Project A

SPECIFICATIONS - ISSUED FOR TENDER

VOLUME 3 OF 3
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Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

.2 Section 31 23 16.26 – Rock Removal

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES STANDARDS

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.2 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI 510 November 2014 - Construction Specification for Removal.

1.4 DEFINITIONS

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.3 Ensure key personnel site supervisor project manager and subcontractor representatives attend.

.2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative when unforeseen delays occur.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Hazardous Materials:

.1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.4 Certificates:

.1 Submit copies of certified weigh bills, bills of lading, and receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.

.2 Written authorization from Departmental Representative is required to deviate from haulers, facilities, and receiving organizations.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.

.2 Storage and Protection.

.1 Protect in accordance with Section 31 00 99 – Earthwork for Minor Works.

.2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

.3 Remove and store materials to be salvaged, in manner to prevent damage.

.4 Store and protect in accordance with requirements for maximum preservation of material.

.5 Handle salvaged materials as new materials.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.6 Protect trees, plants and foliage which are to remain after construction.

.2 Existing Conditions.

.1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.

Part 2 PRODUCTS

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 EXECUTION

3.1 PREPARATION

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect and Cap Designated Mechanical Services.

.1 Natural Gas Supply Lines: remove in accordance with gas company requirements.

.2 Sewer and Water Lines: remove in accordance with authority having jurisdiction and securely plug to form watertight seal.

.3 Other Underground Services: remove and dispose of as indicated.

.5 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.2 REMOVAL OF HAZARDOUS WASTES

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Protect adjacent joints and load transfer devices.

.4 Protect underlying and adjacent granular materials.

.5 Supress dust generated by removal process.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.5 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.6 Decommission water wells and monitoring wells in accordance with Municipal and Provincial regulations.

.7 Stockpile topsoil for final grading and landscaping:

.1 Provide erosion control and seeding if not immediately used.

.2 Ensure that procedures are conducted in accordance with applicable Provincial and Municipal requirements.

.3 Remove topsoil before construction procedures commence to avoid compaction of topsoil.

.4 Handle topsoil only when it is dry and warm.

.5 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation off-site.

.6 Remove brush from targeted area by non-chemical means and dispose off-site.

.7 Strip topsoil by scraper.

.1 Avoid mixing topsoil with subsoil.

.8 Pile topsoil in berms in locations as directed by Departmental Representative.

.1 Stockpile height not to exceed 3 m.

.9 Dispose of unused topsoil off-site.

.10 Protect stockpiles from contamination and compaction.

.11 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

.8 Salvage:

.1 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as indicated.

.9 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site at authorized facilities.

.10 Backfill:

.1 Backfill in areas as indicated and in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.4 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end

markets, and which does not impede disassembly, processing, or hauling procedures.

.5 Contractor must pace deliveries and removals in order to minimize and control stockpiles.

3.5 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Transport material designated for alternate disposal using approved haulers, facilities, and receiving organizations in accordance with applicable regulations.

.1 Written authorization from Departmental Representative is required to deviate from haulers, facilities or receiving organizations.

.4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.1 Disposal Facilities: approved and listed.

.2 Written authorization from Departmental Representative is required to deviate from disposal facilities.

3.6 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 FIELD QUALITY CONTROL

.1 N/A

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 All site road and walkway to and from the construction zone must be kept clean at all times, from mud, dirt, granular material, debris, etc.

.4 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.5 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 41 13.14 – Selective Site Demolition

.2 Section 31 23 16.26 – Rock Removal

.3 Section 31 32 19.16 – Geotextile Soil Stabilization

.4 Section 31 37 00 – Rip-Rap

.5 Section 32 16 15 – Concrete Walks, Curbs and Gutters

.6 Section 32 31 13 – Chain Link Fences and Gates

.7 Section 32.92.23 - Sodding

.8 Section 33 05 16 – Maintenance Holes and Catch Basin Structures

.9 Section 33 11 16 – Site Water Utility Distribution Piping

.10 Section 33 31 13 – Public Sanitary Utility Distribution Piping

.11 Section 33 42 13 – Pipe Culvert

.12 Section 33 46 16 – Subdrainage Piping

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES STANDARDS

.1 ASTM International

.1 ASTM C-177-13 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

.2 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600kN-m/m^3)

.3 ASTM D1895-96(2010)E1 Standard Test Methods for Apparent Density, Bulk Factor, and Pourability of Plastic Materials

.2 CSA International

.1 CSA A23.1/A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.3 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS.MUNI 401 November 2015, Construction Specification for Trenching, Backfilling and Compacting

.2 OPSS.MUNI 402 November 2016, Construction Specification for Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets and Valve Chambers

.3 OPSS 805 November 2015, Construction Specification for Temporary Erosion and Sediment Control Measures

.4 OPSS.MUNI 1004 November 2013, Material Specification for Aggregates - Miscellaneous

.5 OPSS.MUNI 1010 November 2013, Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

.6 OPSD 802.010 November 2014, Flexible Pipe Embedment and Backfill Earth Excavation.

.7 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

.8 OPSD 803.030 November 2015, Frost Treatment – Pipe Culverts Frost Penetration Line Below Bedding Grade.

.4 CIMA+ Details Drawings

.1 #101, Depressed Concrete Sidewalk Slab.

.2 #104, Monolithic Concrete Curb & Sidewalk.

.3 #108, Sidewalk Adjacent to Building Door Still

.4 #112A, Concrete Curb Detail (Typical)

.5 #115A, Concrete Slab for Generator.

.6 #121C, Concrete Ramp.

.7 #142, Sod Planting.

.8 #204B, Roadway and Parking Lot Structure.

.9 #207, Granular Shoulder

.10 #211, Building Compound Area – Sedum Carpet and System Substrate.

.11 #311B, Private Fire Hydrant & Valve Installation

.12 #318, Ditch (Typical)

.13 #333, Swale (Typical)

.14 #353, Bio-Swale, River Stone and Perforated Subdrain.

.15 #600, Temporary Support for Existing Utility.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Granular A Base, Granular B Type II Subbase, Select Subgrade Material (Fill Material) to OPSS.MUNI 1010.

.2 Sand to OPSS.MUNI 1004.

.3 Native Material (Site Excavated Material), Imported Material, Embedment Material and Backfill Material to OPSS.MUNI 401.

.4 Granular Backfill to OPSS.MUNI 402.

.5 Sedum Carpet as manufactured by ZinCo (or approved equivalent) for the Building Compound Area.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Examine soil report.

.2 Evaluation and Assessment:

As indicated in Section 01 71 00, before commencing work, verify and establish locations and extent of public and private underground utilities/services in area of Work and notify Departmental Representative of findings. Costs of such services will be borne by Contractor.

.2 Evaluation and Assessment:

.1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.2 Testing of materials and compaction of backfill and fill will be carried out by a testing laboratory designated and paid by the Departmental Representative.

.3 Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill and fill materials proposed for use.

.4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.

.5 Before commencing work, conduct, with Departmental Representative, condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in-place conditions:

.1 Protect excavations from freezing.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.4 Protect buried services that are to remain undisturbed.

.5 Protect and support exposed existing underground services as per CIMA+ detail #600.

.3 Removal:

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

.3 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

.4 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

3.3 DEWATERING

.1 Keep excavations free of water while Work is in progress.

.2 Provide a detail dewatering to the Departmental Representative for approval.

.3 Protect open excavations against flooding and damage due to surface run-off.

.4 In accordance with the Section 01 35 43 – Environmental Protection, Contractor must register all water taking activities on Ontario's "Environmental Activity and Sector Registry (EASR)" if water taking exceeds 50,000 l/day, and obtain a "Permit to Take Water (PTTW)" if water taking exceeds 400,000 l/day.

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved collection/runoff areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction.

3.4 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

.2 Do blasting in accordance with Section 31 23 16.26 – Rock Removal.

.3 Topsoil stripping:

.1 Strip topsoil as per Section 02 41 13 – Selective Site Demolition.

.2 Stockpile in locations as directed by Departmental Representative.

.3 The stockpiled topsoil can be reuse as much as possible in new landscaped areas.

.4 Excavate as required to carry out work, in all materials met.

.1 Do not disturb soil below bearing surfaces. Notify Departmental Representative when excavations are complete.

.2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

.5 In trenches:

.1 Excavate trenches of watermain and sewer pipes as per OPSD 802.010 or OPSD 802.013 to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 300 mm above pipe not to exceed diameter of pipe plus 600 mm.

