensitive areas.

Dewatering shall not adversely affect streams and wetlands. The Contractor shall comply with all applicable permits and regulatory requirements. The Contractor shall not allow the discharge from any dewatering system to degrade the water quality of the receiving waters. Contractor shall monitor flows above and below the discharge locations as described herein to verify compliance with these requirements.

The Contractor shall provide a power source or generating facilities for the dewatering system that complies with all applicable local controls and noise level rules, regulations and ordinances. Where feasible, the Contractor shall use electric rather than diesel or gas-powered equipment.

All wells shall be constructed and decommissioned in accordance with WAC 173-160. Contractor shall properly contain and dispose of all drill cuttings/spoils and drilling/development water.

All structure and pipe trench excavations shall be dewatered as required to keep the groundwater table at least two (2) feet below the subgrade elevation, or bottom of excavation, whichever is deeper, during construction. Groundwater shall be controlled so as to provide a firm foundation and prevent the formation of "quick" conditions or "boils" during excavation.

At all times, structure excavations and pipe trenches shall be kept free from water to facilitate fine grading, the proper laying and joining of pipes, and prevention of damage to completed joints and structures. Adequate pumping equipment shall be provided to handle and dispose of the water without damage to adjacent property, or cause a nuisance/menace to the public. Water in the trench shall not be allowed to flow through the pipe while construction work is in progress.

Dewatering shall be controlled to prevent damage from settlement to nearby structures or utilities, lowering/reducing stream flow due to lowering of the groundwater table or adversely affecting nearby sensitive areas. The release of groundwater to its static levels shall be performed in such a manner as to maintain the undisturbed state of the foundation soils, prevent disturbance of backfill and prevent movement of all structures and pipelines.

Sumps shall only be used where the conditions are conducive for their use and the static groundwater levels are less than three (3) feet above the structure or trench subgrade or in areas where the potentiometric surface has been previously lowered to within three (3) feet of the structure or trench subgrade. If sumps and pumps are determined to be adequate for control of groundwater during excavation, the sump system shall be an engineered system. The use of open or cased sumps is not acceptable and will not be allowed. An engineered sump system shall consist of sumps constructed of machine-slotted well screen installed three to four feet below excavation grade. An engineered filter pack of properly selected and graded material for the in-situ soils and a minimum of 4-inch thickness filter pack shall be installed around the well screen to reduce soil loss and turbidity during pumping.

Sumps and pumps are not recommended where the groundwater is more than three (3) feet above the structure or trench subgrade or if the soils have a high permeability. The Contractor is responsible for potholing and testing questionable areas well in advance of construction to test the feasibility of dewatering with sumps and pumps. If groundwater recharge is found to be too rapid, vacuum well points or deep wells may be required. If well points or deep wells are used, Contractor shall provide an acceptable plan for accommodating and maintaining traffic, both public and construction, through the area.

Dewatering Discharge

Contractor shall properly develop all wells and well points to remove fines resulting from drilling and construction and to increase the yield and hydraulic connection. The Contractor shall discharge all well development water and sump pump discharge to sediment settling tanks or other accepted treatment devices as specified herein prior to discharge. The Contractor shall not discharge any development water or discharge water from sump pumps directly to the ground surface or any surface waters.

If sanitary sewers are present in the area, the Contractor may discharge dewatering water into the existing sanitary sewer system, provided that there is no sediment present in the discharge water and the volume/rate is within the system's capacity. Unless otherwise allowed, the maximum rate of discharge into the existing sewer system shall not exceed 150 gpm. All sediment discharged into the sanitary sewer system shall be removed.

If the flow adversely affects the treatment processes or sediment laden water is reaching the Contracting Agency's treatment plant, the Contractor shall immediately cease dewatering into the sanitary sewer system upon notification by the Contracting Agency or Engineer. The Contractor shall anticipate that the dewatering discharge may have to be discontinued for a period of time, especially during wet weather conditions.

The Contractor shall do whatever is necessary to eliminate or minimize sediment transport during dewatering operations. If sediments or solids are present in the dewatering water, the Contractor shall employ best management practices to remove suspended solids as required to meet permit or water quality requirements.

If overland flow treatment is utilized, the Contractor shall control dewatering discharge such that the discharge is spread out over as great an area as possible. The overland flow shall not cause erosion or allow sediment laden water to enter wetlands, streams, adjacent properties or the active construction area. Contractor shall adjust or modify the discharge system or use sand bags, temporary berms, erosion control matting or other means as necessary to control the discharge.

Discharge Limits and Requirements

The Contractor shall limit the rate of dewatering discharge such that flooding of the discharge area or the inundation of the discharge receiving system does not occur. The discharge shall not increase the turbidity of any public waters downstream of the work by more than 5 NTU above background turbidity levels in accordance with Washington State Surface Water Quality Requirements, WAC 173-201A. The Contractor shall analyze the discharge for turbidity daily during the first week and weekly thereafter with a field turbidity meter using Standard Method 2130 (Standard Methods for Examination of Water and Wastewater, latest edition). Background turbidity shall be determined from water collected at least 50 feet upstream of all work areas and discharge points. Turbidity shall be calculated as the average of a number of samples (minimum of 3). The number and timing of samples shall be the same for each sampling station (i.e., background and discharge points). If the discharge is not meeting the discharge limits, the Contractor shall immediately modify the discharge system as necessary to meet the discharge limits. The Contractor will be responsible for any fines incurred as a result of the discharges exceeding the Surface Water Quality Requirements. Copies of the turbidity monitoring reports shall be provided to the Engineer.

Restoration of Disturbed Areas

When no longer needed, all dewatering piping and equipment shall be removed and the disposal site(s) shall be regraded and restored to match pre-existing conditions. All wells, well points, and observation wells installed by the Contractor shall be decommissioned.

Permits

The Contractor shall comply with the requirements of all applicable permits and federal, state and local water quality requirements. Contractor shall obtain all necessary permits and agreements required for installation and operation of the dewatering system, including construction and decommissioning of wells and disposal of the dewatering discharge. The Contractor's dewatering plan shall include all permits,

agreements and approvals from landowners required for the work to be completed. Acquisition of permits and agreements shall not result in delay of the work, or be cause for claim of delay.

The dewatering discharge system shall maintain water quality standards for surface waters in compliance with WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and all permits, including the National Pollutant Discharge Elimination System General Permit for Construction Activity.

Monitoring

The Contractor shall provide in-line flow meters on all dewatering discharges.

