# CITY OF GREATER SUDBURY

# SUPPLEMENTAL SPECIFICATIONS

## TO THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS

**Reviewed: January 2021**

**City of Greater Sudbury**

**Index to**

**Standard Specifications**

**Construction**



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| **DIVISION 8 – CONSTRUCTION SPECIFICATIONS ENVIRONMENTAL AND LANDSCAPE** | | | |
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## DIVISION 13 – MATERIAL SPECIFICATION FOR CEMENT AND CONCRETE

| | | | |
|---|---|---|---|
| NOV 17 | JAN 19 | 1350 MUNI | Concrete Materials and Production |

## 102 MUNI GENERAL SPECIFICATION FOR CONSTRUCTION WEIGHING OF MATERIALS

### 102.07.01.01 Mass Measurement

Delete in its entirety and replace with the following:

Weigh tickets for all granular and asphalt material shall be provided in **digital** format. Hand written tickets will not be accepted. Tickets **must** indicate the following minimum information to be accepted for payment. Tickets not meeting these requirements will be returned to the Contractor without payment:

- Supplier Name
- Truck number
- Contract number
- Type of material being supplied
- Gross weight
- Net weight
- Tare weight
- Date and time of delivery

## 106 MUNI GENERAL SPECIFICATION FOR ELECTRICAL WORK

### 106.03 Definitions

Add in the following:

**Acceptable Certification Agency**: means an organization accredited in accordance with the standards council of Canada Act to certify electrical equipment (i.e. CSA, ULC, etc.).

**Faze - (traffic signals)** means a particular and exclusive vehicular or pedestrian traffic directional movement at an intersection for which one or several fazes or phase may constitute a traffic signal phase.

### 106.07.01.02 Contractor's Workers

Delete the following paragraphs:

II Ministry of Transportation's (MTO) 170 training course and 170 Advanced Training course

II 170-332 IMSA/MTO Certification Program

### 106.07.01.03 High - Voltage Work

Delete the entire subsection.

### 106.07.04.04 Traffic Signal Systems Switch-over

Add in the following:

f) The Contractor will ensure that all traffic signal controller programming/settings have been inputted/installed and the traffic signal controller operates as specified while in the "test" mode with the signals de-energized, in the presence of the owner's traffic department representative, prior to switch-over/turn-on.

### 106.07.05 Maintenance of Highway Lighting Systems

Delete the entire subsection.

### 106.07.10.02 High-Voltage System Testing

Delete the entire subsection.

## 127 PROV SCHEDULE OF RENTAL RATES FOR CONSTRUCTION EQUIPMENT INCLUDING MODEL AND SPECIFICATION REFERENCE

### 127.01 Scope

Add in the following:

This specification shall be read in conjunction with the City of Greater Sudbury General Conditions, Section 108-5 “Payment for Extra Work on a time and materials Basis”.

## 180 MUNI GENERAL SPECIFICATION FOR MANAGEMENT OF EXCESS MATERIAL

### 180.02 REFERENCES

Add the following:

Regulate the Removal of Topsoil, the Placing or Dumping of Fill, and the Alteration of Grades of Land - By-Law 2009-170.

### 180.04.01.01 Notification of Site Selection, and Property Owner Release.

Delete in its entirety and replace with:

It shall be the Contractor's responsibility to ensure that the disposal site is permitted in accordance with City of Greater Sudbury BY-LAW 2009-170. Documented proof must be provided to the City that the disposal destination(s) of the material are permitted in accordance with BY-LAW 2009-170.

### 180.04.01.06 Excess Material Audit or Inventory Document

Add the following,

The City may conduct audits to confirm surplus materials are being delivered to permitted sites.

**310 MUNI CONSTRUCTION SPECIFICATION FOR HOT MIX ASPHALT**

**310.02 References**

OPSS 308 PROV TACK COAT

**310.03 Definitions**

Add in the following:

**Field Adjustment to the Job Mix Formula (JMF)** means a change in the target gradation, asphalt cement content, or both of a mix, within specified limits without a redesign of the HMA, resulting in a revised JMF.

**Mix Properties** means the AC content, gradation, air voids and the VMA.

**Mid-Lane Segregation** means a continuous or discontinuous longitudinal “streak”, typically no greater than 300 mm in width located anywhere across the width of the lane.

**Segregation** means a condition of the pavement characterized by areas with comparatively coarser or finer texture than that of the surrounding pavement, with severity.

a) Slight Segregation – a pavement matrix is in place between the coarse aggregate particles; however, there are slightly more coarse aggregate particles in comparison with the surrounding acceptable mix.

b) Medium Segregation – the pavement matrix has significantly more coarse aggregate particles than the surrounding acceptable mat and usually exhibits some lack of surface matrix.

c) Severe Segregation – the pavement appears very coarse, with coarse aggregate particles against coarse aggregate particles and the pavement has little to no matrix.

**Voids** means air voids and voids in mineral aggregate (VMA).

**310.05.01 Hot Mix Asphalt (HMA)**

Add in the following:

The HMA mix design shall conform to the physical requirements of a road with an AADT>5000.

All PGAC 64-34 HMA shall include 4% to 5% Polymer.

**310.07.05.01.01 General**

Delete in its entirety and replace with the following:

The Contractor shall obtain samples according to OPSS 1101 MUNI.

**310.07.05.01.04 Delivery**

Add the following:

The Owner or the Owners designate shall deliver the QA and Referee Samples to the appropriate laboratory in a condition that is suitable for testing.

The Quality Assurance laboratory will be determined by the Owner.

**310.07.05.02.03 Labelling**

Delete in its entirety.

Add the following:

Where not specified or not included on the sample data sheet, samples shall be delivered with a transmittal form identifying the following information:

a) Contract number;

b) Name of contractor;

c) Name of contract administrator;

d) Quantity and type of sample (when a sample consists of more than one item, each item shall be individually identified);

e) Date sampled;

f) Date shipped;

g) Sample, lot and sublot number;

h) Sample location; and

i) Asphalt type.

**310.07.05.02.05 Delivery**

Add the following:

The Owner or the Owners designate shall deliver the QA and Referee Samples to the approved laboratory in a condition that is suitable for testing.

The Quality Assurance laboratory will be determined by the Owner.

**310.07.06.02 Operational Constraints**

Add in the following:

The HMA surface course shall not be placed after September 30 without written permission from the General Manager.

Surface Asphalt shall not be placed until all restoration or deficiency work has been completed to the satisfaction of the General Manager, and with written approval issued.

Warm Mix Asphalt may be used as a substitute for Hot Mix Asphalt at any time. All asphalt placed after September 30th shall be Warm Mix Asphalt. Appendix 310-C shall be invoked for Warm Mix Asphalt.

**310.07.14 Surface Appearance**

Delete in its entirety and add in the following:

Each course after final compaction shall be of uniform texture and shall be free of defects such as segregation, fat spots, oil spills, and roller marks. Defective areas shall be removed and replaced with HMA of the same type and compacted to the satisfaction of the Contract Administrator.

If the Contractor's actions fail to prevent continued medium or severe segregation regardless of cause, the Contract Administrator may instruct the Contractor to cease paving until the problem has been corrected.

From the time that the Contractor receives notification of midlane segregation, the Contractor shall be allowed a maximum of 100 tonnes of mix to be placed on the Contract, in order to demonstrate the effectiveness of any repairs and adjustments that have been made to a defective paver. The Contractor shall demonstrate his repairs or adjustments or both to the Contract Administrator. If the Contractor is unable to eliminate midlane segregation to the satisfaction of the Contract Administrator by making repairs or adjustments to the paver within the allowable 100 tonnes of HMA, then the Contractor shall discontinue the use of that paver.

The defective areas shall be repaired as described elsewhere in this specification.

**310.07.16 Field Adjustments to Job Mix Formula**

The Contractor shall be permitted to adjust the JMF to more closely reflect the mix being produced. The number of field adjustments to the JMF shall be limited to three for each mix design submitted, one prior to the start of production and a maximum of two during production. Field adjustments to the JMF shall be limited in scope such that the net impact of all field adjustments to the JMF does not exceed any of the maximum field adjustment to the JMF in OPSS 1150, Table 8 in comparison to the original JMF submitted under the current mix design.

JMF adjustments shall only be accepted within 24 hours of the placement of the specified mix type being completed. The adjusted JMF shall be submitted in writing on a form supplied by the City. Upon receipt of the JMF adjustment submission, the City shall give a written confirmation of receipt of the adjusted JMF. Within one (1) Business Day of receipt of the JMF adjustment, the City shall give written notice confirming conformance to the contract requirement or advising of any non-conformance. The revised JMF is issued and the previous lot, if requested by the Contractor as part of the written submission for a JMF change. If the request is not made, the revised JMF shall only apply to the mix subsequent to the receipt of the revised JMF.

**310.08 Quality Assurance**

Delete in its entirety and add the following:

**310.08.01 General**

Acceptance of the HMA shall be based on the following:

a) Asphalt Cement Physical Properties;

b) Mix Properties and Compaction;

c) Surface Tolerance;

d) Surface Appearance;

e) Surface Smoothness;

f) Geometrics;

g) Tack Coat and Joint Painting Application Rate.

All samples shall be obtained by the Contractor in the presence of the Owner or Owner's designate. Notwithstanding, the Owner may take samples for its own purposes at any time from any location. The Contractor shall furnish all reasonable assistance to the City and shall require its subcontractors and suppliers to do the same.

The Owner is responsible for conducting QA testing for all HMA aggregates, asphalt cement, and compaction to meet the requirements of the Contract Documents. QA HMA testing shall be conducted at a frequency specified in Table 6 or in the Contract Documents.

All QA testing shall be completed in a certified laboratory that is CCIL Type B and C certified or AMRL accredited, or equivalent. Testing of the samples shall be conducted under the direction and constant supervision of technicians certified to perform the QA tests.

**310.08.02 Asphalt Cement Physical Properties**

The AC shall be accepted as per OPSS.MUNI.1101, November 2016.

A minimum of one sample shall be taken for each type of PGAC used.

**310.08.03 Mix Properties and Compaction**

**310.08.03.01 Mix Properties**

**310.08.03.01.02 Acceptance Testing**

Aggregate gradation and asphalt cement content testing shall be according to LS-282 and LS-292.

**310.08.03.01.03 Basis of Acceptance**

The production air voids for all HMA mixes shall be evaluated according to OPSS Table 9.

Acceptance of hot mix aggregates and asphalt cement shall be according to OPSS 1003 and OPSS 1101 respectively. Aggregate gradation and asphalt cement content results for HMA samples shall meet the JMF tolerance requirements as specified in OPSS 310, Table 7.

**310.08.03.01.04 Referee Testing**

Should the Contractor disagree with the results of QA testing, the Contractor may request, in writing, that the referee sample be analyzed by a independent third party firm within 5 business days of receipt of results. The results of the referee testing shall be used to determine acceptance of material and/or payment reduction factors.

**310.08.03.02 Compaction**

**310.08.03.02.01 Acceptance Testing**

Nuclear density test gauge results shall be used to assess in-place compaction and shall be conducted randomly at a minimum frequency of every 100 m per lane or 150 $m^2$.

Percent compaction shall be determined by comparing the nuclear density in situ Bulk Relative Density (BRD) according to LS-262 to the average plant produced HMA Maximum Relative Density (MRD) according to LS-264.

**310.08.03.02.02 Basis of Acceptance**

Compaction testing of the placed HMA shall meet the requirements specified in OPSS 310, Table 10.

When compaction test results do not meet the minimum percent compaction as specified in Table 10, the HMA shall be deemed rejectable and the Contractor shall be notified in writing. The affected area of HMA pavement shall be removed and replaced with acceptable HMA pavement according to the repair clause in this specification.

**310.08.03.02.03 Referee Testing**

In the case of a dispute, the Contractor or the Owner may request that a coring and testing program be undertaken to verify compaction percentage of the mix.

The cores shall be provided to the Owner to be tested using a mutually agreed upon third party referee laboratory. Density testing of the cores shall be in accordance with LS-287. Percent compaction shall be determined by comparing the core BRD according to LS-262 to the average MRD according to LS-264 of the plant produced HMA.

When compaction results from core densities do not meet the minimum percent compaction specified in OPSS 310, Table 10, the HMA pavement shall be removed and replaced with acceptable HMA pavement.

**310.08.03.03 Repairs**

Repairs shall be full lane or full shoulder width with the exception of localized repairs in binder asphalt only as determined by the City. The material and construction of the repairs shall meet the requirements as specified in the contract documents.

The limits and type of repair shall be subject to the approval of the General Manager and shall be approved prior to the repair being carried out.

The Contractor may elect to carry out repairs in lieu of accepting a payment adjustment, if the lot is not rejectable and the total payment factor of the lot is less than 0.940.

When a lot has been deemed rejectable, it shall be subject to removal and replacement. The Contractor shall be responsible to determine the areas of asphalt that are to be repaired to a minimum length, as specified in the contract document and a full lane or full shoulder width.

The Contractor shall be responsible for determining the limits of the repair. A sketch shall be submitted, identifying the proposed locations of the repairs with clearly labeled area, for review at least 5 business days prior to the intended start of the repair.

Prior to the repair, the Contractor shall take slab samples for testing of mix properties outside of the proposed repair area within 1 m of the limits. A QC, QA and referee sample shall be taken at each sample location.

If the proposed repair limits coincides with the beginning of a sublot that has been determined as acceptable, samples are not required at this location. The repair will match the beginning of the acceptable sublot.

Once the Contractor confirms the repair area, the QA samples, and if required, the referee samples will be tested to confirm the material to remain in the sublot proposed for repair is acceptable. In that time the Contractor shall not be permitted to take additional samples or cores.

If the material is deemed rejectable, the proposed limits of the repair area shall be extended to the satisfaction of the General Manager, and the sampling and testing repeated.

The repair area shall incorporate all sample locations.

The repair area shall be tested as per OPSS Table 7, 9 and 10 according to the frequency in OPSS Table 6. If required, a payment adjustment will be applied as per GSSS 310.10.01 Basis of Payment.

If applicable, the unrepaired sublots combined with the remainder of the repaired sublot shall comprise one lot and shall be assessed. If there are only one or two sublots and the quantity provides for multiple lots, these sublots shall be included as part of the previous or next lot.

**310.08.04 Surface Tolerance Acceptance**

**310.08.04.01 Basis of Acceptance**

The surface tolerances of any pavement surface shall be such that when tested with a 3 m straight edge placed anywhere, including the edge of pavement, in any direction of the surface, except across the crown or drainage gutters, there shall not be a gap between the bottom of the straight edge and the surface of the pavement:

a) greater than 6 mm for all binder courses, leveling courses and padding, or

b) greater than 3 mm for all surface courses.

The Contractor shall provide all traffic control, as required, for the Owner to conduct surface tolerance measurements.

**310.08.04.02 Repairs**

Repairs shall be full lane or full shoulder width with the exception of localized repairs in binder asphalt only as determined by the City. The material and construction of the repairs shall meet the requirements as specified in the contract documents.

The limits and type of repair shall be subject to the approval of the City and shall be approved prior to the repair being carried out.