.2 Excavate trenches of culvert pipes as per OPSD 802.010 and OPSD 803.030.

.6 Excavate for slabs, roadways and parking lots to subgrade levels.

.1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

.7 Excavate under the building slab:

.1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

.2 Excavate down to 300 mm under the Finish Floor Elevation (F.F.E.) of the building.

3.5 SITE QUALITY CONTROL

.1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

3.6 BACKFILLING (INCLUDING PIPE BEDDING AND SURROUND)

.1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.4 Subgrade surface: subgrade surfaces below walks, paving, and slab on grade to be approved by Departmental Representative as well as proof rolled and/or compacted as directed by the Departmental Representative. Fill excavated areas with Native Material approved by Departmental Representative or with Select Subgrade Material and compact as specified.

.5 Placing:

.1 Place backfill, fill and base course material in 300 mm lifts. Add water as required to achieve specified density.

.6 Compaction: compact each layer of material to following densities for material to ASTM D 689:

.1 To underside of subbase course: 95% Standard Proctor Maximum Dry Density (SPMDD).

.2 Base and subbase courses: 100% SPMDD.

.3 Seeded and sodded areas: 90% SPMDD.

.4 Pipe bedding and surround material: From pipe invert to 300 mm above pipe or conduit to at least 96% Standard

Proctor Maximum Dry Density SPMDD (with no results below 95% SPMDD).

.7 Under slab, roadways and parking lots:

.1 Use Native Material approved by Departmental Representative or with Select Subgrade Material up to bottom of granular base courses.

.2 Use Granular B type II for subbase course and Granular A for base course.

.1 Place granular base and subbase material on clean unfrozen surface, free from snow and ice.

.2 Place granular base and subbase to compacted thicknesses as indicated. Do not place frozen material.

.3 Place in layers not exceeding 300 mm compacted thickness. Compact to density not less than 98 % standard proctor maximum dry density in accordance with ASTM D 698.

.4 Finished granular base surface to be within 10 mm of specified grade, but not uniformly high or low.

.8 In trenches:

.1 Backfill trenches of watermain and sewer pipes as per OPSD 802.010 or OPSD 802.013.

.2 Backfill trenches of culvert pipes as per OPSD 802.010 and OPSD 803.030.

.3 Place surround material in unfrozen condition.

.4 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.

.5 Leave joints and fittings exposed until field testing is completed.

.6 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.7 Place layers uniformly and simultaneously on each side of pipe.

.8 Up to 300 mm above pipe or conduit: sand placed by hand.

.9 Over 300 mm above pipe or conduit: Native Material approved by Departmental Representative.

.9 Under seeded and sodded areas: use Native or Imported Material to bottom of topsoil except in trenches and within 600 mm of foundations.

.10 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.

.11 Under building footings: Backfill and imported material meeting Granular B type II.

.12 Against building foundations and up to 300 mm under the Finish Floor Elevation (F.F.E.) of the building slab: Backfill and imported material meeting Granular B type I or type II.

3.7 GRADING

.1 Grade to ensure that water will drain away from buildings, walls and paved areas as indicated. Grade to be gradual between finished spot elevations as indicated.

.2 Rough grade to the following depths below finished grades:

.1 Pavement to depths as indicated.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Upon completion of Work, Remove debris, trim surfaces and leave work site clean.

.3 All Site road and walkways to and from the construction zone must be kept clean at all times, from mud, dirt, granular material, debris, etc.

.4 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 PRICE AND PAYMENT PROCEDURES

.1 Cost of blast survey an monitoring will be paid by Contractor.

.2 Measurement Procedures:

.1 N/A

1.2 REFERENCE STANDARDS

.1 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS.PROV 120 November 2014, General Specification for the Use of Explosives.

.2 OPSS.PROV 202 – Construction Specification for Rock Removal by Manual Scaling, Machine Scaling, Trim Blasting, or Controlled Blasting.

.3 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

1.3 DEFINITIONS

.1 Rock: any solid material in excess of 0.25 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.

.2 PPV: peak particle velocity.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Blasting Submittals: submit for approval, written proposal of operations for removal of rock by blasting to Departmental Representative.

.1 Indicate proposed method of carrying out work. Include details on protective measures, time of blasting and other pertinent details.

.2 Submit records to Departmental Representative at the end of each shift. Maintain complete and accurate record of drilling and blasting operations.

.3 Qualification Statements:

.1 Retain licensed explosives expert to program and supervise blasting work, to interpret recommendations of pre-blasting report, and to determine precautions, preparation and operations techniques.

.2 Submit documentation verifying explosives expert's qualifications.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 QUALITY ASSURANCE

.1 Blasting Survey and Monitoring:

.1 Departmental Representative will visit adjacent buildings and structures to determine existing conditions and describe blasting and seismic recording operations.

.2 Seismographic monitoring will be conducted during entire progress of blasting operations.

.2 Blasting and Vibration Control:

.1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.

.2 During each blast, ground vibration PPV and the peak sound pressure levels shall be monitored as per OPSS.PROV 120.

.3 Ground vibration as measured by PPV shall be limited to the maximum levels shown in Table 1 of OPSS.PROV 120.

.4 Complete blasting before constructing any structural element including concrete footings, walls and columns.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Not used.

Part 3 EXECUTION

3.1 ROCK REMOVAL

.1 Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.

.2 Remove rock to alignments, profiles, and cross sections as indicated.

.1 Do blasting operations in accordance with OPSS.PROV 120 – General Specification for the Use of Explosives and OPSS.PROV 202 – Construction Specification for Rock Removal by Manual Scaling, Machine Scaling, Trim Blasting, or Controlled Blasting.

.3 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.4 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.5 Excavate trenches as per OPSD 802.013.

.6 Cut trenches to widths as indicated.

.7 Use pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques unless specified otherwise or directed by Departmental Representative.

.8 Remove boulders and fragments which may slide or roll into excavated areas.

.9 Correct unauthorized rock removal at no extra cost.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Rock Disposal:

.1 Dispose of removed rock off site in accordance with Section 01 74 21 - Construction/demolition Waste Management and Disposal.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.3 PROTECTION

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures. Erect fencing as needed, post guards, sound warnings and display signs when blasting to take place.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 – Earthwork for Minor Works

.2 Section 31 37 00 – Rip-Rap

.3 Section 33 46 16 – Subdrainage Piping

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES

.1 ASTM International

.1 ASTM A 123/A 123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM D 4355/D 4355M-14, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

.3 ASTM D 4491-99a(2014)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.4 ASTM D 4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.5 ASTM D 4716/D 4716M-14, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.6 ASTM D 4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.7 ASTM D6241-14, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.1-94(R2013), Textile Test Methods - Bursting Strength – Diaphragm Pressure Test.

.2 CAN/CGSB-4.2 No. 11.2-M89(R2013), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).

.3 CAN/CGSB-4.2 No. 12.2-2012, Textile Test Methods – Tearing Strength – Trapezoid Method.

.4 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

.1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 No.4-94, Methods of Testing Geosynthetics – Geotextiles – Normal Water Permeability Under No Compressive Load.

.4 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.

.5 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.6 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

.3 CSA International

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS 1860 November 2012, Material Specification for Geotextiles.

.2 OPSD 219.110 November 2015, Light-Duty Silt Fence Barrier.

.3 OPSD 810.010 November 2013, General Rip-Rap Layout for Sewer and Culvert Outlet.

.5 CIMA+ Details Drawings

.1 #211 Building Compound Area – Sedum Carpet and System Substrate.

.2 #353, Bio-Swale, River Stone and Perforated Subdrain.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit following samples 4 weeks prior to beginning Work.

.1 Minimum length of 2 m of roll width of geotextile.

.2 Methods of joining.

.4 Test and Evaluation Reports:

.1 Submit copies of mill test data and certificate at least 4 weeks prior to start of Work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect geotextiles from direct sunlight and UV rays.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIAL

.1 Geotextile:

.1 Non-woven for silt fence according to OPSS 1860, Table 3

.2 Non-woven for rip-rap, Class II according to OPSS 1860, Table 1.

.3 Non-woven for Sedum Carpet foundation separation and for bio-swale clear stone trench, Class I according to OPSS 1860, Table 1.

.4 Knitted sock geotextile for perforated Subdrain of bio-swale to OPSS 1860, Table 2.