The Contractor shall, on at least a daily basis, visually inspect the discharge areas and system for proper function and compliance with these specifications and permit requirements.

Continual checks or an appropriate means of monitoring by the Contractor shall be performed to verify that structures/soils are not settling or surface waters are not adversely affected by the dewatering operation. Where critical structures/facilities and surface waters exist immediately adjacent to the areas of dewatering, reference points shall be established and observed at sufficiently frequent intervals so as to detect any changes prior to adverse impacts occurring.

Should settlement, reduction in stream flow/depth, or degraded water quality be observed, the Contractor shall immediately cease dewatering operations and implement contingency plans as outlined in the Contractor's accepted dewatering plan. The responsibility for monitoring the dewatering operation in a manner which protects adjacent structures/facilities and streams rests solely with the Contractor.

7-08.3(1)E Wet Weather Earthwork

*Section 7-08.3(1)E is added as the following:
(Local Agency SP)*

Wet weather generally begins in mid-October and continues through May, although precipitation may occur at any time of the year. Earthwork completed in wet weather or under wet conditions shall be accomplished in small sections to minimize exposure to wet weather. Each section shall be sufficiently small so that the removal of soil and placement of backfill can be accomplished on the same day. No soil shall be left un-compacted and exposed to water. Soil that is too wet for compaction shall be removed and replaced with clean, imported backfill material. Grading and earthwork should not be accomplished during periods of heavy continuous rainfall.

7-08.3(3) Backfilling

*The first and second paragraphs of Section 7-08.3(3) are deleted and replaced with the following:
(Local Agency SP)*

Pipe zone backfill material shall be gravel backfill for pipe zone bedding, controlled density fill, or select native bedding material meeting the requirements of Section 9-03.12(3) and shall be compacted as specified herein. Backfill above the pipe zone shall be as specified in Section 2-09 and herein.

The fourth paragraph of Section 7-08.3(3) is deleted and replaced with the following:

Backfill above the pipe zone shall be accomplished in such a manner that the pipe will not be shifted out of position nor damaged by impact or overloading. Placement and compaction of backfill shall conform to Section 2-09.3(1)E. Material excavated from the trench shall be used for backfill if it meets the specified criteria for backfill and does not include organic matter, frozen lumps, wood, rocks or pavement chunks larger than 4 inches in maximum dimension. Material determined by the Engineer to be unsuitable for backfill at the time of excavation shall be removed and replaced with suitable backfill material.

*Section 7-08.3(3) is supplemented with the following:
(Local Agency SP)*

After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed. Excessive settlement of trench backfill will be considered a result of defective compaction and the Contractor will be required to rework the backfill until the specified compaction is achieved.

7-08.3(4) Plugging Existing Pipe

*Section 7-08.3(4) is deleted, renamed and replaced with the following:
(Local Agency SP)*

Where shown on the Plans or where designated by the Engineer, pipes which are to be abandoned in place shall be plugged with a minimum of twelve (12) inches of CDF and the ends capped with an acceptable capping device. Care shall be used in placing the CDF in the pipe to see that the opening of the pipe is completely filled and thoroughly plugged. Manholes that are designated to be abandoned shall have the top five feet of the manhole removed. The remaining barrel of the manhole shall be filled with sand or CDF. Backfill excavations per Section 7-08.3(3).

END OF SECTION 7-08

7-17 Sanitary Sewers**7-17.2 Materials**

*Section 7-17.2 is supplemented with the following:
(Local Agency SP)*

Sewer pipe shall be PVC pressure pipe conforming to section 9-30.1(5)A.

7-17.3(1) Protection of Existing Sewerage Facilities

*Section 7-17.3(1) is supplemented with the following:
(Local Agency SP)*

The Contractor shall provide temporary sewer bypass pumping and piping as necessary to facilitate installation of the facilities/improvements.

7-17.3(2)A General

*The fourth paragraph of Section 7-17.3(2)A is deleted and replaced with the following:
(Local Agency SP)*

Side sewers shall be tested for their entire length from the public sewer to the edge of the right of way in conjunction with the testing of the main sewer.

*Section 7-17.3(2)A is supplemented with the following:
(Local Agency SP)*

Gravity sewer piping and drains shall be flushed with water to remove material or debris that may have been inadvertently introduced. All water used for cleaning shall be considered as wastewater and shall be removed and disposed of accordingly. Pipe shall be relatively clean without significant soil, gravel or other debris in the pipe.

Gravity sewer cleaning shall be conducted by pulling a properly sized "go-no-go" ball/pig through the completed pipeline. Cleaning shall be conducted on a manhole to manhole or individual pipe sections basis.

Sanitary sewer shall be tested using the low pressure air test specified in Section 7-17.3(2)F. Low pressure air tests shall be performed after the sewers have been cleaned.

7-17.3(3) Temporary Sewage Bypassing

*Section 7-17.3(3) is added as the following:
(Local Agency SP)*

The Contractor shall provide temporary sewer bypass pumping and piping as necessary to facilitate installation of the facilities/improvements. The bypass system shall be comprised of at least two pumps, main power and a backup power system. Pumps shall have automatic start/stop controls as well as an appropriate monitoring and alarm system. The monitoring and alarm system shall be capable of notifying the Contractor and the Contracting Agency of a system failure 24 hours a day and shall be fully functional during all bypass operations.

In the event of a failure, Contractor shall respond immediately and fix the cause of the problem. Contractor shall be on-call 24 hours a day and be able to respond within 30 minutes at all times during sewer bypassing. The Contractor will be required to demonstrate that this requirement can be met and that responsible and appropriately trained personnel will be able to deal with emergencies that could arise. The Contractor is encouraged to consider retaining a company or individual(s) that specialize in the operation and maintenance of sewer systems for bypasses that require unattended operation.

Contractor shall be responsible for properly operating, protecting, maintaining and servicing the pumping equipment to ensure continuous and uninterrupted operation of the bypass system for the duration of the temporary bypass. Sufficient equipment, parts and materials and fuel shall be maintained onsite at all times. A minimum of 24-hours of fuel shall be maintained on-site during bypass operations. Contractor's personnel shall be knowledgeable and trained on how to operate and maintain the bypass equipment.

Noise levels of equipment shall meet the requirements of Kitsap County and Washington State noise level requirements. Contractor shall make the necessary provisions to control the noise of the temporary pumping equipment such that the noise generated by the equipment complies with Section 1-07.5(5) of these Special Provisions. Depending on the pumping and power supply equipment that is used, meeting these requirements may require the use of sound attenuating enclosures as well as other provisions and measures.