All areas not meeting the surface tolerance requirements shall be repaired by diamond grinding to a maximum of 5 mm or removed and replaced.

**310.08.05 Surface Appearance Acceptance**

**310.08.05.01 Basis of Acceptance**

HMA deemed by visual appearance to have flushing, bleeding, segregation, fat spot, surface damage, chatter, or surface contamination but not limited to these, shall be considered deficient material or work.

The Contractor shall provide traffic control for all surface appearance assessments. Deficient material, mixture, and work shall be removed and replaced or repaired or assessed a payment reduction.

**310.08.05.02 Referee Testing**

**310.08.05.02.01 General**

The Contractor will have a maximum of 5 business days to submit a written challenge to any surface appearance assessment completed by the City. If required, a second visual assessment will be conducted by an agreed-upon third party. The results of the second visual assessment shall be binding on both the City and the Contractor.

**310.08.05.02.02 Segregation**

The written challenge shall include a list of dimensions and the Contractor's assessment of the severity of each disputed area for the City to consider the challenge. Should the written challenge not be submitted as described, the challenge will not be considered.

**310.08.05.03 Repairs**

**310.08.05.03.01 General**

Repairs shall be full lane or full shoulder width with the exception of localized repairs in binder asphalt only as determined by the City. The material and construction of the repairs shall meet the requirements as specified in the contract documents.

The limits and type of repair shall be subject to the approval of the City and shall be approved prior to the repair being carried out.

**310.08.05.03.02 Segregation**

Other Segregation shall be addressed in according to the following:

- Slightly segregated mix shall be accepted into the work;
- Medium segregation in the levelling courses or binder courses with a thickness of greater than 40 mm shall be accepted into the work;
- Medium segregation in the surface course shall be repaired;
- Severely segregated mix in any lift shall be removed and replaced.

Should any segregated areas deteriorate to a greater severity level, the City may reassess these areas at any time.

**310.08.06 Acceptance Criteria for Surface Smoothness**

The acceptance of surface smoothness shall be as described elsewhere in this specification.

**310.08.07 Geometrics Acceptance**

Random spot checks will be taken by the City to confirm the width of all asphalt courses for acceptance. For binder asphalt, this assessment will occur and acceptance shall be issued in writing prior to placement of the next lift of asphalt.

The width of each lift shall be deemed acceptable based on the following:

i) The outside edges and pavement shoulders are parallel to the centerline and visually uniform;

ii) The width across all adjacent lanes from the outside edge to outside edge is not less than the sum of the specified lane widths;

iii) The width of the paved shoulders is not less than the paved shoulder width as specified in the contract documents.

**310.08.08 Acceptance of Tack Coat and Joint Painting Application Rate**

Tack coat application shall be visually uniform. Areas of insufficient or non-uniform tack coat coverage shall be re-sprayed. When tack coating is performed using hand held devices, the visual appearance of such areas shall be consistent with the adjacent areas of machine applied material.

The joint painting shall provide a thin, uniform and continuous coating to the satisfaction of the City.

The acceptance of Tack Coat shall be in accordance to OPSS 308 PROV.

**310.10 Basis of Payment**

**310.10.01 Hot Mix HL (“type”) – Item**
**Hot Mix HL (“type”) Patching – Item**
**Heavy Duty Binder Course Mix – Item**
**Medium Duty Binder Course Mix – Item**
**Dense Friction Course Mix – Item**
**Superpave (“type”) – Item**
**Superpave (“type”) Patching – Item**
**SMA – Item**

Add the following:

Payment at the Contract price for the above tender items shall include full compensation for the HMA quantities used for temporary ramping, the removal of HMA used for temporary ramping and the applicable payment adjustments.

The Contractor shall perform all repairs at no cost to the City.

**310.10.04 Payment Adjustment**

When QA test results show that the HMA does not meet the requirements of this specification, the City shall notify the Contractor that the HMA represented by the test results may be accepted with a payment adjustment.

**310.10.04.01 Mix Properties**

Should the samples produce a result in the Borderline ranges as defined by OPSS Table 7 and Table 9, a 0.1% payment reduction will be applied to the item unit price for each 0.1% that the sample deviates from the Acceptable Range for each requirement as defined by Table 7 and Table 9.

**310.10.04.02 Changes in the Asphalt Cement Price Index**

Appendix 310-B shall be invoked when the tender item for a separate mix is greater than 500 tonnes. Payment adjustment shall be applied unless the Contractor opts out by notifying the Owner in writing within 5 business days of receiving permission to start work. Once the Contractor has opted out of the payment adjustments based on index, the Contractor will not be permitted to opt back in.

**310.10.05 Referee Testing**

If the referee sample results in a change to the payment factor of more than 1%, the Owner shall pay the costs of the referee testing. Otherwise, the Contractor shall pay all referee testing costs.

## 314 MUNI CONSTRUCTION SPECIFICATION FOR UNTREATED GRANULAR SUBBASE, BASE, SURFACE, SHOULDER AND STOCKPILING

### 314.07.01 Granular Subbase, Base, and Surface

Add in the following:

Subbase material shall not be dumped into position, but shall be deposited on and pushed over the end of the layer being constructed by means of bulldozers or other approved equipment.

The placement of the first layer of material over wet or weak subgrade shall be monitored and the placement and compaction procedure modified as required, with the approval of the General Manager, to minimize subgrade disturbance. Localized, unusually wet or weak subgrade areas shall be identified to the General Manager, for possible treatment.

### 314.07.05.01 General

Add in the following:

The rate of placing material shall be controlled by the adequacy of the compaction obtained.

### 314.07.05.02 Compaction Requirements

Add in the following:

Granular B, Type II shall be compacted using single drum, vibratory, smooth steel drum rollers, with a minimum static drum weight of 8 tonnes (8000 kilograms) and minimum operating dynamic force of 150 kilonewtons. One hundred percent roller pass coverage with a minimum number of four passes shall be provided. Each roller pass shall overlap the coverage of the preceding pass by a minimum of 0.5 m.

### 314.07.05.03 Modified Layer Compaction Method

Add in the following:

Granular B, Type II shall be placed in uniform layers with a compacted depth not to exceed the values allowed by Table 1 for various sizes of single drum, vibratory, smooth wheel drum rollers. Both the minimum drum weight and the minimum operating dynamic force requirement shall be met. One hundred percent roller pass coverage with a minimum number of four passes shall be provided. Each roller pass shall overlap the coverage of the preceding pass by a minimum of 0.5 m.

Table 1: Modified Layer Compaction Thickness for Granular B, Type II

| Minimum Drum Weight (kilograms) | Minimum Operating Dynamic Force (kilonewtons) | Maximum Layer Depth after Compaction (mm) |
|---|---|---|
| 8000 | 150 | 450 |
| 12000 | 250 | 600 |
| 15000 | 350 | 750 |

Where vibration effects are creating environmental problems, the Contractor shall make whatever changes are necessary.

**314.09.01.01.01 Tonne**

Delete paragraphs b) and c)

Add in the following paragraph:

Where the Contractor supplies Modified Granular B composed of blended nickel slag, the total measured mass of blended nickel slag incorporated into the work shall be multiplied by a factor of 0.85.

# 350 CONSTRUCTION SPECIFICATION FOR CONCRETE PAVEMENT AND CONCRETE BASE

## 350.05.01 Concrete

Delete section in its entirety.

Add in the following:

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 35 MPa, Class C-1 Exposure. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

# 351 CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK

## 351.02 References

**Canadian Standards Association:**

CSA A23.1-94/A23.2-94 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

## 351.05.01 Concrete

Delete paragraph.

Add in the following:

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 32 MPa, Class C-2 Exposure. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

## 351.05.06 Tactile Walking Surface Indicator Plates

Delete in its entirety.

Add in the following:

Yellow vitrified polymer composite tactile walking surface indicator plates shall be as specified in the contract documents. Product shall conform to the latest AODA, CSA B651-12 and ISO 23599-12 standards.

## 351.07.13 Concrete Curing

Add in the following:

The Contractor shall provide adequate measures to protect the newly constructed concrete section from damage by vehicular or pedestrian traffic including construction equipment.

# 352 CONSTRUCTION SPECIFICATION FOR CONCRETE STEPS

## 352.02 References

**Canadian Standards Association:**

CSA A23.1-94/A23.2-94 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete

## 352.05.01 Concrete

Delete section in its entirety.

Add in the following:

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 35 MPa, Class C-1 Exposure. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

## 352.09.01.01 Concrete Steps

Delete paragraph.

Add in the following:

Measurement for payment shall be in cubic metres of the concrete placed, based on the neat lines called for in the contract.

**353 MUNI CONSTRUCTION SPECIFICATION FOR CONCRETE CURB AND GUTTER SYSTEMS**

**353.02 References**

**Canadian Standards Association:**

CSA A23.1-94/A23.2-94 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete

**353.05.01 Concrete**

Delete paragraph.

Add in the following:

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 32 MPa, Class C-2 Exposure. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

**353.07.08.03 Concrete Curing**

Add in the following:

The Contractor shall provide adequate measures to protect the newly constructed concrete section from damage by vehicular or pedestrian traffic including construction equipment.

**401 MUNI** **CONSTRUCTION SPECIFICATION FOR TRENCHING BACKFILLING AND COMPACTING**

**401.02** **References**

**Add in the following:**

**OPSS 102** **General Specification for Weighing of Materials**

**GSSD 1227.010** **Pipe Trench Details Sanitary Sewers, Storm Sewers, Watermains and Services**

## 401.05 MATERIALS

Add in the following paragraph:

Backfilling material shall be as specified in GSSD 1227.010.

**401.05.05 Unshrinkable Fill**

Add in the following paragraph:

Unshrinkable fill shall be used when specified.

**401.07.10.01 General**

Add in the following paragraph:

Backfilling material shall be as specified in GSSD 1227.010.

**401.07.14 Trench Stabilization**

Granular O (GSSS 1010) shall be utilized for trench stabilization.

The locations and limits of trench stabilization are to be determined and/or approved by the General Manager.

**401.10.01 Trenching, Backfilling, and Compacting**

Add in the following:

When using Granular O for Trench Stabilization, the payment shall be by the linear metre and shall include the excavation to a maximum depth of 0.6 metres below bedding, prorated by actual depth, as well as any additional excavation required to the dimensions of a safe trench and the disposal of all previously mentioned excavated materials to the designated dump site.

Payment at the Contract Price for the appropriate tender item shall include bedding.

## 403 MUNI CONSTRUCTION SPECIFICATION FOR ROCK EXCAVATION FOR PIPELINES UTILITIES AND ASSOCIATED STRUCTURES IN OPEN CUT

### 403.09.01 Actual Measurement

Add in the following paragraph:

Design trench dimensions shall be as per GSSD 1225.010.

### 403.09.01.01 Rock Excavation for Pipelines, Utilities, and Associated Structures

Subsection – a) Height

Delete the first paragraph:

Add in the following paragraph:

The height of the rock excavation for pipelines, utilities and associated structures is the difference in the elevation between the theoretical bottom of bedding and the lower of the top of original rock or the bottom of shatter.

Subsection – d) Horizontal

Delete second paragraph.

## 405 MUNI CONSTRUCTION SPECIFICATION FOR PIPE SUBDRAINS

### 405.05.01 Materials

Delete in its entirety.

Add in the following:

Pipe material to follow CSA B182.8 and B182.11.

### 405.07.04 Geotextile

Delete second and fourth paragraph.

Add in the following:

Geotextile shall be installed as specified in the Contract Documents.

### 405.07.06.01 General

The pipe shall be joined using a bell and spigot joint with no gasket, to ensure water infiltration.

### 405.07.06.03 Connection to Drainage Structures

Delete in its entirety.

Add in the following:

Subdrain shall be connected to maintenance holes, catch basins and ditch inlets by a one metre section of non-perforated pipe.

Subdrain and outlet pipe connections to concrete maintenance holes, catch basins, and ditch inlets shall be cored and grouted.

### 405.07.07.01 Winter Grading of Material

Delete in its entirety.

Add in the following:

Material shall not be placed over frozen ground, ice or snow.

**405.07.08 Closed-Circuit Television Inspection**

Delete second paragraph.

Add in the following:

100% of the installed pipe subdrain including outlets shall be video inspected and recorded. The inspection shall be conducted following the placement of the granular course and submitted to the Contract Administrator prior to the placement of surface asphalt.

Video recordings to be submitted to Contractor Administrator in a USB flash drive format.

**405.10.01 Pipe Subdrain**

Add in the following:

The unit price for this item shall include all closed-circuit television inspections.

**405.10.02 Closed-Circuit Television Inspection - Item**

Delete first paragraph.

## 407 MUNI CONSTRUCTION SPECIFICATION FOR MAINTENANCE HOLE, CATCH BASIN, DITCH INLET, AND VALVE CHAMBER INSTALLATION

### 407.05.01 Concrete

Delete and replace with the following:

Concrete for cast-in-place structures shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 32 MPa.

### 407.05.03 Precast, Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Add in the following:

Flat top transition slabs, within travelled portion of road, shall be used only with written permission of the General Manager.

### 407.05.04 Steps and Ladders

Add in the following:

Only circular hollow aluminum steps shall be permitted.

### 407.05.05 Adjustment Units

Delete the second and third paragraphs.

Add in the following:

Coning bricks for circular structures and bricks for rectangular structures shall only be hard burned clay with low absorption qualities suitable for exterior application, and shall conform to C.S.A. Specification A82.1.

### 407.05.06 Mortar and Grout

Add in the following:

Gradation requirements for mortar sand are outlined in GSSS 1010, Table 2A.

Add in the following subsection:

### 407.05.12 Steel Strapping

Steel strapping shall be mild steel complete with stainless steel fasteners. Placement and sizing shall conform to the requirements of OPSD 701.100.

Add in the following subsection:

**407.07.02 Restrictions**

Delete entire subsection.

**407.07.08 Excavating Backfilling and Compacting**

Add in the following:

Suitable Native Backfill material shall be placed simultaneously on the sides of the structures in layers not exceeding 300 mm in thickness, loose measurement, and compacted to 95% of the maximum dry density before a subsequent layer is placed.

**407.07.12 Precast Structures**

Add in the following:

Where precast units are used in construction, the precast structures shall be strapped according to the requirements of OPSD 701.100.

**407.07.14 Benching and Channelling**

Add in the following:

In all maintenance holes, channelling shall be provided utilizing the pipe wall as channel lining as shown in GSSD 1004.020. Service connections for dead end maintenance holes shall extend into the maintenance hole to drop into the lined channel as per GSSD 1004.020.

**407.07.16 Installation of Frames with Grates or Covers**

Delete paragraphs two and three.

**407.07.25 Leakage Test**

Delete the first paragraph and replace with the following:

Sanitary sewer maintenance holes shall be tested for leakage. Storm sewer maintenance holes shall be tested for leakage when specified. Leakage shall not exceed a rate of 3 litres per hour per metre of head above the lowest pipe Invert In the maintenance hole.