.2 Hydraulic properties:

.1 Non-woven for silt fence to OPSS 1860, Table 3

.2 Non-woven for rip-rap to OPSS 1860 and the following:

.1 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10, 75-150 µm

.3 Non-woven for Sedum Carpet foundation separation and for bio-swale clear stone trench to OPSS 1860 and the following:

.1 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10, maximum 205 µm

.2 Permittivity: to CAN/CGSB-148.1 No.4, minimum 2.00s^{-1}.

.4 Knitted sock geotextile for perforated Subdrain of bio-swale to OPSS 1860, Table 2

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins or weights.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 300 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 hours of placement.

.7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.1 Place and compact soil layers in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 – Earthwork for Minor Works.

1.2 MEASUREMENT PROCEDURES

.1 N/A

1.3 REFERENCE STANDARDS

.1 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS 511 November 2013, Construction Specification for Rip-Rap, Rock Protection, and Granular Sheeting

.2 OPSS 1004.MUNI November 2013, Material Specification for Aggregates - Miscellaneous

.3 OPSS 1860 April 2012, Material Specification for Geotextiles

.4 OPSD 810.010 November 2013, General Rip-Rap Layout for Sewer and Culvert Outlet

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

Part 2 PRODUCTS

2.1 STONE

.1 Rip-rap shall be according to OPSS 1004 and as specified in the drawings.

.2 Rock protection and granular sheeting shall be according to OPSS 1004.

2.2 GEOTEXTILE FILTER

.1 Nonwoven geotextile soil stabilization: in accordance with Section 31 32 19.16 - Geotextile soil stabilization.

Part 3 EXECUTION

3.1 EXCAVATION

.1 Prior to placing any material, the area shall be excavated or filled or both to the lines and dimensions specified in the Contract Documents and fine graded to a uniform even surface.

3.2 **PLACING**

.1 Place geotextile on prepared surface in accordance with Section 31 32 19.16 - Geotextile soil stabilization and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

.2 Place rip-rap to thickness and details as indicated.

.3 Rip-rap shall be placed in a set and stable manner, flat on the slope with the largest dimension parallel to the slope contours.

.4 The larger pieces of rip-rap shall be placed in the bottom courses.

.5 The rip-rap shall be laid closely so that a reasonable semblance of courses is achieved. Smaller pieces of rip-rap shall be used to fill the voids.

.6 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

Part 1 GENERAL

1.1 PRICE AND PAYMENT PROCEDURES

.1 No extra compensation will be paid for calcium chloride and water ordered and applied on Saturdays, Sundays or holidays.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-15.1-92, Calcium Chloride.

.2 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 506 November 2013, Construction Specification for Dust Supressants.

.2 OPSS 2501 April 2015, Material Specification for Calcium Chloride.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Supply calcium chloride in quantities and at times as directed by Departmental Representative.

.2 Deliver calcium chloride to site in moisture-proof bags, in bulk in tank cars, covered hopper cars, or covered trucks. Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer.

.3 Storage and Handling Requirements:

.1 Store bags of calcium chloride in weather-proof enclosures.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Calcium chloride, Type I: to OPSS 2501 and CAN/CGSB-15.1, 35% aqueous solution.

.2 Water: in accordance with Departmental Representative's approval.

Part 3 EXECUTION

3.1 APPLICATION

.1 Apply calcium chloride and water with equipment approved by Departmental Representative at rate according to manufacturer’s instructions when directed by Departmental Representative.

.2 Apply water and aqueous calcium chloride with distributors equipped with means of shut-off and with spray system to ensure uniform application.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Place materials defined as hazardous or toxic in designated containers.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Formwork.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 30 00 – Cast-In-Place Concrete.

.4 Section 31 00 99 – Earthwork for Minor Works

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-13, Standard Test Method for Materials Finer than 0.075-um (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136/C136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600 kN-m/m3).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.3 Canadian Standards Association (CSA International)

.1 CSA A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 350 March 1998, Concrete Specification for Concrete Pavement and Concrete Base.

.2 OPSS 351 November 2015, Construction Specification for Concrete Sidewalk.

.3 OPSS 353 November 2010, Construction Specification for Concrete Curb and Gutter Systems.

.4 OPSS.MUNI 1010 November 2013, Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.

.5 City of Ottawa Standard Details

.1 SC7.3 March 2016, TWSI Detail

.6 CIMA+ Standard Details

.1 #101, Depressed Concrete Sidewalk Slab.
.2 #104, Monolithic Concrete Curb & Sidewalk.
.3 #108, Sidewalk Adjacent to Building Door Still
.4 #109, Expansion, Control and Construction Joints for Concrete Work
.5 #112A, Concrete Curb Detail (Typical)
.6 #113, Depressed Concrete Curb
.7 #115A, Concrete Slab for Generator.
.8 #121C, Concrete Ramp.
.9 #403, Security Bollard
.10 #409B, Parking Stalls

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Product Data: submit WHMIS MSDS.

.3 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 4 weeks prior to commencing work.

.4 If materials have been tested by accredited testing laboratory or testing laboratory approved by Departmental Representative within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

.5 TWSI (Tactile Walking Surface Indicator): Contractor shall submit shop drawings at least two weeks before TWSI installation showing the proposed plate arrangement at each TWSI location, the width and radius as shown on the Contract Drawings, and the width and radius achieved by the proposed plates, for review by the Contract Administrator. When requested by the Contract Administrator, Contractor shall provide written confirmation that selected TWSI product meets applicable material specifications.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00.

.2 Reinforcing steel: in accordance with Section 03 20 00.

.3 Joint filler and curing compound: in accordance with Section 03 30 00.

.4 Precast concrete curb shall be of C2 concrete class according to CSA A23.1.

.5 Granular base: to Ontario Provincial Standard Specification OPSS.PROV 1010, for Granular A. Maximum size 19.0 mm.

.6 Fill material: to Section 31 00 99 and following requirements:

.1 Select Subgrade to OPSS.MUNI 1010.

.7 TWSI (Tactile Walking Surface Indicator):

.1 Contractor shall select products found in the following table to meet the width and radius of TWSI required at each specific location as shown on the Contract Drawings:

City of Ottawa Approved TWSI:

Type	Manufacturer	Model
Cast Iron, Uncoated/Natural Finish. Dome top dia. 12 to 25mm	Neenah	
	East Jordan	Duralast
	Advantage Cast Iron	
	Ironped	
	ADA Solutions	Irondome
	Bibby-Ste-Croix	Safety Defection System
	Star	

.2 TWSI’s shall be 610 to 650 in depth and extend along the bottom portion of the depressed curb that is flush with the roadway, to the width as shown on the Contract Drawings.

.3 For curb ramps, TWSI’s shall extend the full width of the curb ramp/area.

.4 Plates shall be parallel with the curb radius (i.e. not necessarily perpendicular to the direction of pedestrian travel). This will require the use of radius TWSI plates in some instances.

.5 Radius TWSI’s are available in various radii. Careful consideration of radius design is required as the TWSI radius shall follow as close as possible the back of curb radius. When using different radius TWSI’s to match the back of a single curb radius, plates with varying radii should be alternated.

Part 3 EXECUTION

3.1 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 00 99.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials.

.1 Dispose of surplus and unsuitable excavated material in approved location on site or off site.

.3 Place fill in maximum 200 mm layers and compact to at least 95% of standard proctor maximum dry density to ASTM D698.

3.2 GRANULAR BASE

.1 Obtain Departmental Representative's approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths in accordance to Section 31 99 00 and as per CIMA+ standard details listed in the above item 1.3.6.

.3 Compact granular base in maximum 200 mm layers to at least 98% of standard proctor maximum density to ASTM D698.

3.3 CONCRETE

.1 Obtain Departmental Representative's approval of granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00 and as per CIMA+ standard details listed in the above item 1.3.6.

.3 Provide edging as indicated with 5 mm radius edging tool.

.4 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

3.4 TOLERANCES

.1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 6 m.

.2 Install expansion joints as indicated and at intervals of 6 m.

3.6 ISOLATION JOINTS

.1 Install isolation joints as required around maintenance holes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.2 Install joint filler in isolation joints in accordance with Section 03 30 00 and OPSS 353.

.3 Seal isolation joints with sealant approved by Departmental Representative.

3.7 CURING

.1 Cure concrete by adding moisture continuously in accordance with CSA A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.