If possible, submersible pumps and existing electrical power supplies should be used in order to minimize engine noise. If engine-driven pumps or engine generators are used, equipment shall be located as far from residences as possible, but in no cases closer than 50 feet. The Contractor shall anticipate that such equipment may need to be installed in special sound attenuating enclosures. Depending on the situation and subject to the approval of the Contracting Agency, the only possible exception or relaxation of this requirement will be in cases where the bypassing equipment will only be operated:

1. During the work week;
2. During normal working hours; and
3. Period of bypass operation will be less than one week.

The Contractor shall consider the need for, and be prepared to perform certain work during low flow periods which is generally between 12 am and 5 am in order to minimize bypass requirements.

For short term bypassing needs (<4 hours), the Contractor may consider the use of vacuum and/or tanker trucks. The Contractor is cautioned that this approach is usually only suitable for relatively low flow, short term situations. If this approach is used, proper pre-planning and coordination with the Contracting Agency will be required.

If Contractor elects to haul the sewage for these short term bypasses, then the Contractor shall provide all pumps, piping, and tanker trucks and be responsible for filling tanker trucks, hauling, and properly disposing of sewage. The Contractor shall schedule and conduct his/her work in a manner that will minimize the number of times and length of time that temporary/bypass pumping is required. This method of bypassing the sewage is limited to one-day shifts and shall not be left in operation overnight.

Spills or bypasses of sewage to surface waters or drainage courses are prohibited. In the event sewage spills are caused by the Contractor, the Contractor shall take immediate action to contain the spill, and shall be responsible for cleanup and any consequential damages.

Sewer bypassing shall not cause backup of sewage into residences. Depth of surcharge upstream shall be kept to the minimum necessary. The Contractor will be responsible for repairing any damage to upstream property due to surcharging of the system. All sewer pipes and manholes that were surcharged shall be properly flushed to remove accumulated sewage material at the conclusion of the sewer bypassing.

Contractor shall restore the bypass areas to pre-existing conditions. Contractor is fully responsible for any damage that may result from an inadequate or improper installation, maintenance or operation, or failure of any kind of the bypass system.

If the system has to be drained to complete the work, such as for a cut-over/connection, Contractor shall provide the necessary temporary pumping and/or storage equipment to drain or remove the sewage from the excavation and/or system.

END OF SECTION 7-17

END OF DIVISION 7

8-01 Erosion Control and Water Pollution Control**8-01.3(1)B Erosion and Sediment Control Lead**

*Section 8-01.3(1)B is supplemented with the following:
(Local Agency SP)*

Contractor shall have a certified ESC Lead on-site or on-call at all times.

8-01.3(1)F Construction Operations

*Section 8-01.3(1)F is added as the following:
(Local Agency SP)*

Temporary erosion and sedimentation control measures shall be in place and functional before land disturbing activities take place. Construction areas shall be properly protected and stabilized as the construction progresses. Disturbed slopes along streams or drainage channels shall be protected with erosion control matting or other suitable measures.

Contractor shall maintain drainage conveyance within and downstream of construction areas to properly control drainage and runoff. Contractor shall be responsible for damage caused by lack of, or improper, measures or maintenance.

Properly maintain erosion and sedimentation control measures and facilities so that they will individually and collectively perform and function effectively. The Contractor and Engineer will periodically review and assess the performance and adequacy of the Contractor's TESC measures and facilities. The Contractor shall promptly correct any inadequacies or deficiencies found to exist. Such reviews or lack thereof shall not relieve the Contractor of responsibility for providing and maintaining proper TESC measures and facilities at all times.

8-01.3(2)B Seeding and Fertilizing

*Section 8-01.3(2)B is supplemented with the following:
(Local Agency SP)*

In areas where the Contractor's activities have compromised the erosion control functions of the existing grasses, the Contractor shall over-seed these areas. Grass seed shall be applied at a rate of 5 pounds per 1,000 square feet. Areas subsequently disturbed by the Contractor's operations shall be reseeded.

8-01.3(2)D Mulching

*Section 8-01.3(2)D is supplemented with the following:
(Local Agency SP)*

Mulch shall be wood cellulose fiber. Wood cellulose shall be applied with a soil binder and stabilizing emulsion. Guar gum, or approved equal, shall be used as the soil binder. Stabilizing emulsion shall be Marloc as manufactured by Reclamare Co. or approved equal. Wood cellulose fiber shall be applied at a rate of 200 pounds per acre. Hydro-mulch slurry shall be applied at a rate of 2,000 pounds per acre.

8-01.3(2)E Soil Binders and Tacking Agents

*The first paragraph is revised to read:
(August 6, 2012 WSDOT GSP)*

Tacking agents or soil binders applied using a hydroseeder shall have a mulch tracer added to visibly aid uniform application. This tracer shall not be harmful to plant, aquatic, or animal life. A minimum of 125 pounds per acre and a maximum of 250 pounds per acre of Short-Term Mulch shall be used as a tracer.

8-01.3(2)G Protection and Care of Seeded Areas

*Section 8-01.3(2)G is supplemented with the following:
(Local Agency SP)*

Watering of seeded areas shall be at a frequency, amount and for the duration that is necessary to properly sustain the seeded areas until the grass is fully established and able to survive without supplemental watering.

8-01.3(4) Placing Compost Blanket

*The first paragraph is revised to read:
(August 6, 2012 WSDOT GSP)*

Compost blanket shall be placed to a depth of 3 inches over bare soil. Compost blanket shall be placed prior to seeding or other planting. An organic tackifier shall be placed over the entire composted area when dry or windy conditions are present or expected before the final application of mulch or erosion control blanket. The tackifier shall be applied immediately after the application of compost to prevent compost from leaving the composted area.

8-01.3(5) Placing Plastic Covering

*The second and third paragraphs are revised to read:
(August 6, 2012 WSDOT GSP)*

Clear plastic covering shall be used to promote seed germination when seeding is performed outside of the Dates for Application of Final Seed in Section 8-01.3(2)F. Black plastic covering shall be used for stockpiles or other areas where vegetative growth is unwanted.

The plastic cover shall be installed and maintained in a way that prevents water from cutting under the plastic and prevents the plastic cover from blowing open in the wind.