**407.09.01.01 Maintenance Holes, Catch Basins, Apron, Ditch Inlets and Valve Chambers**

Delete existing paragraph:

Add in the following:

Measurement of maintenance holes, catch basins, ditch inlet and valve chambers is by the vertical height measured from top of base slab to the finished grade.

Add in the following subsection:

**407.09.01.03 Drop Structures For Maintenance Holes**

Measurement of drop structures will be by each.

Add in the following subsection:

**407.09.01.04 Maintenance Hole Access Entrance at Ditches**

Measurement for construction of maintenance hole access entrances will be by each, according to culvert size.

**407.10.01 Basis of Payment**

Add in the following items:

Drop Structures - Item

Maintenance Hole Access Entrance at Ditches - Item

# 408 CONSTRUCTION SPECIFICATION FOR ADJUSTING OR REBUILDING MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS AND VALVE CHAMBERS

## 408.05.04 Steps and Ladders

Add in the following:

Only circular or hollow aluminum steps shall be permitted.

## 408.05.05 Adjustment Units

Delete the second and third paragraphs

Add in the following:

Coning bricks for circular structures and bricks for rectangular structures shall be hard burned clay with low absorption qualities suitable for exterior application, and shall conform to C.S.A. Standard A82.1.

Add in the following subsection:

## 408.05.11 Structure Adjustment Shims

High density Polyethylene shims of varying thickness (3 mm to 25 mm) may be used between the structure's adjustment unit and the frame and cover/grate.

## 408.07.01 General

Add in the following:

Surface paving operations shall be completed within 72 hours of adjusting structures to final elevation.

## 408.07.08 Adjusting

Delete the first and second paragraph

Add in the following:

Adjustment shall constitute a vertical adjustment up or downwards, but not exceeding 300 mm from existing elevation. Rebuilt shall constitute a vertical adjustment up or down greater than 300 mm.

For structures requiring adjustment upwards, greater than 300 mm, the cone shall be removed and the structure shall be rebuilt.

When structure adjustment shims are used, the structure shall first be adjusted using adjustment units raising the structure level as close to the final grade as possible. The adjustment shims shall be placed on top of the adjustment unit and at each of the four (4) corners of the structure frame and cover/grate. A solid seal of mortar shall be placed around the shims between the adjustment unit and the frame and cover/grate.

**408.07.08.02 High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units**

Delete in its entirety.

**408.07.08.03 Rubber Adjustment Units**

Delete in its entirety.

**408.07.09.01 General**

Add in the following:

Any vertical adjustments greater than 300 mm shall be a rebuild.

**408.09.01.01 Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets and Valve Chambers**

Delete the first paragraph:

Add in the following:

Measurement of rebuilt structures shall be by the vertical height greater than 300 mm measured from the finished grade to point where new portion of brick, cast-in-place or precast units connect to the original structure configuration.

Measurement of adjusted structures to a maximum of 300 mm shall be a count of the number of structures adjusted.

## 409 MUNI CONSTRUCTION SPECIFICATION FOR CLOSED-CIRCUIT TELEVISION INSPECTION OF PIPELINES

### 409.01 SCOPE

Add the following:

All references to “Watermains” shall be deleted.

### 409.07.02 Resolution of Videotape and Digital MPEG Video Recordings

Delete in its entirety.

### 409.07.03 Coding Accuracy

Delete in its entirety.

### 409.07.04.04 Camera Position Meter-Reading Device

Delete in its entirety.

### 409.08 QUALITY ASSURANCE

Delete in its entirety.

## 410 MUNI CONSTRUCTION SPECIFICATION FOR PIPE SEWER INSTALLATION IN OPEN CUT

### 410.05.01.01 General

Add in the following:

Storm sewer ditch inlet and outlet pipes shall be corrugated steel pipe (CSP), concrete pipe or smooth inside corrugated Polyethylene.

When extending catch basin leads, the extension shall be made with the same material as the existing lead.

Pipe material types shall not change between maintenance holes. Materials shall remain consistent throughout full length of run.

### 410.05.01.02 Concrete Pipe

Add in the following:

Non-reinforced concrete sewer pipe (CSA 257.1 Class III) may be used in sizes less than 450 millimetres in diameter.

Reinforced concrete sewer pipe shall be CSA 257.2 65-D and used in sizes greater than 375 millimetres in diameter at depth as per OPSD 807.01 and 807.03.

### 410.05.01.03 Corrugated Steel Pipe Products

Add in the following:

Corrugated steel pipe, couplings and fittings having a galvanized metal thickness of 2.0 mm shall be used only for storm sewer ditch inlet and outlet pipes.

### 410.05.01.04 Polyethylene Pipe Products

Add in the following:

Polyethylene pipe is not acceptable as a gravity sanitary sewer pipe.

Only smooth inside corrugated polyethylene pipe may be used for storm sewers. Polyethylene pipe shall be according to CSA B-182.8.

All other types may be used only with the written approval of the General Manager.

### 410.05.01.05 Polyvinyl Chloride Plastic Pipe Products

Add in the following:

Polyvinyl Chloride (PVC) sewer pipe shall be S.D.R. 28 for all service connections and S.D.R. 35 for all sewer mains.

PVC pipe may only be used up to a depth of 6 m.

For storm sewer applications, the Contractor may use concentrically ribbed PVC pipe.

**410.07.12.01 General**

Add in the following:

Installation of service laterals by the method of washing is prohibited.

**410.07.12.04 Corrugated Steel Pipe Products**

Delete entire subsection.

**410.07.12.05 Polyethylene Pipe**

Delete fourth and fifth paragraphs involving:

d) Screw-on Coupler
e) Split Coupler

**410.07.13 Service Connections**

Add in the following:

Crowle Cast Iron Mortar - on saddles (c/w bolts) may be used for large concrete pipe (450 mm or larger).

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts and Pipe Sewers**

Add in the following:

Where a pipeline is to be connected into an existing maintenance hole, neat openings of the size necessary to accommodate the pipeline shall be made in the walls of the maintenance holes and the pipeline shall be securely and neatly grouted in place with non-shrink grout/mortar.

Where connection to existing services requires the abandonment of existing piping, all abandoned pipes shall be bulkheaded with watertight concrete seal as part of the work of constructing the new sewer.

Connections to sewer mains only shall be made with a stainless steel shear ring. Pipe diameter differences shall be made up using appropriate sized rubber bushings. Any service laterals encountered during sewer main repairs shall be reconnected.

Connections to service shall be made with a stainless steel shear ring.

**410.07.16.06 Closed Circuit Television (CCTV) Inspection**

Add in the following:

Prior to the placement of the final lift of asphalt, the following camera work shall be performed by the Contractor and the video report provided to the General Manager.

i) All newly installed sewer mains and laterals shall be at the Contractor's expense.

ii) All sewer mains and lateral repairs as indicated in the contract documents and plans at the Contractor's expense.

iii) Where blasting occurs, all existing sewer mains and laterals within the limits of construction. The Contractor shall be paid for the camera work.

iv) All existing sewer mains and laterals which were crossed either above or below by the installation of new sewer and/or watermain. The Contractor shall be paid for the camera work.

All sewers mentioned above found to be deficient shall be repaired and camera inspected at the Contractor's expense until acceptable to the General Manager.

**410.09 Measurement for Payment**

Add in the following:

**410.09.01.06 Sewer Pipe/Service Spot Repairs**

Measurement for existing sewer pipe/service repairs shall be in metres along the centreline of repair or replacement for a minimum of 3.0 metres or actual whichever is greater.

**410.10.02 Closed - Circuit Television (CCTV) Inspection**

Delete the first paragraph.

Add in the following:

See GSSS 410.07.16.06.

## 412 MUNI CONSTRUCTION SPECIFICATION FOR SEWAGE FORCEMAIN INSTALLATION IN OPEN CUT

### 412.02 Reference

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

Add in the following:

GSSS 442 - Specification for Corrosion Protection of Metallic Fittings.

### 412.05.02 Ductile Iron Pipe Products

Delete the entire subsection.

### 412.05.03 Concrete Pressure Pipe Products

Delete the entire subsection:

### 412.05.04 Polyvinyl Chloride Plastic Pressure Pipe Products

Add in the following:

Polyvinyl Chloride (PVC) pipe shall be DR 25 conforming to AWWA C-900 unless otherwise specified.

### 412.05.05 Polyethylene Plastic Pressure Pipe Products

Add in the following:

Polyethylene Pressure Pipe shall be minimum high density Class 100.

### 412.05.06 Steel Pipe Products

Delete the entire subsection:

Add the following subsection:

### 412.07.11.01 Connection to Existing Structures and Forcemains

Where a pipeline is to be connected into an existing maintenance hole, neat openings of the size necessary to accommodate the pipeline shall be made in the walls of the maintenance hole and the pipeline shall be securely and neatly grouted in place with non-shrink grout/mortar. The end of the pipeline shall be flush with the inside of the structural wall and benching in the maintenance hole shall be altered to accommodate the flow in the new pipe.

Where connections to existing piping require the abandonment of part of the existing piping, all abandoned pipes shall be bulkheaded with concrete as part of the work of constructing the new pipeline.

**412.07.12.02 Ductile Iron Pipe**

Delete the entire subsection.

**412.07.12.03 Concrete Pressure Pipe**

Delete the entire subsection.

**412.07.12.06 Steel Pipe**

Delete the entire subsection.

**412.07.14 Change in Line and Grade**

**412.07.14.01 Ductile Iron Pipe**

Delete the entire subsection.

**412.07.14.02 Concrete Pressure Pipe**

Delete the entire subsection.

**412.07.14.03 Polyvinyl Chloride (PVC) Pressure Pipe**

Delete entire subsection.

Add in the following:

Pipe joints may be deflected up to a maximum of 100 mm, unless manufacturer's recommendation is less than 100 mm. Otherwise, fabricated bends shall be used.

**412.07.14.05 Steel Pipe**

Delete the entire subsection.

**412.07.16 Thrust Restraints**

Delete the first paragraph.

Add in the following:

All connections, caps, and bends shall be restrained by concrete thrust blocks, unless otherwise specified.

Installation of concrete thrust blocks shall be as per GSSD 1103.010 and 1103.020.

**412.07.18 Cleaning and Flushing Forcemains**

Add in the following:

The Contractor will be required to flush a foam swab, of a larger diameter than the forcemain, through the newly installed forcemain, in order to ensure removal of all debris from the forcemain prior to it being put into service.

Add in the following subsection:

**412.07.21 Corrosion Protection**

All metallic components shall be installed with corrosion protection as per GSSS 442 - Specification for Corrosion Protection of Metallic Fittings.

Add in the following subsection:

**412.07.22 Closed Circuit Television (CCTV) Inspection:**

Prior to the placement of the final lift of asphalt, the following camera work shall be performed by the Contractor and video report provided to the General Manager.

i) Where blasting occurs, all existing sewer mains and laterals within the limits of construction, the Contractor shall be paid for the camera work.

ii) All existing sewer mains and laterals which were crossed either above or below by the installation of the new forcemain. The Contractor shall be paid for the camera work.

All sewers mentioned above found to be deficient shall be repaired and camera inspected at the Contractor's expense until acceptable to the City.

**412.10.01 Forcemains**

Delete item "Forcemains"

Add in the following:

Forcemains (Including Fittings and Corrosion Protection)

Delete second paragraph.

Add in the following:

When the Engineer raises or lowers the invert of a forcemain by up to 500 mm from the original design grade, it shall not constitute a Change in the Work and no adjustment shall be made to the payment. When the invert of a forcemain is raised or lowered by more than 500 mm from the original grade, then this shall constitute a Change in the Work for the full extent of the change and an adjustment shall be made to the payment (credit or increase). All of the above also applies to all appurtenances associated with the forcemain work.

## 416 MUNI CONSTRUCTION SPECIFICATION FOR JACKING AND BORING

### 416.10 Basis of Payment

Add in the following:

Where the contract calls for the installation of service piping inside a casing, the service piping shall be paid under the appropriate item.

**421 MUNI CONSTRUCTION SPECIFICATION FOR PIPE CULVERT INSTALLATION IN OPEN CUT**

**421.05.01.01 General**

Add in the following:

The following pipe materials are acceptable:

| Size | Materials |
|---|---|
| ≤900 mm (36") diameter | CSP, Poly-Coated CSP and Polyethylene |
| >900 m (36") diameter ≤ 1.8 metre (72") diameter | Poly-Coated CSP and Concrete |
| >1.8 metres (72") diameter | Concrete Box Culverts Only |
| Note: Polyethylene culverts require a minimum of 600 mm (24") cover. | |

**421.05.01.03 Corrugated Steel Pipe Products**

Add the following:

Corrugated steel pipe, couplings and fittings having thickness of 2.0 mm shall be used only for storm sewer ditch inlet and outlet pipes.

**421.05.01.04 Polyethylene Pipe Products**

**Only** smooth inside corrugated polyethylene pipe may be used as a pipe culvert.

Add the following up to and equal to 900 mm in diameter and must have a minimum of 600 mm of cover.

**421.05.01.05 Polyvinyl Chloride Pipe Products**

Delete in its entirety.

**421.05.01.06 Polypropylene Plastic Pipe Products**

Delete in its entirety.

**421.07.15 Clay Seals**

Delete in its entirety.

Clay seal shall be as per OPSD 802.095 and shall be placed at each end of the culvert.

**421.09.01.03 Clay Seal**

Delete in its entirety.

Add in the following:

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment, and material to do the work and shall be included in the unit price for pipe culvert.

# 422 CONSTRUCTION SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX CULVERTS AND BOX SEWERS IN OPEN CUT

## 422.01 Scope

Add in the following:

Specification shall also include requirement for sheet piling used as cut off walls.

## 422.05.13 Bedding

Delete all paragraphs:

Add in the following:

Bedding shall be as specified in Contract Documents.

Add in the following subsection:

## 422.05.14 Backfill

Delete all paragraphs:

Add in the following:

Backfill shall be as specified in Contract Documents.

## 422.05.15 Cover

Delete all paragraphs:

Add in the following:

Cover shall be as specified in Contract Documents.

Add in the following subsection:

## 422.05.16 Sheet Piling

Sheet Piling CSA G40.21 300 w, “Z” Series - Z55, interlocking.

## 422.07.06 Foundations

Delete second paragraph:

Add in the following:

Unsuitable or unstable material shall be removed as specified in Contract Documents.

**422.07.13 Clay Seal**

Delete in its entirety.

Add in the following:

Clay seal shall be as per OPSD 802.095 and shall be placed at each end of the culvert.

**422.07.14 Geotechnical Testing**

Delete entire subsection.

**422.07.16 Sheet Piling**

Sheet piling shall be installed at both ends of the box culvert. The sheet piling shall be driven from the bottom of the culvert to 2 metres below. Sheet piling shall be placed ensuring the sheet piling does not extend beyond the culvert ends.

The width of the sheet piling shall extend beyond the outer edges of the box culvert by the width of the thickness of the culvert wall or the width of the bedding limits, whichever is greater.

Add in the following subsection:

**422.07.17 Steel Straps**

Once the box units have been installed to the specified alignment and grade 2 - 600 mm long x 100 mm wide x 10 mm thick mild steel straps shall be secured on opposite exterior vertical faces of each box section to tie the sections together.

