

# S-11 CULVERTS, HEADWALLS AND ROADSIDE DRAINAGE

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### 11.01 SCOPE OF WORK

This specification shall cover the requirements for enclosing existing open channel drains located in the right-of-way or adjacent to municipal roadways. This enclosed drain may be used for drive approaches or sidewalk crossings over the existing drain or as an aesthetic infill to enclose the stormwater drainage system. This specification shall also cover the requirements for the field tapping of existing storm outlets into the drain being enclosed. The work shall include the tying in of the required outlets thereto, including all necessary excavation, backfilling and all other items of work as herein described. This specification is NOT to be applied to Municipal Drains which are covered under the Drainage Act.

### 11.02 REFERENCES OR RELATED DOCUMENTS

This specification refers to the following standards, specifications, or publications:

- OPSS 421
- OPSS 1820
- OPSS 1840 & OPSS 1841 & OPSS 1843
- OPSD 804.030
- OPSD 804.040
- AS-209

### **11.03 MATERIALS**

Materials shall meet the requirements of OPSS 1820 for concrete pipe products, OPSS 1841 for polyvinyl chloride (PVC) pipe products, OPSS 1840 for polyethylene (PE) plastic pipe products and OPSS 1843 for polypropylene (PP) plastic pipe products.

Any manholes or catchbasins required shall be in accordance with City of Windsor Standard Specification S-2.

The contractor shall supply ALL materials.

### **11.04 GRANULAR & NATIVE BACKFILL**

This material, unless otherwise specified, shall be 19.5mm Granular 'A' stone compacted and graded to accept the placement of the pipe.

If the culvert is to be located under a hard surface, such as a drive approach, then the remainder of the backfill is to be compacted granular 'A' material to the bottom side of the proposed hard surface. The minimum depth is 300mm.

If the culvert is to be located in a grassed area, with no hard surface, than the backfill can be an approved native soil with a minimum topping of 100mm of approved topsoil..

### **11.05 CONSTRUCTION**

#### **11.05.01 OPSS Reference**

Installation of the pipe culvert shall be in accordance with OPSS 421 unless otherwise noted in the City of Windsor Standard Specification S-11 or as directed by the City Engineer.

#### **11.05.02 Time and Order of Performance**

The Contractor shall commence the works and carry them on at whatever point or points along the line of the drain that the City Engineer may direct.

#### **11.05.03 Existing Conduits, Tracks, etc., Access to Property and Protection**

The Contractor shall be liable and responsible for the adequate support and for protection of sewers, drains, conduits, tracks or other structures owned by the Corporation or any private company or any individual enjoying franchise rights or occupying any portion of the street or right-of-way on, or below or above the surface. The Contractor shall provide access for traffic to houses and other premises, provide for proper protection against damage, and comply with all the requirements of the contract.

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**11.05.04 Excavation**

The trench for the new culvert shall be true to the line and grade required to match the existing line and grade of the roadside drain. The trench shall be of sufficient width to provide free working space and to permit compaction of backfill material around the pipe, but the width of the trench shall not exceed the inside diameter of the barrel of the pipe plus 300mm, unless permitted by the City Engineer in writing. When trenches are excavated wider than the above maximum caused by the use of power equipment, lack of bracing or other reasons, any increase in quantities of excavation, granular backfill or other items incurred by the excess width shall be borne by the Contractor.

Where required by conditions of the soil, sheeting apparatus shall be furnished and the cost of the sheeting, shoring, and bracing shall be borne by the Contractor.

The bottom of the trench shall be filled with a bed of 19.5 Granular 'A' stone backfill, 300mm deep, and no point of the trench bottom shall be within 300mm of the grade line of the bottom of the pipe. The foundation beneath the headwalls shall be as per AS-209.

Where the bottom of the trench is in unstable soils, such as saturated clays and/or silts or quicksand, the trench shall be deepened to the depth required for granular backfill or whatever other means for securing good foundation, as required by the City Engineer.

Not more than 100 metres of cut shall be opened at any one time or placed in advance of the completed drain, unless by written permission of the City Engineer and for such distance as therein specified.

The Contractor shall excavate for the culvert without any damage to any existing trees or the root systems of any trees adjacent to the trench where the culvert is to be placed.

**11.05.05 Laying Pipes**

The trench shall, at all times, be kept dry and no pipes shall be laid in water or upon a wet bed, except when authorized in writing by the City Engineer. At all times during the progress of laying and backfilling and until the work has been accepted, the pipes shall be thoroughly cleaned, kept clean and protected from coatings of dirt. All pipes shall be laid true to line and grade. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place so as to prevent any movement or disturbance of the joint. All junctions, if required, shall be made with the coupler bands manufactured by the culvert manufacturer and approved for use with the type of pipe used for the culvert. The City Engineer, at his discretion, may require that the junctions in the culverts be made with a watertight seal. The Contractor shall then provide culverts that can be jointed in such a way that a watertight seal is obtained. This shall be undertaken by using pipe that has a bell and spigot joining system that provides a watertight seal. No pipe shall be left in the trench overnight without backfilling to protect it.