8-01.3(6) Check Dams

*This section is revised to read:
(August 6, 2012 WSDOT GSP)*

Check dams shall be installed as soon as construction will allow, or when designated by the Engineer. The Contractor may substitute a different check dam, in lieu of what is specified in the contract, with approval of the Engineer. The check dam is a temporary or permanent structure, built across a minor channel. Water shall not flow through the check dam structure. Check dams shall be constructed in a manner that creates a ponding area upstream of the dam to allow pollutants to settle, with water from increased flows channeled over a spillway in the check dam. The check dam shall be constructed to prevent erosion in the area below the spillway. Check dams shall be placed perpendicular to the flow of water and installed in accordance with the Standard Plans. The outer edges shall extend up the sides of the conveyance to prevent water from going around the check dam. Check dams shall be of sufficient height to maximize detention, without causing water to leave the ditch. Check dams shall meet the requirements in Section 9-14.5(4).

8-01.3(7) Stabilized Construction Entrance

*The first paragraph is revised to read:
(August 6, 2012 WSDOT GSP)*

Temporary stabilized construction entrance shall be constructed in accordance with the Standard Plans, prior to beginning any clearing, grubbing, embankment or excavation. All quarry spall material used for stabilized construction entrance shall be free of extraneous materials that may cause or contribute to track out.

8-01.3(9)B Gravel Filter, Wood Chip, or Compost Berm

*The first paragraph is revised to read:
(August 6, 2012 WSDOT GSP)*

Filter berms shall retain sediment and direct flows. The gravel filter berm shall be a minimum of 1 foot in height and shall be maintained at this height for the entire time they are in use. Rock material used for filter berms shall meet the grading requirements in Section 9-03.9(2), but shall not include any recycled materials as outlined in Section 9-03.21.

8-01.3(9)C Straw Bale Barrier

*Section including title is revised to read:
(August 6, 2012 WSDOT GSP)*

8-01.3(9)C Vacant**8-01.3(9)D Inlet Protection**

*The fourth paragraph of Section 8-01.3(9)D is supplemented with the following:
(Local Agency SP)*

Straps shall be provided to assist in removal of and cleaning of the inserts. All inserts shall have a 0.5 CF minimum storage capacity. An overflow shall be provided to prevent flooding in case the insert is clogged. Inserts shall be cleaned and maintained regularly per the manufacturer's recommendations.

8-01.3(11) Vacant

*This section including title is revised to read:
(August 6, 2012 WSDOT GSP)*

8-01.3(11) Outlet Protection

Outlet protection shall prevent scour at the outlets of ponds, pipes, ditches or other conveyances. All quarry spall material used for outlet protection shall be free of extraneous material and meet the gradation requirements in Section 9-13.6.

8-01.3(13) Temporary Curb

*This section is revised to read:
(August 6, 2012 WSDOT GSP)*

Temporary curbs shall divert or redirect water around erodible soils.

Temporary curbs shall be installed along pavement edges to prevent runoff from flowing onto erodible slopes. Water shall be directed to areas where erosion can be controlled. The temporary curbs shall be a minimum of 4 inches in height. Ponding shall not be allowed in roadways.

8-01.3(4)A Fiber Roll

Fiber rolls shall be of the dimensions shown on the Plans, conforming to materials specifications 9-14.5(5), "Wattles", or 9-14.5(6), "Compost Socks".

END OF SECTION 8-01

8-02 Roadside Restoration**8-02.1 Description**

*Section 8-02.1 is supplemented with the following:
(Local Agency SP)*

The work shall also include the preparation and restoration of landscaped and lawn areas and replacement of landscape plant material. All areas shall be restored to equal or better conditions than that which existed prior to construction.

8-02.2 Materials

*Section 8-02.2 is supplemented with the following:
(Local Agency SP)*

Topsoil Type A shall be as described in Section 9-14.1(1).

Grass seed shall be as described in Section 9-14.2, applied at a rate of 5 pounds per 1,000 square feet. Areas subsequently disturbed by the Contractor's operations shall be reseeded at no additional cost to the Contracting Agency.

8-02.3(1) Responsibility During Construction

*Section 8-02.3(1) is supplemented with the following:
(Local Agency SP)*

At the conclusion of the work, and as approved by the Engineer, Contractor shall seed, fertilize, and mulch all areas within the project's limits that have been disturbed by the construction activities.

Unwanted or undesirable vegetation in areas to be seeded shall be controlled according to Section 8-02.3(2)B prior to seeding.

8-02.3(5) Planting Area Preparation

*Section 8-02.3(5) is supplemented with the following:
(Local Agency SP)*

Areas requiring seeding that have become compacted due to construction use shall be loosened and cultivated to a minimum depth of 12-inches prior to seeding. With the Engineer's review and acceptance, the depth of cultivation may be reduced in areas that are in close proximity to existing vegetation that could be damaged.

Areas shall be graded to within 0.10 foot of finish grade prior to seeding.

Suitable native topsoil that was stripped prior to construction shall be evenly spread and distributed in the same general areas from which it originated to the extent possible.

8-02.3(11) Bark or Wood Chip Mulch

*Section 8-02.3(11) is supplemented with the following:
(Local Agency SP)*

Mulch shall conform to section 8-01.3(2)D.

Composted organic mulch shall be an aged, well decomposed, dark, high organic/humus-like material with a fine texture meeting the following requirements:

1. pH range between 6.0 and 8.5
2. Foreign material no more than 1% on a dry weight or volume basis, whichever is least.
3. Meets Grade AA compost
4. Minimum organic matter is 30% on a dry weight basis
5. Soluble salt content less than 4.0 mmhos/cm

6. Compost score of 5 or higher on the Solvita compost maturity
7. Comprised of 85-94% recycled yard waste, 5-10% pre-consumer food waste and 1-5% wood waste.

8-02.3(13) Plant Establishment

*Section 8-01.3(2) is supplemented with the following:
(Local Agency SP)*

Watering of seeded areas shall be at a frequency, amount and for the duration that is necessary to properly sustain the seeded areas until the grass and plants are fully established and able to survive without supplemental watering.

8-02.3(16) Lawn Installation

*Section 8-02.3(16) is supplemented with the following:
(Local Agency SP)*

All lawn and vegetated areas shall be restored to pre-construction condition. The Contractor may either reseed or place sod and is responsible for watering until new grass is established.

8-02.3(16)A Lawn Installation

*Section 8-02.3(16)A is supplemented with the following:
(Local Agency SP)*

The existing sod shall be cut vertically, to a depth of 4 inches, along straight lines at a uniform width to provide ease of handling and matching when replaced. The strips shall be removed to a depth of 3 inches with an approved sod cutter. Sod strips shall be placed in neat piles and maintained continuously in a damp condition until replaced on the lawn.