Each steel strap shall be secured with 2 - 32 mm x 150 mm 304 stainless steel wedge anchors c/w washers to each box unit.

Add in the following subsection:

**422.09.01.02 Sheet Piling**

Measurement of sheet piling left in place shall be a product of horizontal and vertical direct distance from end to end as shown on contract drawings.

**422.10.02 Clay Seal**

Delete in its entirety.

Add in the following:

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment, and material to do the work and shall be included in the unit price for box culvert.

Add in the following subsection:

**422.10.08 Sheet Piling**

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment, and material to do the work.

Add in the following subsection:

**422.10.09 Steel Straps**

Steel straps shall be included in the unit price for box culvert.

## 441 MUNI CONSTRUCTION SPECIFICATION FOR WATERMAIN INSTALLATION IN OPEN CUT

### 441.02 References

Add in the following:

CGS Protocol for New Watermain, Water Service and Wastewater Connections

OPSS 442 Construction Specification for Corrosion Protection of New and Existing Watermains.

Procedure for Disinfection of Drinking Water Ontario

ASTM F1674-96
ASTM A536
ASTM A36
AWWA-M23 PVC Pipe Design

CSA B137.2
CSA B137.3

### 441.05.02 Ductile Iron Pipe Products

Add in the following:

Ductile Iron Pipe shall not be used on watermains sized 600 mm in diameter and smaller.

Ductile Iron Pipe shall be a minimum Class 52. All pipes shall be cathodically protected as per OPSS 442 Specification for the Application of Corrosion Protection of Watermains and Fittings.

All metallic fittings shall be corrosion protected as per GSSS 442 Specification for the Corrosion Protection of Watermains and Metallic Fittings.

### 441.05.03 Concrete Pressure Pipe Products

Add in the following:

Concrete pressure pipe shall not be used on watermains sized 600 mm in diameter and smaller.

### 441.05.04 Polyvinyl Chloride Pipe

Add in the following:

Polyvinyl Chloride (PVC) Pipe shall be minimum DR18 conforming to AWWA C-900, for all pipe 300 mm in diameter and smaller and shall be certified to CSA B137.3. PVC pipe sizes 350 mm to 600 mm in diameter shall be DR18 conforming to AWWA C-905 and shall be certified to CSA B137.2.

Delete Sections c) and d) and replace with:

c) Injection moulded PVC conforming to AWWA C907 in sizes 100 mm to 200 mm.

d) Prefabricated PVC conforming to AWWA C907 for sizes 250 and 300 mm and AWWA C905 for sizes 350 to 750 mm.

Polyvinyl Chloride (PVC) fittings may only be used with PVC pipe.

Prefabricated PVC fittings shall have the same pressure rating (minimum) as the pipe.

**441.05.05 Polyethylene Plastic Pipe**

Add in the following:

Polyethylene may only be used with the prior approval of the General Manager.

Polyethylene (PE) Pressure Pipe shall be minimum DR 11 (160 psi - 1103 kPa), high density Polyethylene.

Add in the following subsection:

**441.05.05.05 Cross – Linked Polyethylene (PEX)**

Cross-Linked Polyethylene (PEX) potable water service tubing for secure connections shall be in accordance with ASTM F876-05, ASTM F877-05, CSA-B137.5 and NSF 61.

PEX water service tubing is to be used with standard copper O.D. brass fittings. PEX tubing ends to be installed with stainless steel insert and be installed with a copper tracer wire (as per 441.05.19) for its entire length.

**Approved PEX sizes are 25 mm to 50 mm and shall be provided by the following manufactures or approved equal:**

REHAU Municipex
IPEX BLUE 904

**441.05.06 Steel Pipe Products**

Delete the entire subsection.

**441.05.07 Copper Pipe**

Add in the following:

Copper service connection pipe shall be CSA certified.
One 10.9 kg zinc anode shall be installed on each copper service as per GSSD 1104.010.

**441.05.09.01 General**

Add the following:

Valves for buried installation shall have mechanical ends only and shall conform to a buried valve specification.

Valves installed in valve chambers shall conform to buried valve specifications.

Delete Section c) and replace with:

c) valves greater than 300 mm shall be gate valves.

Delete Section d).

**441.05.09.02 Service Line Valves**

Add the following:

Rod in the service box shall be stainless steel as per GSSD 1104.010.

**441.05.09.03 Gate Valves**

Delete the first paragraph.

Add in the following:

Gate valves up to 750 mm in diameter shall be according to AWWA C509.

Gate valves over 750 mm in diameter shall be according to AWWA C500.

Add in the following:

All gate valves 500 mm in diameter and larger shall be installed with spur gears.

**441.05.09.04 Butterfly Valves**

Delete the entire subsection.

**441.05.10 Hydrants**

Add in the following:

All hydrants shall have hydrant markers installed. Hydrant makers shall be designed to mount on the base of the hydrant at the back. The markers shall be yellow in colour, 1219 mm in length and constructed of Polycarbonate material or approved equivalent. The material shall be flexible in temperatures of -40 deg. Celsius. The markers shall also be fade resistant and resistant to UV damage.

All hydrants shall have drain holes plugged internally and come with bronze to bronze valves seats.

Hydrant extensions must be located immediately atop the hydrant boot and the rod extended at the top.

The hydrant shall be painted as follows:

The below coating system will be required on the upper barrel and bonnet. All components shall be gloss yellow for the finish and epoxy primer coats.
Zinc Rich Primer Coat: ZNP-300, WFB: 5.5 mils (1 coat), DFB: 3.2 mils
Corrosion Resistance Epoxy Primer: CRE-321, WFB 6.5 mils (1 coat) DFB: 3.3 mils
Finish Coat: Polyurethane DTM, AUE-370, WFB: 7.5 mils (1 coat), DFB: 3.8 mils
All of the above coatings by PPG Commercial Coatings or equivalent
These coatings shall be factory applied in strict conformity to the Manufacturer's coating specifications.
Care shall be taken to ensure that no coating comes in contact with the interior surface of the hydrant unless suitable for contact with drinking water.

Prior to final acceptance, any damage shall be repaired as per manufactures recommendations.

**441.05.12 Service Connection Fittings and Appurtenances**

Add in the following:

Service connection fittings and appurtenances shall be according to AWWA C800.

Add in the following subsections:

**441.05.12.01 Main Stops**

Main stops shall be solid brass, key/plug type, chamfered, threaded inlet end, compression outlet end, and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

**441.05.12.02 Curb Stops/Service Boxes**

Curb stops shall be solid brass, key/plug type, compression ends and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

**441.05.12.03 Couplings**

Couplings shall be solid brass, compression ends and shall be high pressure rated.

For Polyethylene service lines, refer to GSSD 1104.020.

**441.05.12.04 Service Boxes**

Service boxes shall be cast iron, c/w set screw and brass plug and shall have the top stamped water.

Service box rods shall be stainless steel.

**441.05.12.05 Service Saddles**

Service saddles shall be used for all service connections 50 mm and under on all mains except ductile/cast iron. Service saddles shall be broad band, stainless steel type, having an internal threaded outlet.

**441.05.12.06 Insulated Services**

Where services require insulation as per GSSS 441.07.11.01 and 441.07.20.02, the insulating duct shall be 50 mm diameter and suitable for a freeze protection application, high density Polyethylene (HDPE) manufactured from Type 111, Grade P34 in ASTM D1248 high density Polyethylene resin. The duct shall also conform to one of the following standards: AWWA C906-99, ASTM F-714, ASTM D3035, and CSA B137.1. Duct shall be insulated with 50 mm thick, factory-applied, rigid polyurethane insulation, and be protected with 1.27 mm thick black HDPE outer protective jacket as manufactured by Urecon.

Add in the following subsections:

**441.05.17 Valve Boxes**

Valve boxes shall be used on all valves 300 mm in diameter and smaller. All valve boxes shall be cast iron and conform to GSSD 1101.020. All valves and boxes shall be wrapped in geotextile.

**441.05.16 Corrosion Protection**

All metallic fittings shall have corrosion protection as per GSSS 442.

**441.05.18 Joint Thrust Restraints**

All joint restraint devices must meet or exceed the minimum requirements of ASTM F1674-96, (Standard Test Method for Joint Restraint Products for use with PVC Pipe), be UL listed and FM approved. Restraining glands (100 mm to 300 mm) shall be manufactured of high strength ductile iron conforming to the requirements of ASTM A536, Grade 65-45-12 (minimum), (400 mm to 600 mm) shall be manufactured of structural steel conforming to the requirements of ASTM A36. Joints shall be designed for the same design, test and surge pressure ratings as the pipeline in accordance with AWWA-M23 PVC Pipe Design.

All restraints are to be torqued to manufacturer's specifications using a calibrated torque wrench. If power equipment is used during installation, it is to be set as not to over tighten the bolts before they are properly torqued.

Mechanical Joint Restraints shall be provided by the following manufacturers (or approved equal).

- Clow
- Uni-Flange
- Sigma
- Star Pipe

Refer to section 441.07.23 Thrust Restraints, of this section.

**441.05.19 Tracer Wire/Cathodic Protection**

All watermains, hydrant laterals, water services and associated appurtenances shall be traced with an appropriate tracer wire installed in a continuous fashion. The tracer wire shall be secured to the top centre of the main and taped at 5 metre intervals.

An anode shall be installed at the terminus of the tracer wire which is not otherwise connected to an existing tracer wire. One 5.4 kg zinc anode shall be installed for every 500 metres of tracer wire installed, as per GSSD 1110.000.

Tracer wire shall be RW90XLPE wire, rated at minus 40°C, coated 7 strand, 10 gauge.

If required, splices and other wire to wire connections shall be made by using Dryconn waterproof connectors as shown in GSSD 1110.000 or approved equal.

The wire shall be installed in such a manner as to be able to properly trace all watermains, hydrant laterals, water services and associated appurtenances without loss or deterioration of signal, or without the transmitted signal migrating off the tracer wire.

Tracer wire conductivity testing is to be conducted by a qualified third party company and witnessed by the City of Greater Sudbury Construction Services Staff.

Results of tracer wire conductivity testing are to be noted on the Tracer Wire Field Inspection Report to be provided by Construction Services.

A continuity signal shall be applied to the tracer wire and the signal confirmed over the entire length of all tracer wire installed. The signal shall be detectable for a distance of at least 350 metres from either side of the signal connection point. At no time shall there be a break in the continuity of the tracer wire.

The Contractor shall demonstrate that the tracer wire in chambers can be accessed from the finished grade and that the signal is detectable on the watermain outside of the chamber.

In the event that the conductivity tests fail, the Contractor shall be responsible to repair or reinstall all required tracer wire at their own expense.

**441.07.07 Transporting, Unloading, Storing and Handling Pipe**

Delete the fifth paragraph and replace with the following:

Any watermain pipe delivered to the site with damaged or missing end caps shall be rejected and shall be removed from the site.

Add in the following subsection:

**441.07.11.01 Culvert Crossings**

All watermains crossing under culverts larger than 450 mm diameter shall be insulated with 50 mm thick, factory-applied, rigid polyurethane insulation suitable for freeze protection application, and be protected with a 1.27 mm thick black HDPE outer protective jacket as manufactured by Urecon for one entire pipe length centred on the culvert crossing or be lowered a minimum of 2 metres below the invert of the culvert.

All water services crossing under culverts larger than 450 mm diameter shall be installed with insulation as per GSSD 1104.011 and only for a 3 metre length on each side of the culvert crossing or be lowered a minimum of 2 metres below the invert of the culvert.

Other methods may be acceptable on a site specific basis only with the approval of the General Manager.

**441.07.14 Installation of Pipe**

Delete the third paragraph and replace with the following:

When the Engineer raises or lowers the invert of a watermain by up to 500 mm from the original design grade, it shall not constitute a Change in the Work and no adjustment shall be made to the payment. When the invert of a watermain is raised or lowered by more than 500 mm from the original grade, then this shall constitute a Change in the Work for the full extent of the change and an adjustment shall be made to the payment (credit or increase). All of the above also applies to all appurtenances associated with the watermain work.

**441.07.15.06 Steel Pipe**

Delete the entire subsection.

**441.07.15.07 Service Connection Pipe**

Add in the following:

Pipe shall be of continuous length with no fittings between the main stop and the curb stop, for all services 20 metres in length or less.

Add in the following subsection:

**441.07.15.08 Insulated Water Service Duct**

Duct pipe shall be joined by a heat shrink tube. The tube shall have a factory applied sealant.

Insulated duct pipe joints shall be completed using pre-fabricated urethane half shells. The half shells shall be wrapped with adhesive lined heat shrink sleeves as supplied by Urecon. The heat shrink sleeves shall overlap the insulation jacket by a minimum of 75 mm on either side of the joint.

The horizontal goose neck as per GSSD 1104.010 will not be used for the insulated services.

**441.07.17.03 Polyvinyl Chloride Pipe – PVC & PVCO**

Delete the entire clause and add in the following:

Flexibility shall be limited to one degree (1°) or 100 mm per each 6 metre pipe length. Bends shall be used otherwise.

**441.07.17.05 Steel Pipe**

Delete the entire subsection.

Add in the following subsection:

**441.07.17.06 Corrosion Protection**

All metallic components shall be installed with corrosion protection as per GSSS 442 Construction Specification for Corrosion Protection of New and Existing Watermains and Fittings.

**441.07.18.01 General**

Add in the following:

All valves larger than 300 mm shall be installed in a valve chamber. Valves in chambers shall be supported by an adjustable pipe saddle support as per GSSD 1100.012 to 1100.018.

**441.07.19 Installation of Hydrant Sets**

Delete the first paragraph:

Add the following paragraphs:

The work of installing hydrant sets shall include the placing of hydrants, hydrant isolating valves, hydrant leads, tees, bends, valve box, restraining devices and support devices.

Supply and install corrosion protection as per GSSS 442.

If the culvert is larger than 450 mm in diameter, the hydrant lead shall be insulated in accordance with GSSS 441.07.11.01 Culvert Crossings.

Add in the following subsection:

**441.07.19.01 Hydrant Entrances**

Hydrant entrances shall be constructed across ditches at the location and to the elevation shown on the contract drawings. The culvert shall be of the size indicated on the drawings and shall be of the type specified in OPSS MUN 421. Installation of hydrant entrance shall be in accordance with OPSD 217.050. Installation of hydrant shall be in accordance to GSSD 1105.010 Hydrant Installation.

Side slopes in urban areas shall include 100 mm of compacted topsoil and sod, as per GSSD 218.010.

Side slopes in rural areas shall include 100 mm of compacted topsoil and hydro seeding.

The platform area shall include 150 mm of Granular 'A'.

**441.07.20 Installation of Service Connections**

Add in the following:

Water services may be installed by method of jacking or boring. Washing of services may only be done upon receiving written approval of the General Manager.

All watermain taps on existing mains shall only be performed by City forces, with a minimum 48 hour advance notification. The Contractor shall supply and install the tapping sleeve and valve for the City forces to complete the tap on the existing watermain.