Proper foundation shall be provided in unstable soils by the addition of granular material as directed by the City Engineer.

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**11.05.06 Storm Outlet Connections**

While placing the culvert, the Contractor may expose existing storm private drain connections or other culverts that drained to the existing ditch and now must drain into the proposed culvert. The connections are to be made using factory or manufactured tee fittings approved for use with the type of culvert installed. At no time shall the pipe being connected to the culvert protrude into the culvert. No connections shall be abandoned unless approved by the City Engineer.

If it is required that the culvert shall be connected to a pre-cast concrete structure, such as a catch basin or manhole, this shall be done by utilizing the factory supplied “knock out” formed into the pre-cast unit for the size of culvert being tied in or by use of a cast-in-place rubber coupling to accept the size of the culvert. Should it have to be connected to an existing concrete structure, the Contractor shall core drill a hole in the existing structure no larger than 25mm greater than the pipe size. All connections to structures are to be mortared in place, using a rapid setting, waterproof, hydraulic cement mixed according to the manufacturer’s directions.

**11.05.07 Backfilling**

Backfill, unless otherwise specified, shall be in accordance with section 3 and shall be placed over culverts only after it has been approved by the City Engineer. Any earth from cave-ins and all other objectionable matter shall be removed prior to backfilling. Any damaged pipes shall be removed and replaced and also any other repairs shall be performed prior to any backfilling. Backfilling, except for the completion of any section or at the termination of a day’s work, shall be kept back at least 15 metres from the advanced end of the pipe. At the termination of a day’s work, backfilling shall be completed to the end of the pipe to protect it from cave-ins, falling stones, or other damage.

The granular backfill shall be placed in layers not exceeding 150mm in depth when compacted. Care shall be taken to ensure that the backfill is placed under the haunches and around the pipe. Compaction shall be performed in such a manner as not to injure or dislodge the pipe.

**11.05.08 Headwalls**

Where directed by the City Engineer, the Contractor shall place headwalls at the terminal ends of the culverts. Precast or poured in place concrete headwalls shall be constructed as per OPSD 804.030 and OPSD 804.040 at locations approved by the City Engineer.

Headwalls for pipe diameters of 450mm or less can be constructed with standard jute bags filled with 14 MP a damp concrete mix at locations approved by the City Engineer.

Gabion stone with ready mix concrete poured over it will not be allowed as a headwall in a roadside drain without the approval of the City Engineer.

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**11.05.09 Catch Basin / Structures**

The Contractor shall place all structures such as catchbasins and manholes as shown on the approved plans as per City of Windsor Standard Specification S-2.

**11.05.10 Inspection**

The Contractor shall prove his work throughout the entire length of the satisfaction of the City Engineer. Defective work or damaged materials shall be remedied or removed and replaced as directed by the City Engineer immediately on its discovery.

**11.05.11 Disposal of Surplus Materials, etc.**

As the trenches are filled in and the work completed, the Contractor shall, at his own expense and cost, removed and dispose of all surplus earth, stone, and other material from the work in such manner and at such points as directed by the City Engineer.

**11.06 MEASUREMENT FOR PAYMENT**

Measurements will be made in lineal metres of the length of the pipe in place. Separate measurements shall be made of different diameters laid in accordance with the specifications and schedule of payments as called for on the tender.

**11.07 BASIS OF PAYMENT**

**11.07.01 Bid Prices for Laying Pipe**

Bid prices on the above items shall be in full compensation for the excavation of the trench and for the laying of the pipes, backfilling with granular and native (if required) material, the supply and use of all appliances and materials, the disposal of all surplus excavated materials and the satisfactory cleaning of the site and for all work required under this specification, excepting those items for which other payment is herein provided.

**11.07.02 Excavation for Culverts**

The cost of the excavation shall be included in the linear price for the placement of the culvert.

**11.07.03 Granular & Native Backfill**

The cost of the granular and native (if required) backfill shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the supply, handling, hauling, placing and compacting all work herein specified incidental to this item.

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**11.07.04 Catch Basin / Structure Connection**

The cost of connecting the culvert to any structure shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the connection.

**11.07.05 Headwalls**

The cost of excavating, placing, backfilling, and connecting the culvert to any headwall shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the headwalk. Payment shall include, but not be limited to, the supplying and placing of the Unshrinkable Backfill and the supplying, placing and removing of the steel plates, including the steel spikes, the orange construction fencing, including the steel bars to support it or any other protection required by the City Engineer.