

PART 1 GENERAL1.1 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 City of Ottawa Special Provisions
 - .1 F-4411 Watermain Construction by Open Cut.
 - .2 F-4412 Watermain Pipe.
 - .3 F-4417 Relocations, Blankings and Connections to Existing Watermains.
 - .4 F-4492 Thrust Restraint of Watermains and Fittings.
- .2 City of Ottawa Standard Drawings
 - .1 W17 Standard Trench Detail.
 - .2 W25.3 Concrete Thrust Blocks for PVC and DI Pipe 400mm and Under.
 - .3 W25.4 Thrust Block Dimension Tables for PVC and DI Pipe 400mm and Under.
 - .4 W25.5 Restraining and Retaining Rings for PVC and DI Pipe 400mm and Under.
 - .5 W25.6 Tables of Restrained Lengths for PVC and DI Pipe 400mm and Under.
- .3 Ontario Provincial Standard Specification (OPSS):
 - .1 OPSS.MUNI 441 (November 2016), Watermain Installation in Open Cut.
 - .2 OPSS.MUNI 1359 (November 2016) Unshrinkable Backfill.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide marked up record drawings, including surveyed locations or work, details of pipe and fittings, maintenance and operating instructions.
 - .1 Include top of pipe and horizontal location of fittings and type.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

1.5 SCHEDULING OF WORK

- .1 Schedule Work to minimize interruptions to existing services and hydrants.
- .2 Notify fire department of any planned or accidental interruption of water supply to hydrants.

- .3 Provide "Out of Service" sign on hydrant not in use.

PART 2 PRODUCTS

2.1 WATER MAIN PRODUCTS AND APPURTENANCES

- .1 All products used for water main and water service work shall be on the approved materials list of the City of Ottawa. All restraining mechanisms to have stainless steel hardware.

2.2 BEDDING, COVER AND BACKFILL MATERIAL

- .1 Bedding and cover material to be OPSS.MUNI Granular A. Backfill material to meet requirements of Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Pressure grout material shall be according to OPSS.MUNI 1359 for unshrinkable fill, with a 28 day compressive strength in the range of 0.4 to 0.7 MPa.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Submit information, material and design data to Departmental Representative for thrust restraint systems at proposed water main end cap a minimum of 5 working days in advance of work. Thrust restraint systems shall be in accordance with the requirements listed in City of Ottawa S.P. F-4492 –Thrust Restraint of Watermains and Fittings.
- .2 Clean all materials of accumulated debris and water before installation.
 - .1 Inspect materials for defects to approval of Departmental Representative.
 - .2 Remove defective materials from site as directed by Departmental Representative.

3.2 TRENCHING

- .1 Complete trenching work in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.
- .2 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

3.3 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to minimum depth of 200 mm below bottom of pipe and fittings.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% of corrected maximum dry density.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding with compacted bedding material.

3.4 ABANDONMENT

- .1 Contact Departmental Representative to arrange for shutdown of water service.
- .2 Excavate to expose water main. Support and protect water main remaining in place to prevent movement.
- .3 Cut and remove sections of existing water main to allow for installation of end caps.
- .4 Cap end of section of water main remaining in service. Install restraining/retaining rings and thrust block/anchors.
- .5 Cap downstream ends of sections of water main to be abandoned in place.
- .6 Completely fill abandoned sections of water main with pressure grout, and cap end upon completion.
- .7 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket, and maintain concentricity until gasket is properly positioned.
- .8 Avoid displacing gasket or contaminating with dirt or other foreign material.
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
- .9 Minimize deflection after joint has been made.
- .10 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .11 Ensure completed joints are restrained.

- .12 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .13 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .14 Do not utilize frozen bedding or backfill.

3.5 PIPE SURROUND

- .1 Upon completion of pipe work and abandonment, and after Departmental Representative has inspected work in place, surround and cover exposed pipes and fittings.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid-height of pipe to at least 95% of corrected maximum dry density.
- .6 Compact each layer from mid-height of pipe to underside of backfill to at least 95% of corrected maximum dry density.
- .7 Extend cover material to 300 mm above the top of the water main or fitting.

3.6 BACKFILL

- .1 Place backfill material, above pipe cover, in uniform layers not exceeding 300 mm compacted thickness up to final grade of backfill material.
- .2 Do not place backfill in frozen condition.
- .3 Under paving and walks, compact backfill to at least 98% corrected maximum dry density. In other areas, compact to at least 95% corrected maximum dry density.