In cases where the existing service box is located on private property, the existing service box is to be left in place in the open position and the valve stem is to be removed. New service box to be installed as shown on the contract drawings.

The work shall include all appurtenances required to connect to the existing services

Supply and install corrosion protection as per GSSS 442 and Cathodic Protection on copper service.

Add in the following subsections:

**441.07.20.01 Adjustment of Existing Curb Stop Service Boxes**

Where existing curb stop service boxes are to be adjusted, the Contractor shall excavate to sufficient depths to allow for free movement of the service box up and down. Where insufficient adjustment is available on the box, the Contractor shall extend the box using a proper coupling and pipe extension.

**441.07.20.02 Service Connections in Rock Trenches**

In a water service trench, where rock is encountered having less than 1 metre of overburden in any part of the trench, insulation as that provided by Urecon, must be installed along the whole length of service. The water service shall be installed at full depth as per GSSD 1104.011.

**441.07.20.03 Installation of Insulation for Water Services**

Insulation for water services shall be installed beginning with a connection to the existing corporation main stop (the service saddle and main stop do not require insulation). The installation shall continue to and include a new curb stop and service box approximately 300 mm from lot line with a connection to the existing water service at lot line. The end of insulation shall be sealed against the elements with an approved waterproof sealant in accordance with the manufacturer's specifications.

Supply and install corrosion protection as per GSSS 442

**441.07.21 Shutting Down or Charging Mains**

Delete existing paragraph:

Add in the following:

At no time shall watermains that are connected to the existing system be shut down or charged, or valves operated **by anyone other than City forces**.

**441.07.22 Connection to Existing Watermains**

Delete second paragraph:

Add in the following:

Prior to making any connection, all requirements of section 441.07.24 "Field Testing" must be met.

Final connections shall be less than 6 metres and shall be swabbed with 1% to 5% chlorine solution.

The watermain shall be immediately connected to the existing distribution system after field testing.

All connections to existing watermains must be supervised by a certified City Operations Representative or his designate after having received a minimum 48 hour advance notification.

Where connections to existing piping require the abandonment of part of the existing piping, all abandoned pipes shall be bulkheaded with concrete as part of the work of constructing the new pipeline.

Where the Contractor fails to locate a particular watermain or service, for the purpose of connecting to, within 3 metres of the plan view, payment shall be made in accordance with the appropriate item for "Test Dig".

**441.07.23 Thrust Restraints**

Delete in its entirety and replace with the following:

For all PVC pressure pipe installation greater than 350 mm in diameter, thrust restraints shall be provided at all fittings, bends, tees, couplings, valves, hydrants, crosses, reducers and plugged or capped ends in accordance with the contract drawings.

Thrust restraints shall be mechanical restraint devices. Concrete thrust blocking shall be used in addition to mechanical restraints as per GSSD 1103.010 & 1103.020.

In addition to the above thrust restraint requirements, the Contractor shall be responsible to provide Shop Drawings for PVC pressure pipe installations greater than 350 mm in diameter. PVC Shop Drawings shall include the following:

- Letter of Compliance;
- Pipe design calculations;
- Summary of fittings;
- Installation guide;
- Tabulated layout drawings indicating restrained lengths for fittings and valves, signed and stamped by a Professional Engineer licensed to practice engineering in the Province of Ontario.

PVC Shop Drawings shall be provided to the General Manager prior to construction.

**441.07.24 Hydrostatic Testing**

Delete all subsections and replace with the following:

Add in the following subsection:

**441.07.24.01 General**

Testing shall be completed in lengths not to exceed 300 metres with no more than 500 metres of watermain installed before testing must commence. Testing must progress with watermain installation so no more than 500 metres of pipe are installed ahead of testing unless otherwise approved by the General Manager.

Water used for cleaning, flushing, testing and disinfecting of the temporary potable water system and/or new watermain shall not be obtained from an existing hydrant. Water may be obtained from one of the five bulk water loading stations located in the City.

**441.07.24.02 Cleaning and Swabbing**

Prior to disinfecting and hydrostatic testing of the new watermain, the Contractor shall remove all debris from the interior of the watermain with the use of a hydraulically propelled foam swab (of a diameter larger than the watermain).

Cleaning and swabbing to be carried out in stages as sections of the system are completed. Flushed sections shall be protected from contamination.

**441.07.24.03 Disinfecting and Hydrostatic Testing**

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and sodium hypochlorite solution and calcium hypochlorite granules or tablets. **Use of calcium hypochlorite intended for swimming pool disinfection shall not be permitted**.

After cleaning and swabbing is completed, liquid chlorine solution shall be introduced slowly expelling all air by opening fire hydrants and blow offs at high points, dead ends and side street laterals so that the chlorine is distributed throughout the section being disinfected. This water shall not be introduced from a direct connection from the existing distribution system.

The chlorine shall be applied so that the chlorine concentration is 50 mg/L minimum throughout the system.

The chlorinated water shall be retained in the main for a minimum of 24 hours during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances.

Sampling and testing for chlorine residual will be carried out by the Contractor. The chlorine residual will be tested in the section at all hydrants, blow offs and sample points after 24 hours. The maximum allowable decrease in chlorine concentration is 40% of the Initial Chlorine Concentration to a Maximum of 50 mg/L. Therefore, if the initial chlorine concentration is 50 mg/L, and at least 30 mg/L of chlorine is present after 24 hours, proceed with the hydrostatic testing. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained.

All hydrostatic testing shall be conducted under the supervision of a Representative of The City of Greater Sudbury after having received a minimum 48 hours advance notification.

The test section shall be subjected to the specified continuous test pressure for 2 hours.

The minimum initial specified test pressure shall be 1035 kPa (150 psi) or as specified in the contract.

The minimum initial specified test pressure shall be maintained to within $\pm$ 35 kPa (5 psi) of the initial test pressure for the duration of the test.

The final test pressure reading must be equal to the initial test pressure reading.

The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration. The measured leakage shall be compared with the allowable leakage as calculated for the test section. The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of watermain for the 2-hour test.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be re-chlorinated and retested until a satisfactory result is obtained.

The section shall be flushed until chlorine measurements at the extremities of all branches show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system (generally less than 1 mg/litre).

All test data is to be recorded on the City of Greater Sudbury's Watermain Test Report and once completed, a copy shall be forwarded to the General Manager.

If the hydrostatic test has met the requirements and the chlorine residual is acceptable, then the Contractor shall be responsible for obtaining satisfactory bacteriological tests which must be obtained from an approved independent lab prior to connections to the existing system. The first of two sets of bacteriological test samples may be taken immediately. A second set of test samples shall be taken **a minimum of 16 hours** after the first set of samples and immediately following (1) minute flush of water from the sampling line. The set of samples shall consist of at least one from approximately every **370 metres** of new watermain, plus one sample from the end of the line and at least one sample from each branch, in excess of 6 metres.

No hose or fire hydrant shall be used in the collection of bacteriological samples. A corporation cock shall be installed in the main or end cap with a copper tube gooseneck assembly. The sampling tube must be dedicated, clean, disinfected and flushed prior to sampling.

The collection of all samples must be witnessed by the Representative of Construction Services (48 hours notice).

The samples shall then be taken to an accredited water testing laboratory by the Representative of Construction Services.

If there is an indication of contamination in the first set of samples, a third set may be taken **16 hours** after the second set.

If there is indication of contamination in the second or third set of samples, the mains must be disinfected again, flushed and bacteriological samples taken as above.

Successful bacteriological test results for all samples must be forwarded to the General Manager who shall issue written authorization to connect the new watermain to the existing municipal system.

**If the connections are not completed within five (5) calendar days of the date the last bacteriological sample was collected, the watermain shall be flushed, disinfected, and bacteriological testing performed again.**

**441.07.28 Depth of Cover**

Add in the following:

Watermains shall be constructed as shown on the plan and profile drawings.

**DEPTH OF COVER OVER WATERMAINS**

| AREA | STANDARD COVER (m) | DEAD END COVER (m) |
|---|---|---|
| Urban | 2.0 | 2.2 |
| Rural | 2.3 | 2.5 |
| Urban Capreol & Levack - Capreol and Levack | 2.3 | 2.5 |
| Rural Capreol & Levack - Capreol and Levack - Capreol and Levack | 2.6 | 2.8 |

Watermains may require installation at greater depths to avoid conflict with other services, existing and proposed.

**441.07.29 Camera Inspection**

Prior to the placement of the final lift of asphalt, the following camera work shall be performed by the Contractor and the video report provided to the City.

i) Where blasting occurs, all sanitary and storm sewer mains within the limits of construction. The Contractor shall be paid for the camera work.

ii) All sanitary and storm sewers, laterals and mains, which were crossed above or below by the watermain and all laterals and mains repaired during construction. The Contractor shall be paid for the camera work.

All sewers mentioned above found to be deficient shall be repaired and re-cameraed at the Contractor's expense until acceptable to the General Manager.

Add in the following:

**441.07.30 Adjustment of Valve Boxes**

Where existing valve boxes require adjustment, the Contractor shall excavate to sufficient depths around the valve box to allow for movement of the upper section. Should there be insufficient length available for adjustment, the Contractor shall dig down to below the first section and replace with a section of adequate length. The Contractor shall ensure that when complete all valve boxes are vertical and flush to final grade.

Where the valve box is plumb, adjustments in height may be made using cast iron road levellers. A maximum of one road leveller will be allowed per box.

**441.09.01.02 Valves**

Add in the following:

Payment for valves shall include the valve box and corrosion protection.

**441.09.01.02.01 Adjustment of Valve Boxes**

Measurement shall be by the number of units adjusted. The unit of measurement will be each.

**441.09.01.03 Hydrant Sets**

Delete existing sentence.

Add the following:

For measurement purposes, a count shall be made of the number of hydrant sets including corrosion protection regardless of the type.

**441.09.01.03.01 Hydrant Entrances**

Add in the following:

Measurement will be by the number of entrances installed. The unit of measurement will be each.

**441.09.01.04 Service Connection Pipes**

Add the following:

Measurement of service shall include appurtenance sets and shall include corrosion protection.

**441.09.01.05 Service Connection Appurtenance Sets**

Delete in its entirety.

**441.09.01.05.01 Adjustment of Service Boxes**

Add in the following:

Measurement will be by the number of units adjusted. The unit of measurement will be each.

**441.09.01.06 Connections to Existing Watermains**

Delete in its entirety.

**441.09.01.07 Insulating Duct**

Measurement of insulating duct is in metres along the horizontal centre line of the duct.

The copper or polyethylene service shall be paid under the appropriate item.

**441.10.01 Basis of Payment**

Replace with the following:

Watermains (including fittings) – Item

Valves – Item

Hydrant Sets – Item

Hydrant Entrances – Item

Service Connections (including appurtenances) – Item

Insulating Duct - Item

Adjustment of Existing Curb Stop Services Boxes – Item

Payment at the contract price for the above tender items(s) shall be full compensation for all labour, equipment and material to do the work, including the following:

- Thrust restraints and applicable shop drawings
- Removal & disposal or abandoning of existing watermain
- Flushing, disinfecting and testing watermain
- Corrosion protection
- Tracer wire/cathodic protection and associated testing
- Connections to existing watermains
- Temporary caps on existing watermain for isolation purposes

## 442 MUNI CONSTRUCTION SPECIFICATION FOR CORROSION PROTECTION OF NEW AND EXISTING WATERMAINS

### 442.02 References

Add the following:

| | |
|---|---|
| SSPC-SP1 | Solvent Cleaning |
| SSPC-SP2 | Hand Tool Cleaning |
| SSPC-SP3 | Power Tool Cleaning |
| OPSS 503 | Site Preparation for Pipeline, Utilities, and Associated Structures in Open Cut |
| OPSS 504 | Preservation, Protection and Reconstruction of Existing Facilities |
| OPSS 517 | Dewatering of Pipeline, Utilities and Associated Structures |
| OPSS 441 | Watermain Installation in Open Cut |
| OPSS 410 | Pipe Sewer Installation in Open Cut |
| | DENSO ® NORTH AMERICA INC. |

### 442.03 Definitions

Add in the following:

**Service Connection** means the system used to supply water from the watermain to the property line.

**Service Connection Appurtenance Set** means the main stop, curb stop, couplings, service box, service box support, and service saddle used in the installation of a service connection.

### 442.05 Materials

Add in the following:

#### 442.05.03.02 Petrolatum Tape Primer

The primer shall be comprised of saturated petroleum hydrocarbons inert fillers and passivating agents.

The primer shall be in integral component for the preparation of metal surfaces prior to wrapping. Primer will displace moisture, passivate surface oxides, fill imperfections, and ensure contact for the tape.

#### 442.05.03.03 Petrolatum Tape

The tape shall have a character stable in composition and plasticity over a wide temperature range. Tape shall be non-hardening and non-cracking.

#### 442.05.03.04 Petrolatum Molding Mastic

The mastic shall be comprised of saturated petroleum hydrocarbons inert fillers, reinforcing fibers and thermal extenders.

Mastic shall be cold applied self-supporting for molding around irregular shaped fittings to provide a suitable profile for applying anti-corrosion tapes.

Anti-corrosion materials approved for use by the General Manager include the following (or approved equal):

- Denso Paste Petrolatum Tape Primer as Priming Solution,
- Denso Profiling Mastic for profiling irregular contours and
- Denso LT Tape

**442.05.05 Test Stations**

Add in the following:

All test stations shall be weatherproof and non-metallic and shall be of:

Little Fink as manufactured by Cott Manufacturing Company or approved equal.

Test stations to be installed as per GSSD 1125.010.

**442.07.01 General**

Add in the following:

The work of installing corrosion protection on all metallic appurtenances shall include all primer, profiling mastic, and tape. The anti-corrosion materials shall be installed according to the manufacturer's recommendations with a 55% overlap for the tape applications.

**442.07.03 Transporting, Unloading, Storage, and Handling Materials**

Add in the following:

Anti-corrosion materials that can be damaged by exposure to elements shall be stored in a clean, dry enclosure.

**442.07.04 Anode Installation**

Delete sub sections 442.07.04.04, 442.07.04.05,

Add in the following subsections:

**442.07.15 Cold Weather Work**

All work and materials must be protected from freezing.

**442.07.16 Surface Preparation**

Preparation of the surface area for corrosion protection shall be performed in accordance to:

a) SSPC-SP1 Solvent Cleaning
b) SSPC-SP2 Hand Tool Cleaning
c) SSPC-SP3 Power Tool Cleaning
d) High Pressure Wash (3,000-7,000 psi)

**442.07.17 Service Connection Appurtenance Set**

Corrosion protection shall be applied to the following metallic components:

a) Service saddle;
b) Main stop;
c) Couplings or fittings;
d) Curb stop.

Reference the appropriate GSSD 1104.010, GSSD 1104.011, GSSD 1104.020.

The appropriate size anode shall be applied to the service pipe if required.

**442.07.18 Metallic Fittings**

Corrosion protection shall be applied to the following metallic components:

a) Bends or elbows;
b) Tees;
c) Crosses;
d) Caps;
e) Reducers;
f) Pressure release valves;
g) Thrust restraints.