.2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.8 BACKFILL

.1 Allow concrete to cure for 7 days prior to backfilling.

.2 Backfill to designated elevations with material as directed by Departmental Representative.

.1 Compact and shape to required contours as indicated.

3.9 TACTILE WALKING SURFACE INDICATORS

.1 All installations shall be completed in accordance with the detail drawings and the City of Ottawa detail SC7.3.

.2 Manufacturer’s installation procedures; and

.3 The following additional requirements:

.1 TWSI’s shall be set back 150 to 200mm from the back of curb. Where TWSI`s are installed in monolithic sidewalk, plates shall be set back 300 to 350mm from the front face of curb.

.2 Unless indicated otherwise on the contract drawings, for depressed corner areas serving two crossing directions provide 300mm +/- 50mm gap between the TWSI sets.

.3 All TWSI’s shall have 6mm wide x 6mm deep drain grooves at corners between the TWSI and the curb. Panel joints may be adapted for use if touching.

.4 TWSI sets shall be bolted together with Stainless Steel bolts and nuts.

.5 Tops of TWSI’s shall be aligned and level with the adjacent concrete surface and installation in wet concrete shall be effective in permanently securing the TWSI in place once dry.

3.10 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 – Earthwork for Minor Works.

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A 90/A 90M-13, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A 121-13 (2017), Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.

.4 A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM A 123/A 123M-17, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.

.6 ASTM F626-14, Standard Specification for Fence Fittings.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.

.2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.

.3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.

.4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.

.5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 CSA International

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A3000-13, Cementitious Materials Compendium.

.3 CAN/CSA W59-13 – Welded steel construction (metal arc welding)

.4 CAN/CSA-W117.2-12(R2017) – Safety in welding, cutting and allied processes

.4 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.5 CIMA+ Details Drawings (Modified Ontario Provincial Standard Drawings (OPSD))

.1 Modified OPSD 972.101 November 2017, Fence, Chain-Link, Component – Barbed Wire.

.2 Modified OPSD 972.102 November 2017, Fence, Chain-Link, Component – Gate.

.3 Modified OPSD 972.130 November 2017, Fence, Chain-Link, Installation – Roadway (Chain Link Fence with Top Rail).

.4 Modified OPSD 972.132 November 2017, Fence, Chain-Link, Details and Table.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete mixes, fences, posts and gates and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect fence and gate materials from damage.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with CSA A23.1.

.1 Nominal coarse aggregate size: 20-5.

.2 Compressive strength: 20 MPa minimum at 28 days with 5-7% air entrainment.

.2 Chain-link fence fabric: Anti-Climb

.1 ±75mm x ±12.5mm (anti-climb), 8-10 gauge galvanized steel.

.2 Height of fabric:

.1 Fence for generator pad: 3.0m high.

.2 Fence around building area: 3.3m high (3.0m high above ground + 0.3m below ground).

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.

.4 Gates: to CAN/CGSB-138.4.

.5 Fittings and hardware: to CAN/CGSB-138.2 and ASTM F 626, galvanized steel.

.1 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail to ASTM F 626.

.6 Organic zinc rich coating: to CAN/CGSB-1.181.

.7 Barbed wire: to and CAN/CGSB-138.2, 2.5 mm diameter.

2.2 FINISHES

.1 Galvanizing:

.1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.

.2 For pipe: 550 g/m2 minimum to ASTM A 90.

.3 For barbed wire: to ASTM A 121, Class 2.

.4 For other fittings: to ASTM A 123/A 123M.

.2 Vinyl coating: to ASTM F1664.

.1 0.045 mm dry film thickness minimum.

.3 Paint Finish (fencing frame work only):

.1 To be black gloss enamel with epoxy polyester powder coat finish. Prior to coating all surfaces to be chemically cleaned and treated, as specified on the drawings.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Grading:

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

3.3 ERECTION OF FENCE

.1 Erect fence along lines as directed by Departmental Representative and to CAN/CGSB-138.3.

.2 Excavate post holes as indicated on the drawings details.

.3 Space line posts 3 m apart maximum, measured parallel to ground surface.

.4 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.

.5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.

.6 Install terminal posts where change in alignment (i.e. corners) or on both sides of gate openings.

.7 Place concrete in post holes then embed posts into concrete to depths indicated.

.1 Extend concrete 25 mm above ground level and slope to drain away from posts.

.2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.8 Install fence fabric after concrete has cured, minimum of 5 days.

.9 Lay out fence fabric. Stretch tightly and fasten to end/corner/gate posts as per manufacturer’s instructions.

.10 Install barbed wire strands and clip securely to lugs of each projection

.11 Secure waterproof caps.

3.4 INSTALLATION OF GATES

.1 Install gates in locations as indicated.

.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.3 Determine position of centre gate rest for double gate.

.1 Cast gate rest in concrete as directed.

.2 Dome concrete above ground level to shed water.

.4 Install gate stops where indicated.

3.5 PAINTING AND TOUCH UP

.1 All fencing frame work and other fence components to be paint treated with one coat of factory black gloss enamel by powder coating application. Prior to coating all surfaces to be chemically cleared as specified on the drawings.

.2 All final work to be inspected and touched up in the field where necessary to include painting of all clips, tie connectors, bolt heads, scratches or chips.

.3 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas according to manufacturer’s instructions.

.1 Pre-treat damaged surfaces according to manufacturer’s instructions for zinc-rich paint.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES STANDARDS

.1 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 803 November 2015, Construction Specification for Sodding.

.2 CIMA+ Details Drawings

.1 #142, Sod Planting
.2 #318, Ditch (Typical)
.3 #333, Swale (Typical)
.4 #353, Bio-Swale, River Stone and Perforated Subdrain

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule sod laying to coincide with preparation of soil surface.
.2 Schedule sod installation when frost is not present in ground.
.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sod and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.

.3 Samples.

.1 Submit:

.1 Sod for each type specified.

.1 Install approved samples in 1 square meter mock-ups and maintain in accordance with maintenance requirements during establishment period.

.2 Obtain approval of samples by Departmental Representative.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of sod quality.

.5 Test Reports: submit certified test reports showing topsoil analysis and proof of following recommendations of the report.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Landscape Contractor: to be a Member in Good Standing of Landscape Ontario Horticultural Trades Association.

.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.

.3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with supplier's recommendations.

.2 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Topsoil stockpiled from site and imported topsoil as needed.

.2 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.

.2 Turf Grass Nursery Sod quality:

.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.

.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

.3 Mowing height limit: 35 to 65 mm.

.4 Soil portion of sod: 6 to 15 mm in thickness.

.3 Water:

.1 Supplied by Departmental Representative at designated source.

.4 Sod establishment support:

.1 Wooden pegs: 17 x 8 x 200 mm.

.2 Biodegradable starch pegs: 17 x 8 x 200 mm.

.5 Fertilizer:

.1 To Canada "Fertilizers Act" and Fertilizers Regulations.

.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain written approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

Part 3 EXECUTION

3.1 INSTALLERS

.1 Not Used.

3.2 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.3 PREPARATION

.1 Grade area only when soil is dry to lessen soil compaction.

.2 Verify that grades are correct and prepared in accordance with OPSS 803. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.

.3 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.4 Fine grade surface free of humps and hollows to smooth, even grade to tolerance of plus or minus 15 mm, for Turf Grass Nursery Sod surface to drain naturally.

.5 Remove and dispose of weeds; debris; stone; soil contaminated by oil, gasoline and other deleterious materials; in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

3.4 TOPSOIL PLACEMENT

.1 Place topsoil only after Departmental Representative has accepted subgrade.

.2 Spread topsoil during dry conditions in uniform layers not exceeding 300 mm, over unfrozen subgrade free of standing water.

.3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.

.4 Cultivate soil following spreading procedures.

3.5 SOD PLACEMENT

.1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.6 SOD PLACEMENT ON SLOPES AND PEGGIN

.1 Start laying sod at bottom of slopes.

.2 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catchbasins and within 1 m of drainage channels and ditches to following pattern:

.1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.

.2 Not less than 3-6 pegs per square metre.

.3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.

.4 Drive pegs to 20 mm above soil surface of sod sections.

3.7 FERTILIZING PROGRAM

.1 Fertilize and soil amendments shall be applied maximum 48 hours prior to sod placement, as per the recommendations of the topsoil analysis report.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.1 Leave Work area clean at end of each day.