3.7 SURFACE RESTORATION

- .1 After installing and backfilling over water mains, restore surface to original condition or to condition required for other subsequent work as directed by Departmental Representative.

PART 1 GENERAL1.1 REFERENCES

- .1 Canadian Standards Association (CSA):
 - .1 CSA B1800-18, Thermoplastic Nonpressure Piping Compendium - B1800 Series (Consists of B181.0, B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7 B182.8, B182.11, B182.13 and B182.14).
- .2 Ontario Provincial Standard Specifications
 - .1 OPSS.MUNI 409 (November 2017) Closed Circuit Television Inspection of Pipelines.
 - .2 OPSS.MUNI 410 (November 2015), Pipe Sewer Installation in Open Cut.
 - .3 OPSS.MUNI 1010 (November 2013), Aggregates – Base, Subbase, Select Subgrade and Backfill Material.
 - .4 OPSS.MUNI 1359 (November 2016), Unshrinkable Backfill.
 - .5 OPSS.MUNI 1841 (November 2018), Non-Pressure Polyvinyl Chloride (PVC) Pipe Products.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding, cover and sewer materials and provide access for sampling of bedding materials.
- .2 Prepare and submit to the Departmental Representative a sewage flow management plan in the form of drawings and written descriptions of how the existing sanitary sewer serving the Brooke Claxton building will remain in service while required alterations associated with the building demolition are carried out. Include emergency procedures. Submit management plan at least 4 weeks prior to scheduled start of sanitary sewer work.

PART 2 PRODUCTS2.1 PLASTIC PIPE

- .1 Type PSM Poly Vinyl Chloride (PVC): to CSA-B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Gasket and integral bell system.
 - .3 Nominal lengths: 4.0 m or 6.0 m.

2.2 PIPE BEDDING AND SURROUND MATERIAL

- .1 Granular material in accordance with OPSS.MUNI 1010, Granular A.

2.3 BACKFILL MATERIAL

- .1 As indicated in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING

- .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Do not allow contents of sewer or sewer connection to flow into trench.
- .3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.
- .4 Remove existing interior manhole and associated control valve and box.

3.3 GRANULAR BEDDING

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to minimum depth of 150mm. Increase depth to 300mm in areas with rock subgrade.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95 % corrected maximum dry density.
- .6 Fill excavation below bottom of specified bedding with compacted bedding material.

3.4 INSTALLATION

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.

- .2 Ensure transition couplings are compatible with material and condition of existing sewer. Pipe joints and connections to manholes to be structurally sound and water tight. Notify Departmental Representative of any conditions determined during excavation and exposure of the existing pipe that will prevent installation of the replacement pipe section as designed.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket end of pipe facing upgrade.
- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .7 Install plastic pipe and fittings in accordance with CSA B182.11 and OPSS.MUNI 410.
- .8 When any stoppage of Work occurs, restrain pipes to prevent "creep" during down time.
- .9 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .10 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.
- .11 Cut and cap end of building sanitary service that is being abandoned. Remove service between cap and limit of building demolition.

3.5 PIPE SURROUND

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes.
- .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95 % corrected maximum dry density.

- .6 Compact each layer from mid height of pipe to underside of backfill to at least 95 % corrected maximum dry density. Cover material to extend to 300 mm above top of pipe.

3.6 BACKFILL

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 300 mm compacted thickness up to grades as indicated.
- .3 Compact backfill to at least 95% corrected maximum dry density.

3.7 FIELD TESTING

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 Television and photographic inspections:
 - .1 Carry out inspection of installed sewer by camera. Provide 48 hours advance notice to Departmental Representative prior to inspection.

3.8 ABANDONMENT

- .1 Cap abandoned sanitary sewers in locations indicated. Cap material to be designed for, and be compatible with pipe material.
- .2 Plug abandoned pipe entry location to downstream manhole. Within manhole, trim abandoned pipe flush with manhole wall. Utilize material conforming to OPSS.MUNI 1359 for plug. Ensure plug is water-tight and that any voids between the pipe and manhole wall are filled.