**442.07.19 Associated Appurtenances – Hydrants**

Corrosion protection shall be applied to the following metallic components:

a) Tee at watermain;
b) Hydrant valve;
c) Hydrant valve – fittings;
d) Hydrant boot;
e) Hydrant barrel: boot to flange on hydrant.

Reference GSSD 1105.030.

**442.07.20 Associated Appurtenances – Valves**

Corrosion protection shall be applied to the following metallic components:

a) Entire valve exclusive of closing nut;
b) All metallic fittings to connect valve to existing/new distribution system;
c) As indicated on Greater Sudbury Standard Drawings (GSSDs).

**442.09 Measurement for Payment**

Add in the following subsections:

**442.09.03 Fittings – Metallic**

For measurement purposes, corrosion protection shall be included in the unit price for watermain.

**442.09.04 Service Connection**

For measurement purposes, corrosion protection shall be included in the unit price for service connections.

**442.09.05 Hydrant Sets**

For measurement purposes, corrosion protection shall be included in the unit price for hydrant sets.

**442.09.06 Valves**

For measurement purposes, corrosion protection shall be included in the unit price for valves.

**442.10 Basis of Payment**

Add in the following:

Payment shall be full compensation for all labour, equipment, and material to do the work under the appropriate item.

## 492 MUNI CONSTRUCTION SPECIFICATION FOR SITE RESTORATION FOLLOWING INSTALLATION OF PIPELINES, UTILITIES AND ASSOCIATED STRUCTURES

Add in the following subsection:

### 492.07.10 Driveway Restoration

Reconstruction of existing paved driveways shall be a minimum150 mm Granular ‘A’, and a minimum 50 mm asphalt surface course, or existing depth, whichever is greater.

Reconstruction of existing gravel driveways shall be a minimum 150 mm Granular ‘A’, or existing depth, whichever is greater.

Reconstruction of existing lockstone driveways shall be a minimum 50 mm Crusher dust material, and 150 mm Granular ‘A’, or existing depth, whichever is greater.

Existing slag driveways, material shall be salvaged, stockpiled on site and re-used.

## 493 MUNI CONSTRUCTION SPECIFICATION FOR TEMPORARY POTABLE WATER SUPPLY SERVICES

### 493.02 References

Add in the following:

**CSA Standards**

B64.10-17 Selection and Installation of Backflow Preventers

B64.10.1-17 Maintenance and Field Testing of Backflow Preventers

**American Water Works Association (AWWA)**

C511-17 Reduced Pressure Principle Backflow Prevention

C651-14 Disinfecting Watermains

### 493.03 Definitions

Add in the following:

**Backflow Preventer Tester (BPT)** means an individual who is authorized to install, test repair and relocate backflow preventers. A BPT must hold and maintain an Ontario Water Works Association (OWWA) Certified Cross Connection Control Specialist Certificate or a Ministry approved equivalent.

### 493.04.01 Submission Requirements

Delete in its entirety and replace with the following:

The Contractor shall submit a detailed plan and methodology of the proposed temporary water supply system to the City at the Pre-Construction Meeting, or one (1) week prior to any construction activities taking place, whichever comes first. Information provided in the plan and methodology must include, but is not limited to the following:

a) Layout;
b) Watermain construction/shutdown staging plan (if required);
c) Connections to existing watermain;
d) Size and type of pipe;
e) Service connection points;
f) Valves and check valves;
g) Feed connections;
h) Size of service to non-residential buildings**.**

### 493.05 Materials

**493.05.01 General**

Delete the first paragraph.

**493.05.02 Temporary Potable Water Supply Services**

Delete item i) for Double Check Valve Backflow Preventers from the list of materials and replace with the following:

i) Reduced Pressure Principle (RP) Backflow Preventers shall be according to CSA B64.10/B64.10.1 and AWWA C651

**493.07 Construction**

**493.07.01 General**

Add in the following:

The Contractor shall keep and maintain a real time log of the houses which have been placed on and removed from the temporary water supply system. The log shall be made available for review by the City upon request. The log shall include at a minimum, the address, date and meter reading on that day. An example of this log form can be obtained from the City's website:

https://www.greatersudbury.ca/do-business/infrastructure-and-city-construction/engineering-standards/standard-contract-documents-for-municipal-construction/temporary-water-service-notification/

If for any reason, the water meter needs to be removed, the Contractor shall call the Water Meter Compliance Officer and request that City staff be dispatched to remove the meter. Minimum forty-eight (48) hours notice is required.

The Contractor is to coordinate with the City of Greater Sudbury's Distribution / Collection Operations as well as affected businesses, institutions and multiple unit residential buildings to ensure that the temporary water supply system is sized properly to provide for all water requirements. The Contractor may be required to work overnight or on weekends to accommodate the water requirements of the affected stakeholders. It shall be the bidder's responsibility for determining the number of households and/or businesses that require an outside water connection to be installed.

Meetings will be required with the City's Distribution / Collection Operations during the course of the construction to determine scheduling and actions that will be required prior to connections.

All hydrant connections and valve operations shall be completed and supervised by City forces.

It shall be the Contractor's responsibility to protect the temporary water supply system from freezing.

**493.07.02 Temporary Watermains**

Delete the second paragraph and replace with the following:

At any connection of a temporary watermain to the water supply and distribution system (e.g. at hydrants) a CSA Certified Reduced Pressure Principle (RP) backflow preventer shall be installed. Each RP backflow preventer installation shall be installed, field tested, and certified by a licenced Backflow Prevention Tester (BPT).

In addition to the requirements of section 493.07.08 for the flushing and disinfecting of temporary watermains and services, written certification of the backflow preventer installation, prepared by the BPT, must be submitted to the General Manager who shall issue written authorization to connect the temporary watermain to the existing municipal system.

At a minimum, written certification of the backflow preventer installation shall be in accordance with CSA B64.10/B64.10.1 and shall include:

a) Specific location of device;
b) Device size;
c) Device manufacturer;
d) Device model number;
e) Device serial number;
f) Installation date;
g) Installation by (i.e. Business Name);
h) Backflow Prevention Tester Name;
i) Backflow Prevention Tester Business Name;
j) Backflow Prevention Tester Business Address;
k) Backflow Prevention Tester Business Phone Number;
l) Backflow Prevention Tester OWWA Certification No. certification date, and expiry date;
m) Device testing date
n) Test results (i.e. Passed, Failed, re-test);
o) Signature of Backflow Prevention Tester certifying installation and testing of device.

**493.07.03 Temporary Potable Water Services**

Add in the following:

A backflow preventer shall be installed at a point of connection to a private plumbing system (e.g. near the outside tap).

**493.07.06 Protection**

Add in the following:

The Contractor shall only cut and remove asphalt across the roadway to permit burying the by-pass pipe when directed by the General Manager.

**493.07.07 Leakage Testing**

Add in the following:

The temporary system shall be pressure tested at 820 kPa (120 psi) for one hour.

The pressure test shall be deemed acceptable if after one hour the pressure drop does not exceed 34.5 kPa (10 psi) and no leaks are visually apparent over the entire system.

The temporary potable water supply system shall be visually examined daily by the Contractor for leaks and any leakage must be repaired immediately.

**493.07.08 Flushing and Disinfecting Temporary Watermains and Services**

Delete in its entirety and replace with the following:

Flushing and Disinfecting of the temporary system shall be in accordance with section 441.07.24.03 of the City of Greater Sudbury Supplemental Specifications.

The “final connection device” to any buildings shall be treated in accordance with section 441.07.22 of the City of Greater Sudbury Supplemental Specifications.

**493.10 Basis of Payment**

**493.10.01 Temporary Potable Water Supply Services – Item**

Delete the second paragraph and replace with the following:

On completion of the supply, installation, flushing, disinfecting and testing of the temporary water supply system and upon successful connection, a payment of 60% of the lump sum price bid will be made. The remaining 40% will be paid on removal of the system.

Payment at the contract price shall also include the following:

- Removal of the temporary system;
- Protection measures as required to protect the temporary system from freezing;
- Methods and modifications needed to provide the buildings with a temporary water supply;
- Daily inspection and/or repairs as required;
- Flushing, disinfecting and testing of temporary system.

**501 MUNI CONSTRUCTION SPECIFICATION FOR COMPACTING**

**501.02 References**

Add in the following:

**OPSS 102** General Specification for Weighing of Materials

**501.04 Design and Submission Requirements**

Add in the following:

**501.04.01 Notification of Placement of Material**

The Contractor shall notify the General Manager in writing of their intent to place and compact material and submit laboratory testing results according to LS-706 at least 48 hours prior to the work.

**501.05.02 Water**

Add in the following paragraph:

The Contractor shall not use municipal hydrants as a source of water for compaction, dust control, or sod. Water may be obtained at one of the five bulk water loading stations located in the City. The Contractor shall pay for this water at the current rate established by the City.

**501.07.04.01 General**

Add in the following:

Granular and soils shall be compacted according to Method A and according to the field compaction requirements specified in Table A.

**501.07.04.02 Method A**

Delete the second and third paragraph and replace with the following:

Granular and soil materials which satisfies the Contract Document requirements shall be placed and compacted using the appropriate equipment to achieve the maximum dry densities provided in Table A.

Add in the following subsections:

**501.07.04.02.01 Acceptance**

Acceptance shall be based on the QC testing. The Owner may randomly verify the QC through QA testing. Should a discrepancy occur between the QC and QA samples, the QA samples shall govern.

**501.07.04.02.03 Submission of Test Data**

All field test results and information relating to target density, lot location, lift thickness, probe depth, moisture content, and wet density shall be recorded at the time of testing. All of this data shall be submitted to the City within 1 business day following the completion of a lot and prior placement of any subsequent lift using a form supplied by the City. Test results shall be reported on the Field Compaction Report form in Appendix B or another approved form which shall be signed and submitted to the City.

**501.08 Quality Assurance**

**501.08.02 Method A**

Add in the following:

The Owner reserves the right to request additional test locations for a specified construction operation at any time.

**TABLE 1 Compaction Testing Requirements**

Delete **Table 1 Compaction Lot Size** in OPSS 501 and replace with the following table:

| **Construction** | **Testing Frequency** | **Minimum Target Density (%SPMDD)** |
|---|---|---|
| **Earth backfill and embankments** | **Every lift, 15 m maximum length** | **95** |
| **Pipe/Culvert Bedding, Cover Material** | **Every lift, 15 m maximum length** | **98** |
| **Granular Backfill (utility structures, Culverts, Pipes, services)** | **Every lift, 15m maximum length** | **98** |
| **Granular Base, Granular Subbase, Granular Shoulders-Roadway (excluding curb, boulevards, sidewalks and driveways)** | **Every lift, 15m maximum length, per lane,** | **100** |
| **Granular Base, Granular Subbase, - curb, boulevards, sidewalks and driveways** | **Every lift, 15m maximum length** | **98** |
| **Granular B Type II** | **See NOTE 1** | **See NOTE 1** |
| NOTE 1: Granular B, Type II shall be compacted using single drum, vibratory, smooth steel drum rollers, with a minimum static drum weight of 8 tonnes (8000 kilograms) and minimum operating dynamic force of 150 kilonewtons. One hundred percent roller pass coverage with a minimum number of four passes shall be provided. Each roller pass shall overlap the coverage of the preceding pass by a minimum of 0.5 m. | | |

## 506 MUNI CONSTRUCTION SPECIFICATION FOR DUST SUPPRESSANTS

### 506.07.01 General

Add in the following paragraph:

The Contractor shall not use municipal hydrants as a source of water for compaction, dust control, and sod. Water may be obtained at one of the five bulk water loading stations located in the City. The Contractor shall pay for the water at the current rate established by the City.

## 510 MUNI CONSTRUCTION SPECIFICATION FOR REMOVAL

### 510.07.01.03 Salvage

Add in the following:

Where hydrants are to be removed and salvaged, the Contractor shall disconnect and remove the upper hydrant barrel complete with upper/lower rod and main valve seat assembly. Break down hydrant barrel to a minimum of one metre below grade and make a permanent watertight plug in the remaining portion of the barrel.

All salvaged material shall be delivered to the specified Public Works depot.

### 510.07.03.09 Abandonment of Pipes and Culverts

Delete paragraphs two and three.

### 510.07.06.02 Cutting Existing Pavement

Delete the first paragraph.

Add in the following paragraphs:

Pavement shall be prepared for removal by saw cutting to its full depth to expose a fresh, straight, vertical surface along the limits of the proposed excavations.

For concrete curb removal/replacement and only when the roadway will be milled and resurfaced where the existing asphalt thickness is less than 90 mm, the Contractor shall be allowed to use a “disk cutter” to cut the curb’s abutting asphalt.

### 510.07.06.04 Removal of Asphalt Pavement Partial Depth

Add in the following:

Where a pavement milling operation is used, the asphalt pavement shall be removed to an average depth as specified in the Contract Document.

The milled surfaces shall be swept with a power broom leaving the asphalt surface free of a loose, broken materials and consolidated asphalt - rich dust.

In preparation to placing top asphalt, the milling of end joints at the limits of construction and at side streets must be completed when asphalt is to be placed within 24 hours.

Add in the following subsection:

### 510.07.06.07 Removal of Asphalt Pavement Around Structures

The work involves grinding or jackhammering and disposal of the asphalt around structures including maintenance holes, catch basins and valve chambers where no vertical adjustment to the structure is required.

**510.09.01.18 Removal of Asphalt Pavement Partial Depth**

Add in the following:

Measurement for payment shall be based on an average depth as specified in the Contract Document.

Add in the following subsection:

**510.09.01.25 Removal of Asphalt Pavement Around Structures**

For measurement purposes, a count will be made of the number of structures from which asphalt pavement was removed around and where no vertical adjustment to the structure is required.

**510.10.01 Basis of Payment**

Add in the following:

Removal of asphalt pavement from around structures – Item.

**511 MUNI** **CONSTRUCTION SPECIFICATION FOR RIP-RAP, ROCK PROTECTION, AND GRANULAR SHEETING**

**511.05.02** **Geotextile**

Delete all paragraphs:

Add in the following:

Geotextile shall have the following properties:

| PRODUCT SPECIFICATION FOR GEOTEXTILE | | | |
|---|---|---|---|
| **Property** | **Test Method** | **Unit** | **Measurement** |
| Grab Tensile | ASTM D4632 | N | 1400 |
| Grab Elongation | ASTM D4632 | N | 15 |
| Tear Resistance | ASTM D4533 | N | 533 |
| Puncture Resistance | ASTM D4833 | N | 533 |
| Apparent Opening Size (A.O.S.) | ASTM D4751 (U.S. Sieve) | mm | 0.425 |

**512 PROV CONSTRUCTION SPECIFICATION FOR INSTALLATION OF GABIONS**

**512.05.03 Geotextile**

Delete all paragraphs:

Add in the following:

Geotextile shall have the following properties:

| PRODUCT SPECIFICATION FOR GEOTEXTILE | | | |
|---|---|---|---|
| **Property** | **Test Method** | **Unit** | **Measurement** |
| Grab Tensile | ASTM D4632 | N | 1400 |
| Grab Elongation | ASTM D4632 | N | 15 |
| Tear Resistance | ASTM D4533 | N | 533 |
| Puncture Resistance | ASTM D4833 | N | 533 |
| Apparent Opening Size (A.O.S.) | ASTM D4751 (U.S. Sieve) | mm | 0.425 |

## 602 MUNI CONSTRUCTION SPECIFICATION FOR THE INSTALLATION OF ELECTRICAL CHAMBERS

### 602.02 Reference

Ontario Provincial Standard Specifications:
(Construction)

Add in the following:

OPSS 492 - Construction Specification for site restoration for underground utilities.