.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Clean and reinstate areas affected by Work.

3.9 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Departmental Representative.

.2 Remove protection 2 weeks after installation as directed by Departmental Representative.

3.10 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.

.3 Maintain sodded areas weed free 95%.

.4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.11 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.

.4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

.3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

3.12 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.

.3 Cut grass and remove clippings as directed by Departmental Representative to height as follows:

.1 Turf Grass Nursery Sod:

.1 50 mm during normal growing conditions.

.2 Cut grass as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

.3 Fertilize as required and as accepted through prior consultation with the Departmental Representative. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.4 Eliminate weeds by mechanical or chemical means to extent acceptable to Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

.2 Section 33 31 13 – Public Sanitary Utility Distribution Piping

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES

.1 ASTM International

.1 ASTM A 48/A 48M-03(2016), Standard Specification for Gray Iron Castings.

.2 ASTM A 123/A 123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM C 117-17, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.4 ASTM C 136/C 136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM C 139-17, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

.6 ASTM C 478M-15a, Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).

.7 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 CSA Group

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A165 Series-14, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).

.3 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.4 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.

.5 CAN/CSA A257 Series-14, Standards for Concrete Pipe and Manhole Sections.

.4 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS 407, Construction Specification for Maintenance Hole, Catch Basin, Ditch Inlet and Valve Chamber Installation.

.2 OPSS 1351, Precast Reinforced Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers.

.3 OPSS 1850, Frames, Grates, Covers, and Gratings.

.4 OPSD 401.010, Cast Iron, Square Frame with Circular Closed or Open Cover for Maintenance Holes (Type A, Closed Cover).

.5 OPSD 701.010, Precast Concrete Maintenance Hole.

.6 OPSD 701.021, Maintenance Hole Benching and Pipe Opening Alternatives

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for maintenance holes structures and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.5 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect maintenance holes structures from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Precast maintenance hole units: to OPSS 1351, CAN/CSA A257.4, circular and specifically OPSD 701.010.

.2 Joints: to OPSS 1351 and CAN/CSA A257.3, made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.

.3 Mortar: to OPSS 407

.4 Ladder rungs: to OPSS 1351 and CAN/CSA A257.4, CSA G30.18, No.25M billet steel deformed bars, hot dipped galvanized to ASTM A 123/A 123M.

.1 Rungs to be safety pattern (drop step type).

.5 Adjusting rings: to CAN/CSA A257.4.

.6 Steel gratings, I-beams and fasteners: as indicated.

.7 Frames, gratings, covers to OPSS 1850, dimensions as indicated and following requirements:

.1 Metal gratings and covers to bear evenly on frames.

.1 Frame with grating or cover to constitute one unit.

.2 Assemble and mark unit components before shipment.

.2 Gray iron castings: to ASTM A 48/A 48M, strength class30B.

.3 Castings: sand blasted or cleaned and ground to eliminate surface imperfections.

.4 Maintenance holes frames and covers: to OPSS 407 and specifically OPSD 401.010, type A, closed cover.

.8 Granular bedding and granular backfill: in accordance with Section 31 00 99 – Earthwork for Minor Works.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for maintenance holes structures installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 EXCAVATION AND BACKFILL

.1 Excavate and backfill in accordance with Section 31 00 99 – Earthwork for Minor Works and as indicated.

.2 Obtain approval of Departmental Representative before installing maintenance holes.

3.3 INSTALLATION

.1 Construct units in accordance with OPSS 407, and details indicated, plumb and true to alignment and grade.

.2 Complete units as pipe laying progresses.

.3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.

.1 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved collection/runoff areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction.

.4 Set precast concrete base on 150 mm minimum of granular bedding compacted to 98% standard proctor maximum dry density to ASTM D 698.

.5 Precast units:

.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.

.2 Make each successive joint watertight with Departmental Representative's approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.

.3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

.4 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.6 For sewers:

.1 Place stub outlets and bulkheads at elevations and in positions indicated.

.7 Bench to provide smooth U-shaped channel as per OPSD 701.021.

.8 Compact granular backfill to 95% standard proctor maximum dry density to ASTM D 698.

.9 Place frame and cover on top section to elevation as indicated.

.1 If adjustment required use concrete ring.

.10 Clean units of debris and foreign materials.

.1 Remove fins and sharp projections.

.2 Prevent debris from entering system.

.11 Install safety platforms in maintenance holes having depth of 5 m or greater, as indicated.

3.4 FIELD QUALITY CONTROL

.1 Leakage Test:

.2 Install watertight plugs or seals on inlets and outlets of each new sanitary sewer maintenance hole and fill maintenance hole with water.

.3 Leakage not to exceed 0.3% per hour of volume of maintenance hole.

.4 If permissible leakage is exceeded, correct defects.

.5 Repeat until approved by Departmental Representative.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 – Earthwork for Minor Works.

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES

.1 American Water Works Association (AWWA)

.1 ANSI/AWWA C500-09, Metal-Seated Gate Valves for Water Supply Service.

.2 ANSI/AWWA C509-15, Resilient-Seated Gate Valves for Water-Supply Service.

.3 ANSI/AWWA C550-17, Protective Interior Coatings for Valves and Hydrants.

.4 ANSI/AWWA C651-14, Standard for Disinfecting Water Mains.

.5 ANSI/AWWA C900-16, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 60 Inch (100 mm - 1500 mm).

.6 AWWA M17-2016, Installation, Field Testing, and Maintenance of Fire Hydrants.

.2 ASTM International

.1 ASTM D 698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.3 CSA International

.1 CAN/CSA-B137 Series-17, Thermoplastic Pressure Piping Compendium.

.1 CAN/CSA-B137.1-e10, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.

.2 CAN/CSA-B137.3-e12, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S520-16, Standard for Fire Hydrants.

.5 National Fire Protection Association (NFPA)

.1 NFPA 291-16, Recommended Practice for Fire Flow Testing and Marking of Hydrants.

.6 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS 441.MUNI November 2016, Construction Specification for Watermain Installation in Open Cut.

.2 OPSD 802.010 November 2014, Flexible Pipe, Embedment and Backfill, Earth Excavation.

.3 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

.4 OPSD 803.030 November 2015, Frost Treatment – Pipe Culverts, Frost Penetration Line Below Bedding Grade.

.7 City of Ottawa Standard Details

.1 W24 March 2016, Valve Box Assembly.

.2 W25.3 March 2016, Concrete Thrust Blocks for PVC and DI Pipe 400mm and Under.

.3 W25.4 March 2011, Thrust Block Dimension Tables for PVC and DI Pipe 400mm and Under.

.4 W25.5 May 2001, Restraining and Retaining Rings for PVC and DI Pipe 40mm and Under.

.5 W25.6 March 2011, Tables of Restrained Lengths for PVC and DI Pipe 400mm and Under.

.6 W40 March 2013, Cathodic Protection for PVC Watermain Systems.

.7 W42 March 2014, Typical Anode Installation PVC Watermain.

.8 CIMA+ Details Drawings

.1 #310, Typical Section Crossing Sewer Pipe and Watermain Detail.

.2 #311B, Private Fire Hydrant & Valve Installation

.3 #500, Thermal Insulation for Watermains and Sanitary Sewer Pipes in Shallow Trenches.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for distribution piping materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Pipe certification to be on pipe.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Shop Drawings:

.1 N/A

.5 Samples:

.1 Not used.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit data to produce record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details.

.1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

.3 Operation and Maintenance Data: submit operation and maintenance data for pipe, valves, valve boxes, valve chambers and hydrants for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect water distribution piping from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.7 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services.

.2 Submit schedule of expected interruptions for approval and adhere to interruption schedule as approved by Departmental Representative.

.3 Notify Departmental Representative minimum of 72 hours in advance of interruption in service.

.4 Do not interrupt water service for more than 3 hours and confine this period between 10:00 and 16:00 hours local time unless otherwise authorized.

.5 Provide and post "Out of Service" sign on hydrant not in use.

1.8 MAINTENANCE MATERIAL SUBMITTALS

.1 Not used

Part 2 PRODUCTS

2.1 PIPE/SERVICE, JOINTS AND FITTINGS

.1 Pipe: Polyvinyl chloride pressure pipe (PVC): to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa integral bell end gasket.

.2 PVC joints: Integral bell and spigot joints in accordance with manufacturer's specifications.

.3 Service connections 100 mm and over: use tee fitting or tapping valve and sleeve.