Topsoil shall be evenly spread to a uniform minimum depth of 2 inches, and cultivated into the top 6 inches of the existing soil, then raked by approved hand or mechanical methods to remove all large clods, rocks, debris, and litter over 1 inch in any dimension. Such clods, rocks, debris, and litter shall be disposed of by the Contractor.

The area shall then be compacted by rolling in two directions. The second rolling shall be done at right angles to the first rolling. The roller shall be a standard, lightweight, water-filled type roller. The grade after compaction shall be such that the root zone of the sod will be flush with the final grade.

The area shall be raked to make it smooth and level. Topsoil shall be added when necessary, or designated by the Engineer.

Immediately prior to placement of sod, a 10-20-20 fertilizer shall be raked into the soil at a rate of 12 pounds per 1,000 square feet. The fertilizer shall be applied by approved hand or mechanical methods. Application in one direction will be sufficient.

The sod strips shall be placed within 5 days after being cut. Soil shall be moistened by sprinkling prior to the laying of the sod. Sod shall be placed without voids, and have the end joints staggered. Butt joints shall be staggered and tightly fitted. On sloped areas, sod shall be laid with the long dimension across the slope, parallel to the top or toe of the slope.

Following placement, the sod shall be rolled with a smooth, water-filled type roller. After rolling, the sod shall be heavily watered by sprinkling. Lawn areas shall be uniformly level to match existing grades.

The Contractor shall commence watering immediately upon sod replacement and shall schedule additional watering as necessary to prevent drying of joints between sod strips. Water shall be furnished by the Contractor. Watering shall continue until the Owner has accepted the project.

8-02.3(17) Lawn Seeding

*Section 8-02.3(17) is added as the following:
(Local Agency SP)*

After topsoil has been spread to a uniform minimum depth of 4 inches, the areas shall be mechanically tilled to a depth of 6 inches, then raked by approved hand or mechanical methods to remove all large clods, rocks, debris, and litter over 1 inch in any dimension, which shall be disposed of by the Contractor.

The area shall then be rolled in two directions; the second rolling shall be done at right angles to the first rolling. The roller shall be a standard, lightweight, water-filled type roller.

Rake the area to make it smooth and level. Add topsoil where necessary, or as directed by the Engineer.

The finished grade shall be 1 inch below all curbs, sidewalks, and/or other appurtenances.

Apply a 10-20-20 fertilizer at the rate of 12 pounds per 1,000 square feet. The fertilizer shall be applied by an approved hand or mechanical method. Application in one direction is sufficient. Rake the fertilizer into the surface soil to a depth of 1/2 to 1 inch. Roll the area in one direction.

Seed shall be applied after the fertilizer and shall be raked into the top 1 inch of the fertilized topsoil. The seed shall be applied with a lawn type spreader at the rate of 5 pounds per 1,000 square feet.

Immediately following the raking of the seed into the soil, the total area shall be covered with horticultural grade sun-dried peat moss, "HI-PRESS," or approved equal, applied with a lawn type spreader to the rate of 70 pounds per 800 square feet. This material shall not be raked into the topsoil, but shall be rolled with a water-filled roller. The seeded and prepared area shall then be kept continuously moist until the grass is 2 inches high. Water shall be furnished by the Contractor. The Contractor shall be responsible for providing a finished grass area which meets the approval of the Owner until such time that the grass is 2 inches high.

END OF SECTION 8-02

8-22 Pavement Markings**8-22.1 Description**

*Section 8-22.1 is supplemented with the following:
(Local Agency SP)*

Contractor shall remove and replace all striping disturbed by the Contractor's operations. Preconstruction photos shall be used to assist with determining the location of the striping.

8-22.3(1) Preliminary Spotting

*Section 8-22.3(1) is revised to read as follows:
(Local Agency SP)*

Preliminary spotting to guide the striping machine is required for all longitudinal lines except where a clearly visible separation is present. Preliminary spotting shall be provided at a spacing of 100-foot maximum on tangents and 25 feet maximum on curves. The color of the material used for spotting shall match the color of the permanent marking.

END OF SECTION 8-22

END OF DIVISION 8

9-03 Aggregates**9-03.8(2) HMA Test Requirements**

*Section 9-03.8(2) is supplemented with the following:
(May 25, 2006 APWA GSP)*

The number of ESAL's for the design and acceptance of the HMA shall be 3 million to 10 million.

9-03.8(7) HMA Tolerances and Adjustments

*Section 9-03.8(7) is deleted and replaced with the following:
(May 25, 2006 APWA GSP)*

Job Mix Formula Tolerances. After the JMF is determined as required in 5-04.3(7)A, the constituents of the mixture at the time of acceptance shall conform to the following tolerances:

Aggregate, Percent Passing	Non-Statistical Evaluation	Commercial Evaluation
1", ¾", ½", and 3/8" Sieves	±6.0%	±8.0%
U.S. No. 4 Sieve	±6.0%	±8.0%
U.S. No. 8 Sieve	±6.0%	±8.0%
U.S. No. 200 Sieve	±2.0%	±3.0%
Asphalt Binder	±0.5%	±0.7%

These tolerance limits constitute the allowable limits as described in Section 1-06.2. The tolerance limit for aggregate shall not exceed the limits of the control points section, except the tolerance limits for sieves designated as 100% passing will be 99-100. The tolerance limits on sieves shall only apply to sieves with control points.

END OF SECTION 9-03

9-04 Joint and Crack Sealing Materials**9-04.4(1) Rubber Gaskets for Concrete Pipes and Precast Manholes**

*Section 9-04.4(1) is supplemented with the following:
(Local Agency SP)*

Rubber gaskets for use in joints of precast concrete sanitary sewer manhole sections shall conform to the applicable requirements of ASTM C443. In addition to the rubber gasket, all joints shall be provided with a flexible, butyl resin sealant, ConSeal/CS 440 or equivalent.