### 602.05.05 Electrical Handholes

Delete in its entirety.

Add in the following:

Precast concrete handhole shall be constructed in accordance with GSSD 1228.010.

### 602.05.06 Steps

Add in the following:

Only circular hollow aluminum steps shall be permitted.

### 602.05.07 Adjustments Units

Add in the following:

A minimum of one adjustment unit to a maximum height of 300 mm is required at each structure.

### 602.05.08 Frames and Covers

Delete the second paragraph.

Add in the following:

Concrete handhole frames and covers shall be as specified on GSSD 1228.010.

### 602.05.11 Mortar

Add in the following:

Gradation requirements for Mortar Sand is outlined in GSSS 1010, Table 2A.

**602.07.07 Excavating, Backfilling and Compacting**

Add in the following:

Suitable Native Backfill material shall be placed simultaneously on the sides of the structures in layers not exceeding 300 mm in thickness, loose measurement, and compacted to 95% of the maximum dry density before a subsequent layer is placed.

**602.07.12 Duct Entry Holes**

Add in the following:

All ducts entering handholes shall be installed and terminated as shown on GSSD 1228.010.

**602.07.17 Adjusting and Rebuilding Electrical Chambers**

Add in the following:

Only bricks of hard burned clay shall be used for adjusting or rebuilding of Bell Canada maintenance holes. The use of precast adjustment units is not permitted on Bell Canada maintenance holes.

Add in the following subsection:

**602.07.18 "Mineral Surface" Roll Roofing Paper**

Top two metres of the structure to be wrapped with "Mineral Surface" roll roofing paper - "rough side" against structure.

Add in the following subsection:

**602.07.19 Restoration**

Restoration work required for the installation of work described herein shall be carried out in accordance with OPSS 492.

## 603 MUNI CONSTRUCTION SPECIFICATION FOR THE INSTALLATION OF DUCTS

### 603.02 References

**Ontario Provincial Standard Specifications: (Construction)**

Add in the following:

OPSS 492 - Construction Specification for Site Restoration for Underground Utilities.

**Canadian Standards Association:**

CSA C22.2 No. 227.1-1988Electrical Non-Metallic Tubing

### 603.05.03 Sand Bedding

Add in the following:

Gradation requirements for sand bedding is outlined in GSSS 1010, Table 2A.

### 603.05.06 Mortar

Add in the following:

Gradation requirements for Mortar Sand is outlined in GSSS 1010, Table 2A.

### 603.05.08 Ducts and Fittings

Delete Table 1 “Ducts and Fittings:

Add in new Table 1 “Rigid Ducts and Fittings”

**TABLE 1 - RIGID DUCTS AND FITTINGS**

| Duct and Fitting Description | Type | Direct Buried | Concrete Encased | Subsurface Installation | | Embedded of Work | Surface Mounted | CSA Standard |
|---|---|---|---|---|---|---|---|---|
| | | | | In Ground | In Liner | | | |
| PVC | Rigid | X | X | X | X | X | X | C22.2 No. 211.2 |
| Polymeric PVC | Rigid | X type DB2 | X type EB1/DB2 | | X type DB2 | X type EB1/DB2 | | C22.2 No. 211.1 |
| RE | Rigid | X heavy wall | X thin, standard, heavy wall | X heavy wall | X standard, heavy wall | X thin, standard, heavy wall | X standard, heavy wall | C22.2 No. 211.3 |
| Galvanized Steel | Rigid | X | | X | X | | X | C22.2 No. 45 |

**603.07.01 General**

Add in the following:

The Contractor shall ensure that all ducts including those that will be left for future use are free from debris, water, breakage or distortion or distortion by pulling a mandrel through the ducts.

Add in the following subsection:

**603.07.01.13 Restoration**

Add in the following:

Restoration work required for the installation of work described herein shall be carried out in accordance with OPSS 492.

**603.07.02.01 Rigid Ducts, Concrete Encased**

Delete second paragraph:

Add in the following:

Alignment of ducts along the right-of-way shall be as shown on the contract drawings.

Minimum cover for ducts shall be as follows in both earth and rock:

1. Parallel to roadway - 1.0 metres
2. Crossings - 1.2 metres

Maximum depth to underside of ducts shall be 1.8 metres in all locations.

**603.07.05.02 Earth Excavation**

Add in the following:

The edge of the excavation for the utility is to be cut in a straight line. The excavation shall not extend beyond the specified limits of the utility cut. The trench shall be excavated to a depth of 1.0 metre below final road grade when parallel with roadway and a depth of 1.2 metres below final grade at road crossing.

All care is to be taken to ensure that undermining of the adjacent pavement/road base materials does not occur. Where necessary, bracing, shoring, and/or sheeting shall be used to support the sides of the excavation and to prevent any movement that could damage other services, adjacent pavements, etc. This support system shall be removed as backfilling proceeds. Appropriate restoration of all services encountered is the responsibility of the applicant.

All surplus excavated material shall be removed from the site. The utility cut shall be kept free of water at all times.

**603.07.06 Flexible Ducts**

Delete the entire subsection.

**603.07.08 Rigid Ducts, Direct Buried**

Add in the following:

The duct shall be embedded in compacted granular material for 50 mm above conduit and a minimum of 100 mm below the conduit and installed to the manufacturer's specifications.

Appropriate fittings and deflection couplings shall be used for the installation and installed to manufacturer's specifications. PVC boxes shall be mounted to provide the least interference, with at least two stainless steel bolts and expansion anchors. Duct connections shall be cemented to the PVC box adapters.

**603.07.14 Cable and Duct Protection and Marking**

Delete in its entirety.

**603.07.16 Backfilling**

Add in the following:

Under roadways, having M.R. designation, the utility cut is to be backfill using native material from the top of bedding to the bottom of granular subbase level. "Unshrinkable fill" which conforms to OPSS 1359 shall be used for backfill from the bottom of the granular subbase level to the bottom of the adjacent pavement and/or proposed pavement ensuring all voids are filled. In deep strength asphalt, the balance to within 140 mm of finished asphalt grade shall also be backfilled using "Unshrinkable Fill".

The backfilled utility cut must be covered for at least 24 hours with steel plates of sufficient thickness to support traffic during this period. The edge of the existing pavement is to be painted with SS-1 emulsified asphalt or equipment, prior to placing 50 mm lifts of binder asphalt and a 40 mm lift of surface asphalt to the level of the existing pavement.

**604 MUNI CONSTRUCTION SPECIFICATION FOR THE INSTALLATION OF CABLES**

**604.02 References**

Others:

Add in the following:

CSA C22.1-1998 Canadian Electrical Code, Part 1 (18th Edition), Safety Standard for Electrical Installation, and Ontario Amendments to the Canadian Electrical Code, Part I, C22.1-98.

**604.07.14 Cable Systems**

Delete title and paragraph:

Add in the following:

**Cables in Electrical Maintenance Holes**

Low voltage and extra-low voltage cables passing through electrical maintenance holes shall be trained towards maintenance hole walls, with bend radii kept greater than the minimum recommended by the cable manufacturer, and fastened with mechanical supports where required. Expansion joints shall be accurately formed and mechanically supported as specified in the contract.

**604.10 Basis of Payment**

Add in the following subsections:

**604.10.01 Low Voltage Cables, Direct Buried - Item**
**Extra-Low Voltage Cables, Direct Buried - Item**
**Traffic Signal Cables, Direct Buried - Item**
**Co-axial Cables, Direct Buried - Item**

Payment at the contract price for the above tender item(s) shall be full compensation for all labour, equipment and material required to do the work regardless of size and number of conductors in the cable and including earth excavation, backfilling, bedding, compaction, low voltage and extra-low voltage splices, connections, baffles, marker tape and all mechanical support and mounting equipment required. Such payment shall include full compensation for removal and trimming of pavement, sidewalk and curb and gutter as required and restoration work where such work is not included in other tender items.

**Low Voltage Cables, in Ducts - Item**
**Extra-Low Voltage Cables, in Ducts - Item**
**Traffic Signal Cables, in Ducts - Item**
**Co-axial Cables, in Ducts - Item**
**Communication Cables, in Ducts - Item**

Payment at the contract price for the above tender item(s) shall be full compensation for all labour, equipment and material required to do the work regardless of size and number of conductors in the cable and regardless of size and type of duct and including low voltage and extra-low voltage splices where applicable, connections, installation of all mechanical support, systems and baffles required.

**604.10.04 All Inclusive Price Method**

Payment at the contract price for the above tender item includes low voltage cable systems and extra-low voltage cable systems and shall be full compensation for labour, equipment and material required to install the appropriate cable systems, regardless of type and size, in ducts, by direct burial or aerially, and shall include all earth excavation, backfill, bedding, compaction, all pole line hardware, fittings and accessories required for aerial cable systems, installation of all mechanical support, mounting equipment and baffles required for cable systems in ducts and maintenance holes, all splices, connections, test, terminations, coils of cable, slack cable required. Such payment shall include full compensation of removal and trimming of pavement, sidewalk and curb and gutter as required and restoration work where such work is not included in other tender items.

**604.10.05 Individual Item Method**

**604.10.05.01 General**

Payment at the contract price for the above tender items shall include full compensation for all labour, equipment and material required for vertical runs of cable, coils of cable, slack cable, waste cable and for all testing and accessories required.

# 609 CONSTRUCTION SPECIFICATION FOR GROUNDING

## 609.07.01 General

Add in the following

Grounding arrangement shall conform to the Ontario Electrical Safety Code Bulletin Schematic Drawing For Signalized Intersection Grounding.

## 610 MUNI CONSTRUCTION SPECIFICATION FOR THE REMOVAL OF ELECTRICAL EQUIPMENT AND MATERIALS

### 610.07.04 Demolition

Add in the following to the second paragraph:

The broken edges of the structure to remain in place shall be saw cut to their full depth to expose a fresh, straight, vertical surface along the squares up limits of the proposed excavation.

### 610.07.09.02 Packaging of Electrical Equipment and Materials

Delete the last paragraph:

Add in the following:

Where temporary storage of equipment is required, materials other than traffic signal controllers and electronic components shall be stored in accordance with the contract documents.

## 615 MUNI CONSTRUCTION SPECIFICATION FOR ERECTION OF POLES

Add in the following subsection:

### 615.07.04.04 Concrete Pole Base

Construction of concrete base for traffic signal poles shall be in accordance with GSSD 1230.010.

Construction of concrete base for 100 mm diameter traffic light signal poles shall be in accordance with GSSD 1230.020.

### 615.09.01.01 Actual Measurement

Add in the following:

Measurement shall be made for each concrete pole base.

Add in the following subsection:

### 615.10.02.07 Concrete Pole Base - Item

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment and materials required for the installation of each type of pole base specified.

## 620 MUNI CONSTRUCTION SPECIFICATION FOR TRAFFIC SIGNAL EQUIPMENT AND ELECTRICAL TRAFFIC CONTROL DEVICES

### 620.05.08 Junction Boxes and Fittings

Add in the following:

Fibreglass reinforced concrete junction boxes for curbside loop detector and lead-in connections shall be "Quazite" with the label "TRAFFIC" impressed into the cover, or as indicated in the contract.

### 620.07.02.04 Signal Heads

Delete second and third paragraphs:

Add in the following:

Opaque jute sacking or plastic film shall entirely cover the signal heads and remain securely in place until all tests have been completed and the signal heads have been put into operation. Pedestrian signal heads shall be turned to face the pole prior to operation.

Signal heads shall be adjusted for maximum visibility and focussing prior to final tightening of hardware. Unused hubs in signal heads shall be plugged with sealing caps, without gaskets.

## 706 MUNI CONSTRUCTION SPECIFICATION FOR TRAFFIC CONTROL SIGNING

### 706.10 Basis of Payment

Delete subsection 706.10.01 in its entirety and replace with the following:

### 706.10.01 Traffic Control Signing

Payment shall be full compensation for all labour, equipment, and material to do the work under the appropriate tender items.

# 710 CONSTRUCTION SPECIFICATION FOR PAVEMENT MARKINGS

## 710.05.02 Organic Solvent Based Traffic

Add in the following:

Permanent pavement marking paint shall be “IBIS Products”, Identity 40-4600 for White and 40-4601 for Yellow or approved equal.

## 710.05.05 Preformed Plastic Pavement Marking Tape

Add in the following:

Temporary pavement marking tape shall be “Scotch-Lane” (TM) wet reflecting removal tape, Series A750 (White) and A751 (Yellow), manufactured by 3M Canada.

Add in the following subsection:

## 710.06.04 Abrasive Blasting Equipment

Pavement markings shall be removed using approved abrasive blasting equipment and material in accordance with OPSS 128.

## 710.07.03 Pavement Marking Obliterating

Delete in its entirety.

Add in the following:

The depth of the removal shall be the minimum required to totally remove the existing pavement markings to a normal depth, typically averaging 3 mm.

Pavement marking obliterating shall be carried out using a soft abrasive blast cleaning system at locations specified in the contract ensuring that the asphalt pavement is not adversely damaged in any way and that no pavement markings remain visible upon completion.

The pavement marking obliterating operation shall be completed ensuring no damage is caused to pedestrian nor vehicular traffic by controlling all dust / effluent spray generated by the operation.

## 710.07.04 Premarking

Delete in its entirety.

Add in the following:

Premarking shall be required for all pavement markings prior to final painting. The Contractor shall provide the necessary measurements required to establish the position of all pavement markings to assure their proper placement. The Contractor shall notify City’s Traffic and Transportation staff, two (2) business days in advance for inspection and approval of premarking before permanent marking operation is started.

**710.07.06 Short Term Pavement Marking**

Add in the following:

Short term pavement markings shall be applied having a 0.3 metre line length with a maximum 6 metre gap length between lines.

**710.09.01.01 Pavement Marking**

Add in the following:

- Short term pavement marking
- Crosswalk pavement marking
- Stop bar pavement marking

Measurement for crosswalk marking is by the horizontal length in metres of 30 cm wide lines.

Measurement for stop bar markings is by the horizontal length in metres of 45 cm wide lines.

**710.10 Basis of Payment**

Add in the following:

- Short Term Pavement Marking.- Item
- Crosswalk (30 cm width) - Item
- Stop Bar (45 cm width) - Item

**772 MUNI CONSTRUCTION SPECIFICATION FOR CHAIN LINK FENCE**

**772.09.01 Measurement for Payment**

**772.09.01.01 Chain-Link Fence**

Delete reference to gate openings.

Add the following:

Measurement for payment of chain link fence shall cease on either side of the terminal posts.