.4 Tee connections: Tee connections to be fabricated of same material and to same standards as specified pipe fittings and to have ends matching pipe to which they are joined.

2.2 VALVES AND VALVE BOXES

.1 Gate valves:

.1 Gate valves up to 300 mm for line, branch, isolation, auxiliary, air, drain, tapping and meter installations shall be Resilient-Seated Gate Valves that meet or exceed AWWA C-509.

.2 Gate valves shall be cast iron or ductile iron body, with non-rising stems and an operating nut positioned for vertical operation. The stem seal shall be of the standard O-ring type. Valves to open counter clockwise.

.3 All gate valves shall follow the test procedures in AWWA C-509 and C500. The manufacturer shall provide to the Departmental Representative an Affidavit of Compliance indicating that all the tests specified have been performed and all test requirements have been met.

.2 Air and vacuum release valves: heavy duty combination air release valves employing direct acting kinetic principle.

.1 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 2 MPa working pressure.

.2 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.

.3 Valve complete with surge check unit.

.3 Nuts and bolts for valves to be type 304 or 316 stainless steel.

.4 Epoxy coating:

.1 All valves shall be supplied with either a two-part spray epoxy coating or a fusion bonded epoxy coating, factory applied to both the exterior and interior surfaces of the valve to inhibit corrosion, suitable for continuous submerged service as per current AWWA C-550. The thickness of the coating shall be 12 mils. The interior and exterior surfaces shall be cleaned as per current NACE No. 2/SSPC-SP 10 prior to the coating application.

.2 The manufacturer shall provide proof that the coating products are certified as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF Standard 61, Drinking Water Systems Components-Health effects. Manufacturers shall state the certification file numbers of the accredited organization. The water supply contains chlorine or chloramines in accordance with the Safe Drinking Water Act. The manufacturer shall prove the coating materials are designed to be immersed in a potable water system that requires chemical disinfection.

.5 Operating Nut:

.1 The operating nut shall be 51 mm x 51 mm as per current AWWA C-500 and shall be secured by a pin or key.

.2 A stem extension from the operating nut to the surface shall be provided when the depth of cover is greater than 2.4 m. All stem extensions shall be solid 32 mm square bar material.

.6 Valve boxes:

.1 Valve boxes shall be 130mm screw type with standard dimensions conforming to Ottawa detail drawing W24.

.2 Valve boxes shall be of good quality grey iron.

.3 Valve box castings shall have a tensile strength of not less than 138 MPa.

.4 Valve boxes shall be solid with clean surfaces, free from scales, bumps, flows, blow holes, or other defects.

.5 After cleaning and inspection, the valve boxes shall be thoroughly coated with an approved casting paint.

.6 Top of box to be marked "WATER"/"EAU".

2.3 VALVE CHAMBERS

.1 Not Used

2.4 HYDRANTS

.1 Hydrant installation to be as per CIMA+ standard detail #311B and shall comply with ANSI/AWWA C-502 Standard.

.2 Post type: 150 mm diameter; depth of bury 2 m; counter clockwise opening; 2 - 64 mm Canadian Underwriters Association approved hose connections and one 127 mm pumper nozzle; two-piece barrels with breakaway flange; drain ring; The Contractor must ensure that the breakaway flange is located above the finished ground (approximately 150 mm). Hydrant pumper connection to face the roadway and nozzles must be parallel to the edge of pavement/curb line.

.3 The hydrant shall be designed for a test pressure of 1035 kPa minimum.

.4 Hydrants to open counter clockwise, threads to local standard, fittings to be internal lug quick-connect to CAN/ULC-S543.

.5 Provide metal caps and chains.

.6 Provide key operated gate valve located 1 m from hydrant.

2.5 CATHODIC PROTECTION

.1 Provide cathodic protection to the new water distribution system by adding zinc anodes to new metal fittings, valves, and fire hydrants as per the City of Ottawa standard details W40 and W42.

2.6 PIPE EMBEDMENT AND SURROUND MATERIAL

.1 Embedment material in accordance with Section 31 00 99 – Earthwork for Minor Works.

2.7 BACKFILL MATERIAL

.1 In accordance with Section 31 00 99 – Earthwork for Minor Works.

2.8 PIPE DISINFECTION

.1 Disinfect water mains in accordance with OPSS 441.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for distribution piping installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Clean pipes, fittings, valves, hydrants, and appurtenances 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.

3.3 TRENCHING

.1 Do trenching Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.4 GRANULAR BEDDING

.1 Do pipe bedding Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.5 PIPE INSTALLATION

.1 Pipe installation to OPSS 441 and as follows:

.2 Lay pipes to manufacturer's standard instructions and specifications.

.3 Join pipes in accordance with manufacturer's recommendations.

.4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.

.5 Lay pipes on prepared bed, true to line and grade.

.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.2 Take up and replace defective pipe.

.3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.

.6 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.

.7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

.8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.

.1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.9 Position and join pipes with equipment and methods approved by Departmental Representative.

.10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.11 Align pipes before jointing.

.12 Complete each joint before laying next length of pipe.

.13 Minimize deflection after joint has been made.

.14 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.

.15 Ensure completed joints are restrained by compacting embedment material alongside and over installed pipes or as otherwise approved by Departmental Representative.

.16 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.

.17 Do not lay pipe on frozen bedding.

.18 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with embedment material.

.19 Terminate building water service 1 m outside building wall opposite point of connection to main.

.1 Install coupling necessary for connection to building plumbing.

.2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker to locate pipe end.

.20 Do pipe surround work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.6 VALVE INSTALLATION

.1 Install valves to manufacturer's recommendations at locations as indicated.

.2 Valve boxes as per City of Ottawa standard detail W24.

.3 Support valves by means of Bedding same as adjacent pipe. Valves not to be supported by pipe.

3.7 VALVE CHAMBERS

.1 Not Used

3.8 UNDERCROSSING

.1 Crossing under proposed sewer pipe in accordance with CIMA+ standard detail #310.

3.9 OVERCROSSING

.1 Not used.

3.10 HYDRANTS

.1 Install hydrants at locations as indicated.

.2 Install hydrants as per CIMA+ standard detail #311B and in accordance with AWWA M17.

.3 Install 150 mm gate valve and cast iron valve box on hydrant service leads as indicated.

.4 Set hydrants plumb, with hose outlets parallel with edge of pavement or curb line, with pumper connection facing roadway and with body flange set at elevation of 50 mm above final grade.

.5 If fire hydrant is equipped, with drain holes, ensuring that drain holes are plugged.

.6 Place appropriate sign beside installed hydrants as per CIMA+ standard detail #311B.

3.11 THRUST BLOCKS AND RESTRAINED JOINTS

.1 Thrust blocks:

.1 Concrete Work to be in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as per City of Ottawa standard details W25.5 and W25.4.

.3 Keep joints and couplings free of concrete.

.4 Do not backfill over concrete within 24 hours after placing.

.2 Restrained joints:

.1 Install restrains as per City of Ottawa standard details W25.5 and W25.6

.2 Only use restrained joints approved by Departmental Representative.

3.12 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with OPSS 441.

.2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.

.3 Notify Departmental Representative at least 24 hours in advance of proposed tests.

.1 Perform tests in presence of Departmental Representative.

.4 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Departmental Representative.

.5 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved embedment material placed to dimensions indicated.

.6 Leave joints and fittings exposed.

.7 When testing is done during freezing weather, protect joints and fittings from freezing.

.8 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.

.9 Open valves.

.10 Expel air from main by slowly filling main with potable water.

.1 Install corporation stops at high points in main where no air-vacuum release valves are installed.

.2 Remove stops after satisfactory completion of test and seal holes with plugs.

.11 Thoroughly examine exposed parts and correct for leakage as necessary.

.12 Apply hydrostatic test pressure in accordance with OPSS 441.

.13 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.

.14 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.

.15 Repeat hydrostatic test until defects have been corrected.

.16 Apply leakage test pressure in accordance with OPSS 441.

.17 Do not exceed allowable leakage as defined in OPSS 441, including lateral connections.

.18 Locate and repair defects if leakage is greater than amount specified.

.19 Repeat test until leakage is within specified allowance for full length of water main.

3.13 BACKFILL

.1 Do backfilling work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.14 HYDRANT FLOW TESTS

.1 Conduct flow tests on every hydrant to determine fire flows prior to painting hydrant caps and ports.