END OF SECTION 9-04

9-05 Drainage Structures and Culverts**9-05.15(1) Manhole Ring and Cover**

The second paragraph of *Section 9-05.15(1)* is revised to read as follows:
(Local Agency SP)

All covers shall be interchangeable within the dimensions shown on the Drawings. All mating surfaces shall be machine finished to ensure a nonrocking fit. Manholes frames and covers shall have the word "SEWER" cast into the top surface of the cover and shall be the bolt down type and size as shown on the Drawings. Subject to compliance with the contract documents the following manufacturers are acceptable:

1. EJ Company.
2. Neenah Foundry.
3. Deeter Foundry.
4. Olympic Foundry.
5. Approved Equal.

9-05.50(2) Manholes

Section 9-05.50(2) is supplemented with the following:
(Local Agency SP)

Flow channels shall be formed at the factory in all sanitary sewer manhole bottoms in accordance with WSDOT Standard Plan B-15.20. A "U" shaped flow channel (round bottom half with vertical side walls on the top half) shall be constructed to form a smooth continuation of the pipes through the manhole. Channel height shall equal the full diameter of the largest pipe. Adjacent shelf shall be pitched at a minimum of 2% (1/4-inch per foot) to channels. The channel and shelf shall be constructed of commercial class concrete and in accordance with Section 6-02. Channels shall be formed for all connecting piping with branch line(s) curved into a main channel; avoiding excessive widening of the channel. Branch channel inverts shall intersect the main channel at a somewhat higher elevation.

High strength, non-shrink grout shall be mixed using two (2) parts sand, one (1) part Portland cement with an expansive agent to limit shrinkage. Sufficient water shall be added in accordance with the manufacturer's instructions for placement and maintaining a minimum 4,000 psi 28-day compressive strength. Alternatively, premixed high strength grout with only water to be added in accordance with the manufacturer's instructions may be used. Subject to compliance with the requirements, acceptable manufacturer's include Master Builders, Gifford-Hill, Sauereisen, US Grout, Set Products or Sika.

Grade rings shall conform to ASTM C478.

9-05.50(6) Coatings for Sanitary Sewer Manholes

Section 9-05.50(6) is added as the following:
(Local Agency SP)

Exterior Surfaces – The exterior surfaces of the manhole base and riser sections shall be factory coated with Tnemec Series 46H-413 Hi-Build Tneme-Tar or approved equal. Exterior coating shall be applied at 16 mils dry film thickness and per manufacturer's specifications. Exterior joints, cracks that are 10 mils (0.01 inch) wide or greater as well as damage due to transport and installation, shall be touched up in the field prior to backfilling.

Interior Surfaces – The interior surfaces of the manhole base and riser sections shall coated as follows:

- | | |
|----------------------|---|
| Coating Material: | Surface Filler, Amine Epoxy Mortar & Polyamine Epoxy |
| Surface Preparation: | SP-13 |
| Surface Filler: | One coat, 1/16". Fill Joints, Voids, Bugholes, Tnemec Mortar Clad |

Intermediate: One coat, 125 mils dry film thickness, Tnemec 434 Perma Shield
 Final: One coat, 15-18 mils dry film thickness, Tnemec 435 Perma Glaze
 Color: Primer: Beige; Finish: Light Grey

The interior surface coating system shall be field applied. Shop coating will not be allowed. The Contractor is advised that with all thick-film, quick curing materials applied to concrete surfaces, outgassing of the concrete can occur. Possible remedies include applying materials when the temperature of the concrete surfaces are descending, or applying a thin (1/8 inch) layer of the specified surfacing material. Other remedies may exist, and may be submitted to the Contracting Agency's Representative for approval.

Fill all joints, voids, bug holes and other surface imperfections with specified surface filler.

Apply specified chemical resistant mortar to all floor areas and walls scheduled to be coated at specified nominal thickness. Application shall be either by trowel or spray. If spray-applied, material shall be finish-toweled to a hard, dense film.

Topcoat/gel coat shall be applied to the minimum specified thickness upon cure regardless of the number of coats required.

9-05.50(7) Flexible Boot-Type Seals/Connectors

*Section 9-05.50(7) is added as the following:
 (Local Agency SP)*

Unless otherwise specified or shown on the Plans, wall penetrations shall consist of a flexible boot type connector including resilient EPDM Rubber internal Korbond and external pipe clamp. Resilient EPDM Rubber shall conform to ASTM C923. Internal Korbond shall conform to ASTM C923 and ASTM A167. Korbond shall be made of 304 stainless steel. External pipe clamp shall conform to ASTM C923 and ASTM A167. External take-up clamps shall be made of 304 stainless steel. The bolt assembly shall be made of 304 stainless steel. Flexible connectors shall be Kor-N-Seal, G-3 Boot (by A-Lok Products) or accepted equal.

9-05.50(8) Rigid/Mechanical Type Seals/Connectors

*Section 9-05.50(8) is added as the following:
 (Local Agency SP)*

Modular rigid/mechanical type seals shall consist of synthetic rubber links, sized to fill the annulus between pipe and wall opening. Rubber links shall expand to form a watertight seal with Type 304 or 316 stainless steel bolts and nuts. Seals shall be installed per manufacturer's recommendations. Seals shall be Link-Seal Model S-316 or approved equivalent.

9-05.50(11) Flexible Couplings

*Section 9-05.50(11) is added as the following:
 (Local Agency SP)*

Center rings and end rings shall be ductile iron per ASTM A536 with a fusion bonded epoxy coating. End rings shall be color coded for the material on which the coupling is being installed. Gaskets shall be SBR or Nitrile (Buna N) per ASTM D2000. Bolts, nuts, and washers shall be 316 stainless steel. Subject to compliance with the contract documents the following manufacturers are acceptable:

1. Romac Industries, Inc. Style 501
2. Smith Blair, Inc Style 461 Quantum
3. Approved Equal

9-05.50(12) Manhole Steps and Grab Bars

Section 9-05.50(12) is added as the following:
(Local Agency SP)

Manhole steps shall be constructed of injection molded copolymer polypropylene conforming to ASTM D4101 that encapsulates a ½-inch diameter, Grade 60 ASTM A615 deformed steel reinforcing bar. Manhole steps shall have a tread width of 13-3/4 inches. Manhole steps shall meet ASTM C478, C497, AASHTO M-199 and OSHA related standards. Steps provided in conformance with ASTM C478 shall conform to the applicable requirements prescribed in the latest edition of ANSI 14.3. Grab bars shall be by the same manufacturer as the manhole steps. Minimum reinforcing bar size shall be 1 inch diameter, galvanized.

Subject to compliance with the contract documents the following manufacturers are acceptable:

1. Bowco Industries, Inc.
2. Parson Environmental
3. American Step
4. Approved equal

9-05.50(13) Packaged Metering Manhole (PMM)

Section 9-05.50(13) is added as the following:
(Local Agency SP)

The PMM shall conform to ASTM D3753-12. Composition of the packaged metering manhole laminate shall be in accordance with the recommendations shown in the Quality Assurance Report for Reinforced Thermostat Plastic (RTP) Corrosion Resistant Equipment prepared under the sponsorship the Society of the Plastics Industry, Inc. (SPI) and the Material Technology Institute of the Chemical Process Industries, Inc. (MTI) for "Hand Lay-up Laminates" and shall meet the specifications for Type 1, Grade 10 laminates shown in Appendix M-1 of said report.