# 802 CONSTRUCTION SPECIFICATION FOR TOPSOIL

## 802.07.03 Placement of Topsoil

Delete and add in the following:

Topsoil shall be spread to a uniform depth of 100 mm on designated areas and up to the subgrade elevation on the roadway front slope.

Soil from swamps or muskeg areas, when used in place of topsoil shall be spread to a uniform depth of 150 mm, with no woody material protruding above the surface.

Imported topsoil must be approved by the General Manager prior to arrival on site.

## 803 MUNI CONSTRUCTION SPECIFICATION FOR SODDING

Add in the following subsection:

### 803.07.07 Water

The Contractor shall not use municipal hydrants as a source of water for compaction, dust control, and sod. Water may be obtained at one of the five bulk water loading stations located in the City. The Contractor shall pay for this water at the current rate established by the City.

### 803.10 Basis of Payment

Add the following:

### 803.10.02 Sodding, Staked – Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment and material to do the work.

**1004 MUNI CONSTRUCTION SPECIFICATION FOR AGGREGATES – MISCELLANEOUS**

**1004.05.02 Clear Stone**

Delete the first paragraph:

Add in the following:

Gradation requirements shall be as per Table 2A in GSSS 1010

**1004.05.04 Mortar Sand**

Delete the second paragraph:

Add in the following:

Gradation requirements shall be as per Table 2A in GSSS 1010

**1004.05.05 Gabion Stone, Rip-Rap and Rock Protection**

Delete reference to G-3 Gabion Stone

**1004.05.07 Winter Sand**

Add in the following:

The General Manager shall also accept gradation specified in Table 2A in GSSS 1010.

## 1010 MUNI MATERIAL SPECIFICATION FOR AGGREGATE - BASE, SUBBASE, SELECT SUBGRADE AND BACKFILL MATERIAL

### 1010.03 Definitions

Add in the following:

**Delivery Sample** means a random sample taken at the point of loading or discharge from delivery vehicles.

**Production Property** means an attribute or feature of an aggregate or soil material, including gradation that is introduced through the manufacturing process (i.e.: crushing, screening, blending etc.). Tests are carried out to measure the affects of the process on the material.

Add in the following section:

### 1010.04 Design and Submission Requirement

As requested by the Owner, the Contractor shall supply the Owner QC testing records, including but not limited to sieve analysis and Proctor Maximum Dry Density data for the aggregates to be used in the work.

### 1010.05.03.09 Sand Bedding, Winter Sand, Mortar Sand, 6.35 mm Screenings, and 19 mm Stone

These aggregates shall be composed of clean, hard, durable un-coated particles obtained from deposits of gravel or sand, talus rock, quarried rock, iron-blast furnace or blended nickel slag, clinkes, or other suitable granular materials.

They shall all conform to the same Gradation Requirements as outlined in Table 2A in GSSS 1010.

### 1010.08 Quality Assurance

### 1010.08.01 General

Delete the first paragraph in its entirety and replace with the following:

QA testing shall be carried out by the Owner for the purposes of ensuring that the aggregates used in the work are according to the requirements of the Contract Documents. Individual test results may be forwarded to the Contractor as they become available.

### 1010.08.03 Sampling

Delete in its entirety and replace with the following:

**1010.08.03.01 General**

The Contractor shall be responsible for obtaining duplicate aggregate samples in the presence of the Owner's representative and according to LS-625. For production property requirements, the sampling shall be delivery samples obtained from the work. For physical property requirements, the sampling shall be either delivery samples or pit source samples. When required, the Contractor shall provide a front-end loader to obtain the materials.

In the event that the Contractor is unavailable to take a sample, no further materials shall be placed in the work until the duplicates samples have been taken.

The owner shall invoke Table B-1, Sampling and Testing Frequency for Physical Properties. One set of duplicates samples of each aggregate to be used in the work shall be randomly sampled from lots up to 5,000 tonnes.

The sampling and testing for production properties shall be based on the lots established for the aggregate types in accordance with Table 4 in GSSS 1010. When more than one aggregate source is used, separate lots shall be established for each source. When aggregates are produced with blended or reclaimed materials or both, QA testing shall be performed on the final product.

The mass of each sample shall meet the requirement shown in Table 3. When more than 30 kg is required, the total samples shall be recombined prior to testing.

The samples shall be identified on both the inside and outside of the sample container. Data to be included with the samples shall be according to the Aggregate Sample Data Sheet in GSSS 1010.

The Owner shall deliver the duplicate samples to the appropriate laboratory in a condition that is suitable for testing.

**Table 4 – Lot Schedule for Sampling and Testing for Production Properties**

| Quantity for Each Source or Process (tones) | Granular A and O | Granular B and Select Subgrade |
|---|---|---|
| < 250 | At the Owner's discretion | |
| 250 – 1,000 | One Sample | |
| 1,000 – 5,000 | One Lot | |
| >5,000 | 5,000 tonne lots up to 20,000 tonnes, & 10,000 tonne lots thereafter | 10,000 tonne lots up to 20,000 tonnes and 20,000 tonne lots thereafter |

Note 1: When the quantity of granular material is less between 250 – 1,000 tonnes, one sample shall be collected and analyzed for gradation and SPMDD. Where the sample does not meet gradation requirements, the material shall be rejectable.

Note 2: When the quantity of granular material is insufficient for a complete lot and is:

a) Less than one-half the quantity of a complete lot, that quantity shall then be added to the previous lot; or
b) Greater than or equal to one-half the quantity of a complete lot, then that quantity shall form its own lot.

Note 3: One lot shall be divided into 4 equal sublots.

**1010.08.05 Acceptance**

Delete in its entirety and replace with the following:

**1010.08.05.01 Acceptance of Physical Properties**

QA test results shall be used for acceptance purposes, except when referee testing has been carried out.

A lot shall be deemed to be acceptable for physical properties if all off the test results for the samples of aggregates representing that lot meet the requirements shown in Table 1.

The Owner shall invoke Appendix 1010-C where if a tested sample of aggregates shows that the aggregates do not meet the requirements of this specification, the aggregates represented by the test result, including material in existing stockpiles or in this work shall not be accepted. The Contractor may request a reduced price in lieu of removal provided the applicable test results:

a) Do not exceed the requirement for LS-614 by more than 25% of the specified value.

b) Do not exceed the requirement for LS-618 by more than 10% of the specified value.

c) Do not identify a plasticity index within the material when determined according to LS-703/704 and the requirement for LS-602 on the 75 µm is met.

d) Meet all other requirements of this specification.

Should the test results for any sample of aggregates representing a lot not meet the requirements listed above, then all the aggregates within that lot shall be considered rejectable and if used in the work shall be removed at no cost to the Owner.

If the lot is not rejectable, the reduced price payment shall be 20% of the applicable aggregate tender price for that lot for physical properties.

The reduced price payment for the lot given above shall be in addition to any payment reduction determined according to Acceptance clause for production properties.

Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

The Owner shall invoke the test data form in Appendix 1010-D.

**1010.08.05.02 Acceptance of Production Properties**

Where applicable, test results from each sublot within a lot shall be combined to determine the mean of the lot for each test result.

When QA test results show that the Granular A and/or Granular B aggregates do not meet the requirements of this specification, the Contract Administrator shall notify the Contractor that the aggregates represented by the test results may be accepted with a payment adjustment according to the following payment adjustment method:

Payment adjustment shall be calculated based on QA results using the following formula:

*Payment Adjustment = Lot Size (t) x Unit Rate ($/t) x Payment Adjustment Factor*

The payment adjustment factor, in percent, shall be equal to the sum of the adjustment points determined as follows:

a) Adjustment points shall be applied for each 0.1% that the mean gradation falls outside the gradation specification limits for each sieve. See **Table 5 in GSSS 1010**.

b) If the payment adjustment is greater than 12.5%, the material shall be rejected.

**Table 5. Adjustment Points for Granular Materials**

| SIEVE SIZE | ADJUSTMENT POINTS PER 0.1% DEVIATION FROM SPECIFIED LIMIT | | |
|---|---|---|---|
| | GRANULAR A | | GRANULAR B TYPE I / II / III |
| 150 mm | - | - | 0.1 (Type I & III only) |
| 100 mm | - | | 0.1 (Type II only) |
| 75 mm | - | - | - |
| 63 mm | - | | - |
| 26.5 mm | 0.1 | | 0.1 |
| 22.4 mm | 0.1 | | - |
| 19.0 mm | 0.1 | - | - |
| 9.5 mm | 0.1 | - | 0.1 (Type III only) |
| 4.75 mm | Excess Passing 0.5/Insufficient Passing 0.2 | | |
| 1.18 mm | 0.1 | | 0.1 |
| 300 µm | 0.1 | | 0.1 |
| 75 µm | 1.0 | | 1.0 |

The owner shall invoke the test data form in Appendix 1010-E.

**1010.08.06 Referee Testing**

Delete the first paragraph and replace with the following:

When the QA test results show that the aggregates do not meet the requirements of this specification, the Contractor may request , in writing, that the referee sample be analyzed by an independent third party firm within 5 business days of receipt of initial results. The results of the referee testing shall be used to determine acceptance of material and/or payment reduction factors.

If the referee sample results in a change to the payment factor of more than 1%, the Owner shall pay the costs of the referee testing. Otherwise, the Contractor shall pay all referee testing costs.

**City of Greater Sudbury**

**TABLE 2A**

**GRADATION REQUIREMENTS**

| SIEVE SIZE | PERCENTAGE PASSING BY MASS | | | | |
|---|---|---|---|---|---|
| | SAND BEDDING | 19 MM (3/4") CLEAR STONE | 6.35 MM (1/4") SCREENING | WINTER SAND | MORTAR SAND |
| 150 mm | | | | | |
| 106 mm | | | | | |
| 100 mm | – | – | – | – | – |
| 75 mm | | | | | |
| 63 mm | – | – | – | – | – |
| 37.5 mm | – | – | – | – | – |
| 26.5 mm | – | – | – | – | – |
| 25.0 mm | – | – | – | – | – |
| 22.4 mm | 100 | 100 | – | – | – |
| 19.0 mm | – | 90 - 100 | – | – | – |
| 16.0 mm | 75 - 100 | 65 - 90 | – | – | – |
| 13.2 mm | – | – | – | – | – |
| 9.5 mm | – | 20 - 55 | – | – | – |
| 6.35 mm | – | – | 97 | – | – |
| 4.75 mm | 25 - 100 | 0 - 10 | 25 - 100 | 100 | – |
| 2.36 mm | – | 0 - 5 | – | 65 - 95 | 100 |
| 1.18 mm | 10 - 85 | – | 10 - 85 | 40 - 90 | – |
| 600 um | – | – | – | 20 - 70 | – |
| 300 um | 5 - 40 | – | 5 - 40 | 5 - 35 | 15 - 40 |
| 150 um | 1 - 22 | – | 1 - 22 | 0 - 15 | 0 - 10 |
| 75 um | 0 - 8 | – | 0 - 8 | 0 - 5 | 0 - 5 |

Note: um = 1 micrometre = $\frac{1}{1000}$ millimetre, mm

1010-05

**1150 MUNI HOT MIX ASPHALT**

Add in the following subsection:

**1150.02 References**

Add in the following:

**OPSS 102** General Specification for Weighing of Materials

**1150.04.01.02.03 Changes to the Job-Mix Formula and the Mix Design**

Delete in its entirety.

Add the following:

Changes to the JMF shall be permitted subject to the conditions specified in GSSS 310.

A new mix design shall be completed according to the Mix Design clause, when:

a) A material is eliminated.
b) A new material is added.
c) A material source is changed.
d) The net impact of all adjustments to the original JMF exceeds any of the maximum field adjustments according to Table 8.
e) The allowable time period has been exceeded and the use of the mix design has not been extended.

The allowable time period has been exceeded and the use of the mix design has not been extended.

**1150.05.02.05 Heavy Duty Binder Course (HDBC)**

Add the following:

“All reference to crushed bedrock material shall also mean particles produced by crushing gravel, cobbles or boulders retained by the 50.0 mm sieve having a minimum of 95% of crushed materials with two (2) fractured faces.

**1150.08.01 General**

Add in the following:

- Note 2 of Table II Gradation Requirements - Mix Design Criteria is amended to read:

  “HDBC shall contain 30 to 52 percent by volume of the total aggregates passing the 4.75 mm sieve.”

- Table III, Asphalt Cement Content - Mix Design Criteria is amended to read:

  “4.7% Asphalt Cement Content (minimum by mass of mixture) for HDBC hot mix type.”

## 1350 MUNI MATERIAL SPECIFICATION FOR CONCRETE – MATERIALS AND PRODUCTION

### 1350.07.05.01 Delivery of Ready Mixed Concrete

Add the following:

The Contractor shall be responsible for ensuring that only concrete which is in accordance with the submitted mix design and which meets the specification requirements for air content, slump, temperature and delivery time, is included in the work.

### 1350.07.06 Quality Control

For all concrete, Quality Control (QC) testing consisting of slump, air content and temperature determinations shall be carried out on each load or batch of concrete until satisfactory control is established. Satisfactory control shall be established each day. It is established when concrete from 5 consecutive loads or batches, is within the specified requirements without field adjustments. If any field adjustments are required, testing on each load shall be continued until 5 consecutive loads or batches meet the requirements with no field adjustment. After satisfactory control has been established, testing shall be carried out on every third load. If testing indicates that a load does not meet the requirements, testing shall resume on each load until satisfactory control is established.

If multiple plants supply concrete, satisfactory control shall be established for each plant.

QC testing shall be performed by a person holding either of the following certifications:

a) CSA Certified Concrete Testing Technician, Concrete Testing and Sampling Certificate, or

b) ACI Concrete Field Testing Technician – Grade 1.

This person shall have a valid original card issued by the certifying agency in his or her possession at all times.

Sets of cylinders for 28 day compressive strength testing shall be cast for every 20 cu.m of concrete placed or one set per day, whichever is more frequent. The testing frequency may be adjusted by the City as deemed necessary. In addition to the above, air content, slump, and temperature tests shall be carried out whenever compressive test cylinders are cast.

The Contractor shall supply, maintain and subsequently remove upon completion of the project, a temporary storage facility for concrete test cylinders. The facility shall be capable of housing 24 cylinders, insulated, located in the shade and be maintained at a temperature about 5 degrees Celsius. Vehicle access to the storage facility shall be provided at all times.

### 1350.08 Quality Assurance

### 1350.08.01 General

Add the following:

QA testing for compressive strength shall be completed by the city's representative.

The Contractor is responsible for testing of slump, air content, and temperature of plastic concrete and shall cast QA and Referee cylinders. The Owner or the Owner's designate shall deliver the samples to the appropriate laboratory.

**1350.08.02.04.03 Referee Testing**

Add the following:

Should the Contractor disagree with the results of Quality Assurance (QA) testing, the Contractor may request, in writing, that the referee sample be analyzed by an independent third party firm within five (5) business days of receipt of results. The results of the referee testing shall be used to determine acceptance of material.

If the referee sample results in a change from rejection to acceptance, the Owner shall pay the costs of the referee testing. Otherwise, the Contractor shall pay all referee testing costs.