3.15 PAINTING OF HYDRANTS

.1 After installation, paint hydrants yellow.

.2 After hydrant flow tests, paint caps and ports to meet NFPA 291 colour code.

3.16 FLUSHING AND DISINFECTING

.1 Flushing and Disinfection of watermain in accordance with OPSS 441.

3.17 SURFACE RESTORATION

.1 After installing and backfilling over water mains, restore surface to original condition as directed by Departmental Representative.

3.18 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

.2 Section 33 05 16 – Maintenance Holes and Catch Basin Structures

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D 698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft4-lbf/ft³ (600 kN-m/m³)).

.2 ASTM D2412-11, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

.3 ASTM D 3034-16, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.4 ASTM D 3350-14, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.2 CSA International

.1 CSA B1800-15, Thermoplastic Non-pressure Pipe Compendium.

.3 Ontario Provincial Standard Specification (OPSS) and Drawings (OPSD)

.1 OPSS 410.MUNI November 2015, Construction Specification for Pipe Sewer Installation in Open Cut.

.2 OPSS 1840 November 2015, Material Specification for Non-Pressure Polyethylene Plastic Pipe Products.

.3 OPSS 1841 November 2015, Material Specification for Non-Pressure Polyvinyl Chloride Pipe Products.

.4 OPSD 802.010 November 2014, Flexible Pipe Embedment and Backfill Earth Excavation.

.5 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

.4 CIMA+ Details Drawings

.1 #310, Typical Section Crossing Sewer Pipe and Watermain Detail.

.2 #500, Thermal Insulation for Watermains and Sanitary Sewer Pipes in Shallow Trenches.

.3 #600, Temporary Support for Existing Utility.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.3 Notify Departmental Representative 24 hours minimum in advance of any interruption in service.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Shop Drawings:

.1 N/A

.5 Samples:

.1 Not used.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect pipes from damage.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 VITRIFIED CLAY PIPE [FOR MAIN SEWERS]

.1 Not used.

2.2 ASBESTOS- CEMENT PIPE [FOR MAIN SEWERS]

.1 Not used.

2.3 CONCRETE PIPE

.1 Not used.

2.4 PLASTIC PIPE

.1 Type PSM Polyvinyl Chloride (PVC): to OPSS 1841, and CSA standard B1800 and/or ASTM D 3034.

.1 Standard Dimensional Ratio (SDR):

.1 150mmØ pipes = SDR28.

.2 200mmØ to 375mmØ pipes = SDR35.

.2 Gasket and integral bell system.

.3 Nominal lengths: 6 m.

.2 Corrugated High Density Polyethylene (HDPE): to OPSS 1840, and CSA standard B1800 and/or ASTM D 3350.

.1 Gasket and integral bell system.

.2 The pipe shall have a minimum stiffness of 320 kPa at 5% deflection. Tests shall be conducted in accordance with ASTM D2412.

2.5 SERVICE CONNECTIONS

.1 Plastic pipe: to CSA B1800 (CSA B182.1, with push-on joints or CSA B182.2).

.2 Connection to Maintenance Holes:

.1 Straps holding the rubber connectors in contact with the pipe shall be 316 Stainless Steel.

2.6 CEMENT MORTAR

.1 Not used.

2.7 PIPE BEDDING AND SURROUND MATERIALS

.1 Granular material to Section 31 00 99 - Earthwork for Minor Works.

2.8 BACKFILL MATERIAL

.1 Backfill material in accordance to Section 31 00 99 - Earthwork for Minor Works.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of subgrade previously installed under other Sections or Contracts are acceptable for sewer pipe installation in accordance with manufacturer's written instructions.

.1 Visually inspect subgrade in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and sediment and erosion control measures on Civil drawing C4.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

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

.3 Clean and dry pipes and fittings before installation.

.4 Obtain Departmental Representative's approval of pipes and fittings prior to installation.

3.3 TRENCHING

.1 Do trenching Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

.2 Protect trench from contents of sewer or sewer connection.

3.4 CONCRETE BEDDING AND ENCASEMENT

.1 Not used.

3.5 GRANULAR BEDDING

.1 Do pipe bedding Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.6 PIPE INSTALLATION

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

.2 Handle pipes using methods approved by Departmental Representative.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.3 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.

.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.2 Take up and replace defective pipe.

.3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.

.4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.5 Joint deflection permitted within limits recommended by pipe manufacturer.

.6 Water to flow through pipe during construction, only as permitted by Departmental Representative.

.7 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.8 Install plastic pipe and fittings in accordance with CSA B1800 (CSA B182.11).

.9 Pipe jointing:

.1 Install gaskets in accordance with manufacturer's written recommendations.

.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes before joining.

.4 Maintain pipe joints free from mud, silt, gravel and foreign material.

.5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.

.6 Complete each joint before laying next length of pipe.

.7 Minimize joint deflection after joint has been made to avoid joint damage.

.8 At rigid structures, install pipe joints not more than 1.2 m from side of structure.

.9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.10 When stoppage of Work occurs, block pipes as directed by Departmental Representative to prevent creep during down time.

.11 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.

.12 Make watertight connections to manholes.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.13 Use prefabricated saddles or field connections approved by Departmental Representative, for connecting pipes to existing sewer pipes.

.1 Joints to be structurally sound and watertight.

3.7 PIPE SURROUND

.1 Do pipe surround work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.8 UNDERCROSSING

.1 Crossing under existing utilities in accordance with CIMA+ standard detail #600.

3.9 OVERCROSSING

.1 Crossing over proposed watermain pipe in accordance with CIMA+ standard detail #310.

3.10 BACKFILL

.1 Do backfilling work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.11 FIELD TESTING

.1 Do field testing as per OPSS 410.

3.12 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D 698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft4-lbf/ft³ (600 kN-m/m³)).

.2 ASTM D2412-11, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

.3 ASTM D 3034-16, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.4 ASTM D 3350-14, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.2 CSA International

.1 CSA B1800-15, Thermoplastic Non-pressure Pipe Compendium.

.3 Ontario Provincial Standard Specification (OPSS) and Drawings (OPSD)

.1 OPSS 410.MUNI November 2015, Construction Specification for Pipe Sewer Installation in Open Cut.

.2 OPSS 1840 November 2015, Material Specification for Non-Pressure Polyethylene Plastic Pipe Products.

.3 OPSS 1841 November 2015, Material Specification for Non-Pressure Polyvinyl Chloride Pipe Products.

.4 OPSD 802.010 November 2014, Flexible Pipe Embedment and Backfill Earth Excavation.

.5 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

.4 CIMA+ Details Drawings

.1 #310, Typical Section Crossing Sewer Pipe and Watermain Detail.

.2 #321B, Stainless Steel Security Grate at Pipe Exit for PVC/HDPE Pipes.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Not used.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Shop Drawings:

.1 N/A

.5 Samples:

.1 Not used.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect pipes from damage.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 VITRIFIED CLAY PIPE [FOR MAIN SEWERS]

.1 Not used.

2.2 ASBESTOS- CEMENT PIPE [FOR MAIN SEWERS]

.1 Not used.

2.3 CONCRETE PIPE

.1 Not used.

2.4 PLASTIC PIPE

.1 Type PSM Polyvinyl Chloride (PVC): to OPSS 1841, and CSA standard B1800 and/or ASTM D 3034.

.1 Standard Dimensional Ratio (SDR):

.1 ≤150mmØ pipe = SDR28.

.2 200mmØ to 375mmØ = SDR35.

.2 Gasket and integral bell system.

.3 Nominal lengths: 6 m.

.2 Corrugated High Density Polyethylene (HDPE): to OPSS 1840, and CSA standard B1800 and/or ASTM D 3350.

.1 Gasket and integral bell system.

.2 The pipe shall have a minimum stiffness of 320 kPa at 5% deflection. Tests shall be conducted in accordance with ASTM D2412.

.3 Gasket and integral bell system.

.3 Ditch inlet security grate for PVC and HDPE pipes as per CIMA+ standard detail #321B.

2.5 CEMENT MORTAR

.1 Not used.

2.6 PIPE BEDDING AND SURROUND MATERIALS

.1 Granular material to Section 31 00 99 - Earthwork for Minor Works.

2.7 BACKFILL MATERIAL

.1 Backfill material in accordance to Section 31 00 99 - Earthwork for Minor Works.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of subgrade previously installed under other Sections or Contracts are acceptable for sewer pipe installation in accordance with manufacturer's written instructions.