PART 1 GENERAL1.1 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA):
 - .1 CSA B1800-18, Thermoplastic Nonpressure Piping Compendium - B1800 Series (Consists of B181.0, B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7 B182.8, B182.11, B182.13 and B182.14).
- .2 Ontario Provincial Standard Specifications
 - .1 OPSS.MUNI 410, (November 2015) Pipe Sewer Installation in Open Cut.
 - .2 OPSS.MUNI 1010 (November 2013), Aggregates – Base, Subbase, Select Subgrade and Backfill Material.
 - .3 OPSS.MUNI 1359 (November 2016), Unshrinkable Backfill.
 - .4 OPSS.MUNI 1841 (November 2018), Non-Pressure Polyvinyl Chloride (PVC) Pipe Products.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding, cover and sewer materials and provide access for sampling of bedding materials.
- .2 Certification to be marked on pipe.

PART 2 PRODUCTS2.1 PIPE CAPS

- .1 Type PSM Poly Vinyl Chloride (PVC) fittings: to CSA-B182.2.

2.2 PIPE BEDDING AND SURROUND MATERIAL

- .1 Granular material in accordance with OPSS.MUNI 1010, Granular A.

2.3 BACKFILL MATERIAL

- .1 As indicated in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 EXECUTION3.1 PREPARATION

- .1 Clean new fittings and pipe ends on which caps are to be placed of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING

- .2 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Do not allow contents of sewer to flow into trench.
- .4 Excavate to expose areas of storm sewer to be cut and capped, and sections to be removed.

3.3 GRANULAR BEDDING

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness at capped ends of abandoned pipe. Depth of bedding to conform with the requirements of Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .3 Shape transverse depressions as required to suit joints.
- .4 Compact each layer full width of bed to at least 95 % corrected maximum dry density.

3.4 INSTALLATION

- .1 Lay and join fittings to pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Install plastic pipe and fittings in accordance with CSA B182.11.
- .3 Joints:
 - .1 Install gaskets as recommended by manufacturer.
 - .2 Maintain joints free from mud, silt, gravel and other foreign material.
 - .3 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
 - .4 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

- .4 When any stoppage of Work occurs, restrain pipes to prevent "creep" during down time.
- .5 Cut pipes as required for fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .6 Make watertight connections for caps.
- .7 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.5 ABANDONED PIPE REMOVAL

- .1 Remove and dispose off-site storm sewer sections and associated trench drains and manholes indicated for removal.
- .2 Backfill trench in accordance with Paragraph 3.7. Existing granular bedding and cover material may be left in place.

3.6 SURROUND

- .1 Place surround material in unfrozen condition at capped pipe locations.
- .2 Upon completion of cap placement, and after Departmental Representative has inspected area, surround and cover pipes and fittings.
- .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95 % corrected maximum dry density.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 95 % corrected maximum dry density.

3.7 BACKFILL

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 300 mm compacted thickness up to grades as indicated.
- .3 Compact backfill to at least 95% corrected maximum dry density.

3.8 ABANDONMENT

- .1 Cap abandoned storm sewers in locations indicated. Cap material to be designed for, and be compatible with pipe material.
- .2 For pipes indicated to be abandoned in place, fill the entire volume of the pipe with pressure grout. Fill material shall meet the requirements for unshrinkable backfill as indicated in OPSS.MUNI 1359, with a 28-day compressive strength in the range of 0.4 MPa to 0.7 MPa.
- .3 Plug abandoned pipe entry locations to downstream manholes. Within manhole, trim abandoned pipe flush with manhole wall. Utilize material conforming to OPSS.MUNI 1359 for plug. Ensure plug is water-tight and that any voids between the pipe and manhole wall are filled.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 Canadian Council of Ministers of the Environment (CCME)
 - .1 CCME PN 1326-2003, Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products.
 - .2 CCME PN 1299-2006, Canadian Environmental Quality Guidelines.
 - .1 Chapter 7-2006, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
- .2 Canadian Federal Legislation
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .2 Canadian Environmental Assessment Act (CEAA), 2012, c. 37.
 - .3 Canada Labour Code (R.S. 1985, c. L-2).
 - .1 Part II (September 2000) - Occupational Health and Safety.
 - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 ULC-S601-07, Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids.
- .5 Storage Tank System Regulations for Petroleum and Allied Petroleum Products Regulations (SOR 2008-197)
- .6 TSSA - Contractor to be certified and be registered with TSSA.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide written storage tank description in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide the following information on storage tank as per section 44 and 45 of SOR 197:
 - .1 Internal ID number
 - .2 ECCC ID # (if applicable)
 - .3 TSSA Approved contractor contact information and certification #.
 - .4 Confirmation of the following:
 - .1 All liquids and sludge removed and disposed of.
 - .2 Tank is purged of vapours.
 - .3 No long term harmful effects to the environment.
 - .4 Date of withdrawal and removal.
 - .5 Location.
 - .6 Reason for removal.

- .4 Provide Departmental Representative with copy of vapour removal test results.
- .5 Forward affidavit of destruction of underground storage tanks to authority having jurisdiction.

1.3 QUALITY ASSURANCE

- .1 Contractor must be licensed/certified by Province authorities having jurisdiction for removal of underground storage tanks.
 - .1 License/certificate, title and number must accompany tender document.
 - .2 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.
- .2 Divert metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .3 Segregate and deliver non-salvageable or non-recyclable materials, including waste liquids and sludges to Provincially licensed waste facility.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 PREPARATION SAFETY AND SECURITY

- .1 Conform to or exceed Federal, Provincial and Territorial codes, local municipal by-laws, by-laws, and codes and regulations of utility authorities having jurisdiction.
- .2 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Protection:
 - .1 Meet safety requirements of Occupational Safety and Health, Canada Labour Code Part II and Regulations for Construction Projects.

- .2 Disconnect or remove source of ignition from vicinity of tank.
- .3 Provide temporary protection for safe movement of personnel and vehicle traffic.
- .4 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
- .5 Ground and bond metal equipment, including tanks and transfer pipes, before operating equipment or transferring flammable materials.
- .6 Use non-sparking tools and intrinsically safe electrical equipment.
- .7 Smoking is not permitted.

3.2 DRAINING

- .1 Drain and flush piping into tank.
- .2 Pump out liquid from tank
 - .1 Use explosion proof, air driven or hand pump.
- .3 Remove sludge from tank bottom.
 - .1 Dispose of product and sludge in accordance with local, Provincial regulations using waste disposal carrier licensed by Provincial Environmental Agency having jurisdiction.

3.3 TANK REMOVAL

- .1 Remove tank in accordance with SOR 197 and/or TSSA Regulations.
- .2 Contact Departmental Representative immediately if there is evidence of contamination in tank excavation, stop Work until further notice.

3.4 VAPOUR REMOVAL

- .1 Purging:
 - .1 Purge vapours to less than 10% of lower explosive limit (LEL).
 - .2 Verify with combustible gas metre.
- .2 Inverting:
 - .1 Displace oxygen to levels below necessary to sustain combustion.
 - .2 Verify with combustible gas metre.
- .3 Water Method:
 - .1 Fill tank with water to expel vapours.
 - .2 Remove and dispose of contaminated water in accordance with regulations after tank is removed from site.
 - .3 Verify with combustible gas metre.
- .4 Dry Ice Method:
 - .1 Add 1.85 gm of solid carbon dioxide (dry ice) for each 100 litre capacity.
 - .2 Crush and distribute ice evenly over greatest area to secure rapid evaporation. Avoid skin contact.
 - .3 Verify dry ice has vapourized.

- .5 Air Method:
 - .1 Ventilate tank with air using small gas exhauster operated with compressed air or other suitable means.
 - .2 Air to enter opening at one end and to exit opening at other end to quickly remove vapour.
 - .3 Test interior of tank to determine when tank is free of vapour.

3.5 CAPPING

- .1 Cap holes after tank has been freed of vapours and before tank is moved from site.
 - .1 Leave vents open.
- .2 Plug corrosion leak holes using screwed (boiler) plugs.

3.6 SECURING AND REMOVAL FROM SITE

- .1 Check vapour levels prior to transport:
 - .1 Remove vapour if required.
- .2 Dispose of tank in accordance with local, Provincial, Federal or Territorial regulations.
- .3 Truck removal:
 - .1 Secure tank on truck for transport to disposal site.
 - .2 Cut suitable openings in tank sides to render tank unusable.
 - .3 Ensure 3 mm vent hole located at uppermost point on tank.

3.7 WORKMANSHIP AND DISPOSAL

- .1 Tanks destined for disposal:
 - .1 Dismantle, cut sufficient openings or otherwise render unusable.