Visual inspection for defects shall be made without the aid of magnification and defects shall be classified as to type and level as shown in Table 1 of ANSI/ASTM D2563-0, approved 1977, (or any subsequent revision). Allowable surface tolerances are as follows:

DEFECTS	ALLOWABLE TOLERANCES
Cracks, Crazing, Blisters, Chips, Pits, Dry Spots, Fish Eyes, Burned Area, Entrapped Air	None
Wrinkles and solid blisters, not to exceed 1/8"	Maximum Deviation: 10% of thickness
Surface porosity (pinholes or pores in the laminate surface)	None
Exposed Glass, Exposure of cut Edges:	None

Each packaged metering manhole shall be a complete integral unit consisting of a composite fiberglass reinforced plastic (FRP) manhole with sealed fiberglass bottom, fiberglass access ladder, metering flume and accessories as required. Packaged metering manhole body shall be totally manufactured of fiberglass reinforced polyester. Packaged metering manhole shall be molded individually to the exact dimensions specified. Fiberglass barrel shall be 60 inches in diameter. Thickness of the walls and floor of the PMM shall be not less than 1/2" thick.

PMM body shall be:

1. Engineered composite fiberglass reinforced plastic (FRP).

2. Molded in one piece to create a seamless corrosion barrier impervious to moisture.
3. FRP resin shall be polyester.
4. Packaged Metering Manhole Hardware (when applicable): T-316L stainless steel.

Packaged metering manhole shall be manufactured of reinforced thermoset plastic in one integral piece that is structurally strong, lightweight, watertight and corrosion resistant to salt water, ground water, corrosive soil conditions and many commonly encountered industrial chemicals. PMM inside surface shall be smooth, isophthalic gelcoat of 10 - 20 mil (0.25 - 0.51mm) thickness. Exterior Surface shall be grey gel coat 15-20 mil (0.25 – 0.51mm) thickness for UV protection. The surface shall be free of exposed reinforcing fibers. The minimum glass content shall be 30% exclusive of gelcoat surfaces.

Any portion of the flume or end adapters extending outside the manhole shall have a reinforced cover. The manhole sides, bottom and external flume sections shall be designed to withstand H-20 loading. There shall be no light duty angles of flanges protruding beyond the flume or manhole that can be damaged by shear or load forces.

Structural characteristics for a 1/8” (3mm) glass mat laminate shall meet the following minimum physical properties:

Tensile strength	15,000 psi (1034 ksc)
Flexural Modulus	1,000,000 psi (70307 ksc)
Flexural Strength	20,000 psi (1406 ksc)
Compressive Strength	22,000 psi (1547 ksc)
Impact Strength	9.0 ft-lbs/in. (1.24 kgf/m)
Water absorption	0.13% (in 24 hours)

The manhole barrel shall be fitted with through-wall water tight conduit penetrations to permit sub-grade entrance for power or recording lines without damaging the watertight integrity of the manhole. See electrical drawings for further information.

Subject to compliance with the contract documents, acceptable manufacturers are:

1. Plasti-Fab Inc.
2. Tracom Inc.
3. Virtual Polymer Compounds, LLC.
4. Approved Equal.

9-05.50(13)A Access Hatches for PMM

Access hatch doors and frame shall be designed to support H30 (AASHTO) loading (H20 + 30% increase).

Access hatches shall meet the following requirements:

1. Access hatch doors and frames shall be designed to meet load requirements specified herein. Size and number of leafs shall be as indicated on the Drawings.
2. Doors shall be constructed of aluminum and stainless steel materials. Non-traffic duty and light traffic duty doors shall be constructed of ¼ -inch minimum structural grade aluminum, mill finish, diamond plate. Heavy traffic duty doors shall be constructed of 3/8-inch minimum structural grade aluminum, mill finish, diamond plate. Provide stiffeners as required to meet load requirements.

3. Frame shall be constructed of 3/8-inch minimum structural grade, one piece aluminum extruded frame having a continuous concrete anchor as part of the one piece construction. The inside of the frame shall have a continuous door-support angle which must have a full bed of concrete under both the frame and the support angle. Frame shall have 1-1/2 inch drain welded under frame to allow free drainage.
4. Doors shall be hydraulic spring assisted, open to 90 degrees and lock automatically in that position by a stainless steel positive locking arm (two minimum per leaf) and release handle. No more than 30 pounds of force shall be required to open hatch cover. Hinges shall be stainless steel with tamper proof fasteners and be hinged as shown on the drawings.
5. Doors shall have a stainless steel lifting handle and stainless steel slam lock with padlock hasp and removable key handle.
6. Provide safety grating for hatch opening. Grating shall be similar in design to aluminum Safety Grate System by LW Products or Syracuse Castings.
 - a. Grating shall be designed to provide 300 psf rated fall-through protection.
 - b. Grating hardware shall be stainless steel. Grating shall be hinged to open the same as doors. Hinges shall have tamper proof fasteners. Grating shall open to 90 degrees with positive locking hold-open arm using spring assist such that no more than 30 pounds of force is required to open safety grating. Provide vinyl grip handle. Design shall be such that the clear opening of hatch is not reduced.
7. Doors shall be bolted down for traffic.
8. Hatches shall be protected from corrosion. Coat all surfaces in contact with concrete or dissimilar metals with two heavy coats of bituminous paint or equivalent.
9. All hardware shall be stainless steel.
10. Padlocks shall be provided with all access hatches.

Subject to compliance with the Contract Documents, the following manufacturers are acceptable

1. LW Products
2. Bilco Company
3. Halliday Products
4. Nystrom
5. Approved equal

Grade rings, conforming conform to ASTM C478, shall be installed between the PMM and the access hatch. Hydrophilic caulk shall be installed between the grade ring and the PMM.

9-05.50(13)B PMM Ladder

Ladders shall be fabricated of either fiberglass or aluminum and shall conform to ASTM C478 and the applicable requirements prescribed in ANSI 14.3.

Fiberglass ladders, grating, and support members shall be as follows:

1. Made of shop fabricated, premium grade isophthalic polyester resin.
2. Fiberglass reinforced plastic (FRP) structural shapes shall be manufactured by the pultrusion process.
3. All components shall be protected with UV and fire retardant inhibitor additives in the resin and a synthetic surfacing veil.
4. Color shall be OSHA approved safety yellow.

5. Fasteners, clips, saddles and miscellaneous components shall be fiberglass. Type 316 stainless steel shall be used if fiberglass components are unavailable. All bolts and nuts shall be Type 316 stainless steel.
6. Rungs shall have fluted skid resistant/non-slip surfacing
7. Grating and associated supports shall be designed for a uniform 100 psf live load and concentrated 300 pound load.
8. Ladder shall include a telescoping safety post fabricated of aluminum or Type 304 stainless steel as manufactured by Bilco or approved equal.

Subject to compliance with the contract documents the following manufacturers are acceptable:

1. Fibergrate Composite Structures
2. Strongwell
3. American Grating
4. McNichols
5. Approved equal

9-05.50(13)C PMM to Concrete Slab Connections

A 1/2" thick expanded polystyrene bead board shall be supplied for placement on the concrete slab under the manhole. Manhole shall be equipped with hold down brackets for anchoring the unit to the concrete slab.

9-05.50(13)D PMM Inlet and Outlet Pipes

The PMM shall be provided with 24.803 inch O.D. pipe stubs for connection to incoming pipe (24 inch O.D. ASTM F679 PVC) and outgoing pipe (18 inch O.D. ASTM F679 PVC). Flume end adapters shall allow a smooth flow transition from pipe flow to flume flow. Neoprene boots with stainless steel clamping bands shall be supplied and sized to connect inlet and outlet pipe stubs to the pipeline.

9-05.50(13)E PMM FRP Grating

Manufacturer shall be certified to the ISO 9001-2008 standard and shall provide a 3 year limited warranty on all FRP products against defects in materials and workmanship.

Fiberglass reinforcement shall be continuous roving in sufficient quantities as needed by the application and/or physical properties required. Resin shall be Vinyl Ester with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

Grating shall be of a one piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have a square mesh pattern providing bidirectional strength. Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 1/8" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 35% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements of the Contract. Grating bar intersections are to be filleted to a minimum radius of 1/16" to eliminate local stress concentrations and the possibility of resin cracking at these locations. Grating shall be manufactured with an integrally applied grit to the top surface of each bar providing maximum slip resistance.

Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Data performed only on the resin shall not be acceptable. Molded grating products

shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test. Gratings shall not burn past the 25 mm reference mark and will be classified HB per ASTM D635.

After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.

Grating shall be designed to withstand a uniform loading of 150 psf and a concentrated load of 300 pounds with deflections not to exceed 0.25" or $L/D = 120$, whichever is less. The manufacturer shall certify that the stiffness of all panels manufactured are never more than 2.5% below the published load-deflection values.

Grating shall have a mesh configuration of 1-1/2" x 1-1/2" with a tolerance of plus or minus 1/16" mesh centerline to centerline. All shop fabricated grating cuts shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.

Subject to compliance with the contract documents the following manufacturers are acceptable:

1. Fibergrate Composite Structures
2. Strongwell
3. American Grating
4. McNichols
5. Approved equal

END OF SECTION 9-05

9-14 Erosion Control and Roadside Planting

9-14.1(1) Topsoil Type A

Section 9-14.1(1) is deleted and replaced with the following:
(Local Agency SP)

Type A topsoil shall be imported topsoil that consists of a two way soil mixture of 50% composted organic mulch and 50% sand, sandy loam or silty sand high in organic content blended with compost. Topsoil shall be well combined, free of weeds, rocks, debris, and other deleterious materials that will not pass through a 7/16 inch sieve. Mix shall not contain fresh sawdust or other fresh wood byproducts. Native topsoil may be used for Topsoil Type A if it meets the criteria for Topsoil Type A.

9-14.2 Seed

Section 9-14.2 is supplemented with the following:
(Local Agency SP)

Grass seed of the following composition, proportion and quality shall be applied at the rate shown in the table below (Grass Seed Mix). Seed shall be certified weed free which indicates there are no noxious or nuisance weeds in the seed (reference Washington State Noxious Weeds List, WAC 16-750-005).

Grass Seed Mix

Kind and Variety of Seed in Mixture	Scientific Name	Percentage Pure Live Seed
Meadow barley	<i>Hordeum brachyantherum</i>	40
Blue wildrye	<i>Elymus glaucus</i>	40
Spiked bentgrass	<i>Agrostis exarata</i>	10
Slender hairgrass	<i>Deschampsia elongate</i>	10

9-14.4 Mulch and Amendments

Section 9-14.4 is supplemented with the following:
(Local Agency SP)

Mulch shall be wood cellulose fiber. Wood cellulose shall be applied with a soil binder and stabilizing emulsion. Guar gum, or approved equal, shall be used as the soil binder. Stabilizing emulsion shall be Marloc as manufactured by Reclamare Co. or approved equal. Wood cellulose fiber shall be applied at a rate of 200 pounds per acre. Hydro-mulch slurry shall be applied at a rate of 2,000 pounds per acre.

Composted organic mulch shall be an aged, well decomposed, dark, high organic/humus-like material with a fine texture meeting the following requirements:

1. pH range between 6.0 and 8.5
2. Foreign material no more than 1% on a dry weight or volume basis, whichever is least.
3. Meets Grade AA compost
4. Minimum organic matter is 30% on a dry weight basis
5. Soluble salt content less than 4.0 mmhos/cm
6. Compost score of 5 or higher on the Solvita compost maturity
7. Comprised of 85-94% recycled yard waste, 5-10% pre-consumer food waste and 1-5% wood waste.

END OF SECTION 9-14

9-15 Irrigation System**9-15.18 Detectable Marking Tape**

*Section 9-15.18 is supplemented with the following:
(Local Agency SP)*

Marking tape and tracer wire shall be installed over all force mains. Tracer wire shall be No. 12 solid insulated copper wire, continuous between hand holes, and strapped to the pipe crown at 20 to 25 foot intervals with nylon zip ties rated for 150# or equal. Splicing of tracer wires will not be allowed, excepting under special circumstances with the acceptance of the Engineer. If allowed, splices shall be rated for direct bury and shall be effectively moisture sealed for two or more conductors. Splices shall be installed per manufacturer's instructions and applicable codes. The device shall be UL listed as a wire connector system for use with underground conductors.

END OF SECTION 9-15

END OF DIVISION 9