.1 Visually inspect subgrade in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and sediment and erosion control measures on Civil drawing C4.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

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

.3 Clean and dry pipes and fittings before installation.

.4 Obtain Departmental Representative's approval of pipes and fittings prior to installation.

3.3 TRENCHING

.1 Do trenching Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

.2 Protect trench from contents of sewer or sewer connection.

3.4 CONCRETE BEDDING AND ENCASEMENT

.1 Not used.

3.5 GRANULAR BEDDING

.1 Do pipe bedding Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.6 PIPE INSTALLATION

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

.2 Handle pipes using methods approved by Departmental Representative.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.3 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.

.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.2 Take up and replace defective pipe.

.3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.

.4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.5 Joint deflection permitted within limits recommended by pipe manufacturer.

.6 Water to flow through pipe during construction, only as permitted by Departmental Representative.

.7 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.8 Install plastic pipe and fittings in accordance with CSA B1800 (CSA B182.11).

.9 Pipe jointing:

.1 Install gaskets in accordance with manufacturer's written recommendations.

.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes before joining.

.4 Maintain pipe joints free from mud, silt, gravel and foreign material.

.5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.

.6 Complete each joint before laying next length of pipe.

.7 Minimize joint deflection after joint has been made to avoid joint damage.

.8 At rigid structures, install pipe joints not more than 1.2 m from side of structure.

.9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.10 When stoppage of Work occurs, block pipes as directed by Departmental Representative to prevent creep during down time.

.11 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.

.12 Make watertight connections to manholes.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.13 Use prefabricated saddles or field connections approved by Departmental Representative, for connecting pipes to existing sewer pipes.

.1 Joints to be structurally sound and watertight.

3.7 PIPE SURROUND

.1 Do pipe surround work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.8 UNDERCROSSING

.1 Not used.

3.9 OVERCROSSING

.1 Crossing over proposed watermain pipe in accordance with CIMA+ standard detail #310.

3.10 BACKFILL

.1 Do backfilling work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.11 FIELD TESTING

.1 Do field testing as per OPSS 410.

3.12 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works.

.2 Section 31 32 19.16 – Geotextile Soil Stabilization.

.3 Section 31 37 00 – Rip-Rap

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D 698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft4-lbf/ft^3 (600 kN-m/m^3)).

.2 ASTM F 667/F 667M-16, Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.

.2 CSA International

.1 CSA B1800-15, Thermoplastic Non-pressure Pipe Compendium.

.3 Ontario Provincial Standard Specification (OPSS) and Drawings (OPSD)

.1 OPSS 421.MUNI November 2015, Construction Specification for Pipe Culvert Installation in Open Cut.

.2 OPSS 1840 November 2015, Material Specification for Non-Pressure Polyethylene Plastic Pipe Products.

.3 OPSD 802.010 November 2014, Flexible Pipe Embedment and Backfill Earth Excavation.

.4 OPSD 803.030 November 2015, Frost Treatment – Pipe Culverts Frost Penetration Line Below Bedding Grade.

.5 OPSD 810.010 November 2013, General Rip-Rap Layout for Sewer and Culvert Outlets.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and backfill and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Shop Drawings:

.1 N/A

.5 Samples:

.1 Not used.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect pipes from damage.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 CORRUGATED STEEL PIPE

.1 Not used.

2.2 CONCRETE PIPE

.1 Not used.

2.3 CORRUGATED POLYETHYLENE PIPE AND FITTINGS

.1 Corrugated High Density Polyethylene (HDPE): to OPSS 1840 and CSA B1800 (CSA 182.8) and/or ASTM F 667/F 667M.

.1 Gasket and integral bell system.

.2 Minimum pipe stiffness of 320 kPa.

.3 Smooth wall interior.

2.4 GRANULAR BEDDING AND BACKFILL

.1 Granular bedding and backfill material in accordance with Section 31 00 99 – Earthwork for Minor Works.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of subgrade previously installed under other Sections or Contracts are acceptable for sewer pipe installation in accordance with manufacturer's written instructions.

.1 Visually inspect subgrade in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and sediment and erosion control measures on Civil drawing C4.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TRENCHING

.1 Do trenching Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.4 BEDDING

.1 Do pipe bedding Work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.5 LAYING CORRUGATED STEEL PIPE CULVERTS

.1 Not used.

3.6 JOINTS: CORRUGATED STEEL CULVERTS

.1 Not used.

3.7 LAYING CONCRETE PIPE CULVERTS

.1 Not used.

3.8 JOINTS: CONCRETE PIPE CULVERTS

.1 Not used.

3.9 LAYING CORRUGATED POLYETHYLENE PIPE CULVERTS

.1 Begin laying at downstream end of culvert.

.2 Install pipe in trench by lowering.

.3 Ensure bottom of pipe is in contact with shaped bedding throughout pipe length.

.4 Water to flow through pipe during construction, only as permitted by Departmental Representative.

3.10 JOINTS FOR POLYETHYLENE CULVERTS

.1 Install couplings in accordance with manufacturer's instructions.

3.11 BACKFILLING

.1 Do backfilling work in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.12 FLUMING

.1 Not used.

3.13 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 – Earthwork for Minor Works.

.2 Section 31 32 19.16 – Geotextile Soil Stabilization.

1.2 MEASUREMENT AND PAYMENT

.1 N/A

1.3 REFERENCES

.1 ASTM International

.1 ASTM D 698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 ASTM F405-13, Corrugated Polyethylene (PE) Pipe and Fittings.

.2 CSA International

.1 CSA B1800-15, Thermoplastic Non-pressure Pipe Compendium

.3 Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD)

.1 OPSS 405.MUNI November 2017, Construction Specification for Pipe Subdrains.

.2 OPSS.MUNI 1004 November 2013, Material Specification for Aggregates - Miscellaneous

.3 OPSS 1840 November 2015 – Material Specification for Non-Pressure Polyethylene Plastic Pipe Product.

.4 OPSD 802.010 November 2014, Flexible Pipe, Embedment and Backfill, Earth Excavation.

.5 OPSD 802.013 November 2014, Flexible Pipe Embedment and Backfill Rock Excavation.

.4 CIMA+ Detail Drawings

.1 #353, Bio-Swale, River Stone and Perforated Subdrain.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Not used.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pipes, pipe fittings, and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Shop Drawings:

.1 N/A

.5 Samples:

.1 Not used.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect pipes from damage.

.3 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Perforated plastic pipe and fittings: to OPSS 1840 and ASTM F405 and/or CSA B1800 (CSA B182.8).

.1 Nominal pipe size as indicated on Civil drawing C4 (between 150mm to 300mm).

.2 Minimum pipe stiffness of 210 kPa.

.3 Smooth wall interior.

.4 Large number of perforations;

.2 Knitted sock and filter fabric geotextile: In accordance with Section 31 32 19.16 – Geotextile Soil Stabilization.

.3 Clear stone shall be 19mm Type I or Type II, according to OPSS 1004.

.4 River Stone: Rounded stone sorted in 25mm to 75mm diameter.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sub-drainage piping installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 TRENCHING

.1 Do trenching Work in accordance with CIMA+ standard detail #353 and with Section 31 00 99 – Earthwork for Minor Works.

3.3 BEDDING

.1 Do bedding in accordance to CIMA+ standard detail #353.

3.4 INSTALLATION OF PIPE SUBDRAINS

.1 Refer to CIMA+ standard detail #353 and OPSS 405.

.2 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.

.1 Ensure barrel of each pipe is in contact with bed throughout full length.

.3 Begin laying at outlet and proceed in upstream direction.

.4 Make joints tight in accordance with manufacturer's instructions.

.5 Make watertight connections to existing drains, new or existing manholes and catch basins where indicated.

.6 Provide end cap or wrap with knitted sock geotextile at open upstream ends of pipes.

.7 Wrap or sleeve perforated pipe with knitted sock geotextile as indicated.

.8 Surround and cover drain with 19mm clear stone as per CIMA+ standard detail #353.

.9 Backfill remainder of trench as per CIMA+ detail #353.

.10 Do not place embedment and backfill materials in frozen condition.

.11 Protect subdrains against flotation during installation.

3.5 FIELD TESTS AND INSPECTIONS

.1 Repair or replace pipe, pipe joint or embedment material found defective.

.2 Closed-Circuit Television Inspection as per OPSS 405.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION