

The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

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## **SPECIFICATIONS**

### **1.0 Add the following Specifications Sections (attached) to the Contract Documents**

- 31 00 99 Earthworks for Minor Works
- 32 12 16.02 Asphalt Paving for Building Sites
- 32 17 23 Pavement Markings
- 32 31 13 Chain Link Fence and Gate
- 32 92 19.13 Mechanical Seeding
- 33 05 13 Manholes and Catch Basin Structures
- 33 11 16 Site Water Utility Distribution Piping
- 33 31 13 Public Sanitary Utility Sewerage Piping
- 33 41 00 Storm Utility Drainage Piping
- 33 46 16 Subdrainage Piping

### **2.0 Section 07 46 23 WOOD SIDING**

Add .1.3 TO 2.1 MATERIALS as follows:

#### **2.1.1.3**

Lumber siding material will be provided by William Head Institution and will be stored in a building in the institution close to the building site for the Contractor to pick up and install.

### **3.0 Section 11 50 00 WOK BENCHES**

Change 2.1 MANUFACTURED PRODUCT to read as follows:

#### **2.1 MANUFACTURED PRODUCT**

- .1 Benches: Gladiator work bench Mod # GAWB08HWEG or Approved Equal.  
(eight required)
  - .2 Modular mobile drawer unit: Gladiator Geardrawer Mod # GAGD275DRG or Approved Equal.  
(One per bench)
  - .3 Modular mobile door unit: Gladiator Gearbox Mod # GAGB272DRG or Approved Equal.  
(one per bench)
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## **ARCHITECTURAL DRAWINGS**

- 1.0 Drawing A 215  
Change the wording “NEW EQUIPMENT/FURNITURE (OSCI) to  
“NEW EQUIPMENT/FURNITURE (CONTRACTOR PURCHASE/SUPPLY AND INSTALL)”
- 2.0 WILLIAM HEAD INSTITUTION REAL PROPERTY LINE DRAWINGS  
Add this drawing (1 page attached) to the Contract Documents)
- 3.0 Drawing A211 to A215  
Change NOTE 3) at the bottom right hand corner of the Drawings to read as follows:  
OWNER SUPPLIED CONTRACTOR INSTALLED (OSCI) ITEMS ARE THE EXISTING  
EQUIPMENT/FURNITURES CURRENTLY LOCATED IN BUILDING 3 AND D OF WILLIAM HEAD  
INSTITUTION (REFER TO WILLIAM HEAD INSTITUTION REAL PROPERTY LINE DRAWINGS).  
CONTRACTOR TO VERIFY EXISTING WORKING CONDITIONS OF ALL  
EQUIPMENT/FURNITURES. CONTRACTOR TO DISCONNECT EQUIPMENT/FURNITURES  
AND CAP OFF ELECTRICAL AND MECHANICAL SERVICES. DISCONNECT VENT DUCTS  
FOR EQUIPMENT TO BE RELOCATED AND CAP OFF AT THE CONNECTIONS TO THE MAIN  
DUCT CONNECTION. CONTRACTOR TO RELOCATE THESE EQUIPMENT/FURNITURES AND  
INSTALL IN LOCATIONS IN NEW MAINTENANCE BUILDING AS SHOWN IN THE DRAWINGS.
- 4.0 Drawing A101 (LOCATION PLAN AND OVERALL SITE PLAN)  
Add the following note:  
NOTE:  
REPAIR ALL ROADS AND PAVING AREAS AFTER EXCAVATION AND RELOCATION OF  
ELECTRICAL CABLES AND OTHER UNDERGROUND MECHANICAL AND ELECTRICAL ITEMS.

## **QUESTIONS AND ANSWERS**

- Q1 I've noticed there is a significant amount of missing information in the specifications provided, based on the table of contents.  
Please provide these missing specifications (as soon as possible).\
- 31 00 99 Earthworks for Minor Works
  - 32 12 16.02 Asphalt Paving for Building Sites
  - 32 17 23 Pavement Markings
  - 32 31 13 Chain Link Fence and Gate
  - 32 92 19.13 Mechanical Seeding
  - 33 05 13 Manholes and Catch Basin Structures
  - 33 11 16 Site Water Utility Distribution Piping
  - 33 31 13 Public Sanitary Utility Sewerage Piping
  - 33 41 00 Storm Utility Drainage Piping
  - 33 46 16 Subdrainage Piping
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- A1 Provided by this ADDENDUM.
- Q2 In Vestibule 100A there is a pedimat shown, but there are no spec's. Can we get a specification on it?
- A2 Provided already in Section 12 48 16 Entrance Floor Grille of the specifications..
- Q3 Hello, as per EMCS General Requirements Section 25 05 01, Part 1, 1.2.3 The DDC system shall be tied into existing "Reliable DDC system in building 103". Our information indicates that the existing system is a "Delta DDC system". Please provide clarification as to which system is presently installed in Building 103. Thank You in advance.
- A3 The existing DDC system in Building 103 is Delta Controls.
- Q4 Building permit – Is the contractor required to obtain any building permit associated with any of the Work under this Contract?
- A4 Contractor shall apply and pay for the Building Permit from the district of Metchosin, including all associated deposits, fees and charges.
- Q5 A215 – New Equipment/Furniture (N1,N2,N3) states "OSCI" but specification is provided so I would like confirm that the "Owner" is supplying this item?  
Further to the question above...  
Section 11 50 00 – Work Benches, Products 2.1 Manufactured Product  
a. Item 1 (the Bench) Model number : GAWGB09MTRG has never existed according to the representative I spoke to at Gladiator. I was told that the bench does not come in 9' length, and no model ends in MTRG.  
i. The drawings have an 8' length on page A221, so I can only assume this is meant to be either 'GAWGB08HWEG' or 'GAWGB08HWGW'?  
ii. The count provided in the specifications says "seven required" but Page 221 shows 9 (Nine). Please confirm on actual quantity required?  
b. Item 3 (Mobile Door Unit) – GAGD272DRG does not exist as well. Is this actually meant to be GAGB272DRG?  
c. The picture provide on page A215 shows only 2 units below the bench, but the specification notes 3 units per bench. Please confirm actual quantity of units below each bench?
- A5 Answer provided in this ADDENDUM.
- Q6 Constructions site is inside the Institutions perimeter fence; will the use of cell phones, WI-FI and other communication methods be permitted both on site and in job site trailer?"  
I remember it was discussed during the walk through meeting. Is the answer "Yes"?
- A6 Only registered/approved cell phone(s) are permitted inside the institution. Full details to be discussed during the construction start up meeting.
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- Q7 RFI 06 – Please provide details as to the type/design of perimeter fencing required to secure the Area of Work.
- A7 Use Type 1 Fence described in CSC Technical Criteria as follows:  
Rental construction protection fence comes with welded wire mesh and components conforming to ASTM F2919 Welded Wire Mesh Fence specifications. Mesh is galvanised steel no longer than 50 x 150 mm (vertically long rectangle) with vertical wire projecting and exposed at top. Fence must be at least 1800 mm high and secured with pins inserted in the ground through the “T” base support. Sections of fence must be securely clamped together to ensure that the each fence run acts as a continuous barrier which will resist lateral forces and separation. Sloped runs must be protected by mesh panels to ensure continuity of barrier from ground up.
- Q8 In the door schedule it shows the carpentry shop has a door E 3660 x 2440 Door 114c however the E in the Door Types is a man door. Could this be a typo and the Door should be F?
- A8 This IS a typo and the Door should be F.
- Q9 There is a specification section for polished concrete (03 35 10 – Concrete Grinding and Sealing) but the finish schedule on A902 does not show any rooms with polished concrete.  
Please confirm that this specification is not being used anywhere in this building?  
If for some reason this specification is meant to be applied to all floors, then it contradicts the specification 03 30 05 3.8 Sealing.  
Also, both sections 03 30 05 and 03 35 10 reference Related Work Section 03 35 00 Concrete Finishing and that specification does not exist.
- A9 It is confirmed that there are no polished concrete floors. Section 03 35 10 Concrete Grinding and Sealing to be used for reference where and if grinding is required during preparation of new concrete floors for sealing.  
It is confirmed that Section 03 35 00 Concrete Finishing does not exist.

## **STRUCTURAL ADDENDUM, QUESTIONS AND ANSWERS**

- 1.0 Refer to Structural Addendum #1 attached.

## **ELECTRICAL ADDENDUM, QUESTIONS AND ANSWERS**

- 1.0 Refer to Electrical Addendum #1 attached.

**END OF ADDENDUM #1**

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**Part 1 General****1.1 RELATED SECTIONS**

- .1 Section 32 12 16.02 – Asphalt Paving for Building Sites
- .2 Section 32 92 19.13 – Mechanical Seeding
- .3 Section 33 05 13 – Manholes and Catchbasin Structures
- .4 Section 33 11 16 – Site Water Utility Distribution Piping
- .5 Section 33 31 13 – Public Sanitary Utility Sewerage Piping
- .6 Section 33 41 00 – Storm Utility Drainage Piping

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregate.
  - .3 ASTM C117, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .4 ASTM D1557, Specification for Test Methods for Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (457 mm) Drop.
  - .5 ASTM D698, Standard Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures using 2.49 kg Rammer and 304.8 mm Drop.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction.
- 3. The Contractor is to examine and comply with the project geotechnical assessment document prepared by Golder Associates as follows:
  - 1. September 10, 2015 report titled “Geotechnical Investigation Report; Proposed Maintenance Building, William Head Institution, Metchosin, BC”; report number 1314470497-010-R-Rev0-5000.

In the case of any conflict between the requirements of the specification sections and the project geotechnical assessment document referred to above, comply with the more stringent requirement.

**1.3 SCOPE OF WORK**

- .1 General site clearing, grubbing and topsoil stripping.
  - .2 Civil Engineering cut, fill, trenching and grading work exceeding 1m beyond the building footprint inclusive of:
    - .1 Excavating, trenching and backfill for utility services and buried installations.
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- .2 General site grading
- .3 Topsoil restoration
- .4 Sub-grading below paved areas
- .3 Exclusions to scope of this specification section:
  - .1 Earthworks inside a perimeter drawn 1m beyond the building footprint.

#### **1.4 REGULATIONS**

- .1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.
- .2 Do not begin backfilling or filling operations until material has been approved for use by the Departmental Representative.
- .3 Before commencing work, conduct, with the Departmental Representative, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

#### **1.5 TESTS AND INSPECTIONS**

- .1 The contractor shall retain, at his own cost, the services of an independent and certified testing agency to undertake soil and granular material tests at the following minimum frequencies / intervals:
  - .1 Sieve Analysis prior to commencing and 1 every 200 tonnes on:
    - .1 All materials referred to in item 2.1 of this Section 31 00 99 (Earthworks for Minor works)
    - .2 Base and sub-base materials referred to in item 2.1.1 of Section 32 12 16.02 (Asphalt Paving for Building Sites).
  - .2 Modified Proctor Analysis on all materials for which density tests are specified below, prior to commencing and 1 every 200 tonnes.
  - .3 Density Tests on placed and compacted fills and granular materials, for which the results are to be expressed as a percentage of Modified Proctor Density, as follows:
    - 1. Stripped and compacted subgrade: Density tests at 1 per 300 m<sup>2</sup> or part thereof.
    - 2. Compacted fill below paved areas: Density tests at 1 per 300 m<sup>2</sup> or part thereof per 0.5m of fill depth.
    - 3. Base and Sub-base granular: Density tests at 1 per 300 m<sup>2</sup> or part thereof.  
Note: For all other specification details for base and sub-base granular material please refer to Section 32 12 16.02 - Asphalt Paving for Building Sites.

4. Compacted trench backfill (trenches up to 1.5m depth): Density tests at 2 per 30 lin.m or part thereof; one at half height and one at pavement subgrade elevation.
5. Compacted trench backfill (trenches exceeding 1.5m depth): Density tests at 3 per 30 lin.m or part thereof.; at one-third and two-thirds height and just below pavement subgrade elevation.
4. The Contractor shall cooperate with the Departmental Representative in the selection of test samples. Copies of the test results shall be forwarded to Departmental Representative.
5. The Contractor is responsible for ensuring all materials meet specifications. Where initial tests fail and subsequent testing is deemed necessary by the Departmental Representative, the cost of the subsequent testing will be the responsibility of the Contractor.
6. In addition to sample testing, the Contractor will undertake proof rolling of subgrade, subbase and base granular surfaces as required and in the presence of the Departmental Representative and / or the Geotechnical Consultant, for which a minimum of 48 hours notice shall be provided by the Contractor.

## 1.6 BURIED SERVICES

- .1 Before commencing work verify the location of all buried services on and adjacent to the site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations and elsewhere as shown on drawings or where in conflict with the permanent works. Cap cut-offs.

## 1.7 PROTECTION

- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect all active buried services. Assume all services to be active unless:
  - .1 Stated otherwise in contract documents;
  - .2 Confirmed otherwise by contractor's own investigations in consultation with Departmental Representative.
- .6 Repair at contractor's own cost damage to existing structures or services resulting from the contractor's failure to locate and protect.
- .7 Avoid mixing excavated materials. Protect the condition and suitability of native soil and topsoil materials stockpiled for re-use.

**Part 2 Products****2.1 MATERIALS**

- .1 Imported granular material to be composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. In absence of satisfactory performance records over a five year period for particular source of material, soundness to be tested according to ASTM test procedure C-88 or latest revised issue. Maximum weight average losses for course and fine aggregates to be 30% when magnesium sulphate is used after five cycles.
- .2 Imported crushed granular material when tested according to ASTM C-136 and ASTM C-117, or latest revised issue, to have a generally uniform gradation, conform to following sieve grading and have one or more fractured faces. Determination of the Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "A", which determines fractured faces by count. The Plasticity Index for crushed gravel to not exceed 6.0.
- .3 Acceptable native material is to be used only as used as trench backfill or subgrade fills below areas absent from existing or proposed paving. Acceptable native material to be any workable soil obtained within limits of Contract that is free of organic or foreign matter. Native material is not acceptable if it is impracticable to control its water content or compact to specified density.
- .5 Below paved areas trench backfill and general fill should consist of imported 75 mm minus sand or gravel with less than five percent fines (particles passing the 75 µm diameter sieve), be substantially free of clay lumps, free of organic matter and other extraneous material and meet the gradation requirements below.

**Percent Passing**

<b>Sieve Designation</b>	<b>Pit run gravel</b>	<b>Pit run sand</b>
300mm dia	(100)	
200mm dia	--- (100)	
100mm dia	--- (100)	
75.0mm	--- 100	
50.0mm	70 - 100	
25.0mm	50 - 100	
12.5mm	-----	100
4.75mm	22 - 100	35 - 100
2.36mm	10 - 85	20 - 70
1.18mm	-----	13 - 50
0.600mm	-----	8 - 35
0.300mm	-----	5 - 25
0.150mm	-----	2 - 15
0.075mm	2 - 8	0 - 6

- .4 Granular Pipe Bedding and Surround Material is to consist of crushed or graded gravels conforming to the following gradation:



Sieve Designation	Percent Passing	
	Type 1*	Type*2
25.0mm	100	100
19.0mm	90 - 100	90 - 100
12.5mm	65 - 85	70 - 100
09.5mm	50 - 75	-----
4.75mm	25 - 50	40 - 70
2.36mm	10 - 35	25 - 52
1.18mm	6 - 26	15 - 38
0.600mm	3 - 17	6 - 27
0.300mm	-----	3 - 20
0.075mm	0 - 5	0 - 8

\*Type 1: standard gradation

\*Type 2: to be used only in dry trench conditions and with Departmental Representative's prior approval.

### Part 3 Execution

#### 3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated and / or re-graded.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

#### 3.2 CLEARING AND GRUBBING

- .1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas to be excavated, covered with new construction or re-graded.
- .2 Remove stumps and tree roots below footings, slabs, and paving, and to not less than 200 mm below finished grade elsewhere.
- .3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

#### 3.3 EXCAVATION

- .1 Topsoil stripping
  - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
  - .2 Strip topsoil over areas to be excavated, areas to be covered by new construction, areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
  - .3 Topsoil to be stored for re-use in stockpiles not exceeding 1.5m high in location designated by the Departmental Representative.
  - .4 Should insufficient quantity of native topsoil be available for restoring landscaped areas, due to inappropriate handling or storage of topsoil by contractor, the contractor shall import the required balance at his own cost, ensuring imported material is equal or better than native material.

- .5 Avoid mixing topsoil with subsoil.
- .2 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify the Departmental Representative when excavations are complete and obtain Departmental Representative's approval before proceeding further. If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work. Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.
- .3 Temporary excavations for service trenches and building areas deeper than 1.2m requiring worker entry should be sloped/shored in accordance with Workers' Compensation Board regulations, or as directed on site by a qualified professional engineer. Flatter cut slope inclinations may be required if heavy groundwater seepage is encountered or if the temporary excavations will be open during periods of high precipitation.
- .4 Dewatering may be required, especially if the excavation is carried out during wet weather. The contractor should protect open excavations against flooding and damage from surface runoff. Select dewatering methods based on site conditions and construction techniques, disposing of water in accordance with Environmental procedures via flocculation tanks, settling basins or other treatment facilities to remove suspended solids or other contaminants before discharging to storm sewers. Avoid discharge to permanent existing or proposed soakaways without written approval of the Departmental Representative.
- .5 Excavate trenches to provide uniform continuous bearing and support for 100 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 300 mm above pipe not to exceed diameter of pipe plus 600 mm.
- .6 Excavate for slabs and paving to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.
- .7 For trench excavation, unless otherwise authorized by the Departmental Representative in writing, do not excavate more than 30m of trench in advance of installation operations and do not leave open more than 15m at the end of the day's operation.
- .8 Keep excavated and stockpiled materials a safe distance away from edge of trench. Restrict vehicle operations directly adjacent to open trenches.
- .9 Avoid mixing different excavated subsoils.

### **3.4 BACKFILLING / FILLING**

- .1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by the Departmental Representative.
  - .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
  - .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
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- .4 Compaction: place backfill / fill in uniform lifts not exceeding 150mm and compact to following Modified Proctor densities in compliance with ASTM D1557. (All densities in compliance with ASTM D1557).
  - .1 Below boulevards, easements and landscaped areas to minimum 90%
  - .2 Below and within 1:1 sloping zone of influence of ground-bearing structures, roads, driveways, shoulders, re-shaped ditches, parking areas, patios, paved areas and sidewalks to minimum 95%.
  - .3 Use caution in pipe zone to ensure no damage to pipe.
- .5 Under areas to be top-soiled: use compliant native material up to bottom of topsoil.
- .6 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.
- .7 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .8 During backfilling / filling and compaction, compact each layer before placing succeeding layer.
- .9 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing concrete.
  - .3 Place layers simultaneously on both / all sides of installed work to equalize loading.

### 3.5 CONTAMINATED MATERIALS

- .1 If contaminated materials are detected during excavation operations, immediately notify the Departmental Representative. Any contaminated materials to be disposed of using methods approved by the Departmental Representative.

### 3.6 GRADING

- .1 Following clearing and topsoil stripping excavate to rough grade any areas requiring cut.
  - .2 Proof roll exposed sub-grade. Excavate soft spots encountered and backfill with permitted materials in maximum 150mm lifts with compaction to specified density.
  - .3 Before placing fill in areas requiring fill, scarify surface to depth of 150mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
  - .4 In areas requiring fill, raise elevations in permitted materials in maximum 150mm lifts with compaction to specified density.
  - .5 Employ the preceding operations to achieve rough grading to design elevations allowing for depth of pavement structure, topsoil or other surface treatment as indicated. Grade slopes to be consistent and smooth between finished spot elevations shown on drawings. Tolerance on sub-grade elevations is within 30mm of design elevations but not uniformly high or low.
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- .6 Slope rough grade away from building at 2% minimum (unless indicated otherwise).
- .7 Do not disturb soil within branch spread of trees and shrubs to remain.

### **3.7 RESTORATION – TOPSOILED AREAS**

- .1 Prepare subgrade as detailed above and verify that all grades are correct.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 remove debris, roots, branches, stones in excess of 50mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75mm above surface. Dispose of removed material to appropriately licensed off-site disposal area.
- .4 Coarse cultivate entire area which is to receive topsoil to a minimum depth of 150mm immediately before placing topsoil. Cross cultivate areas where equipment used for hauling and spreading has compacted soil.
- .5 When sub-grade accepted by Departmental Representative, commence placing topsoil.
- .6 Place topsoil over prepared subgrade and allow to settle or compact by light rolling such that it is firm against deep footprints. Do not compact topsoil more than is necessary to meet this requirement.
- .7 Ensure topsoil is moist (25% to 75% of capacity) but not wet when placed, and do not handle if frozen or so wet that its structure will be altered.
- .8 Manually spread topsoil around trees, shrubs and obstacles.
- .9 Fine grade topsoil after placing to specified elevations and contours. Re-grade rough spots and low areas to ensure positive surface drainage.
- .10 Finish surface smooth, uniform, firm against deep footprinting with a fine loose surface texture. Mechanically seed restored and repaired topsoiled areas in accordance with Section 32 92 19.13 – Mechanical Seeding.

### **3.8 RESTORATION - GENERAL**

- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by the Departmental Representative.
- .2 Reinstate pavement, sidewalks and grass-block areas in layers, materials, densities and to lines and elevations which existed before excavation, in all cases providing smooth transition to adjacent paved areas.
- .3 Clean all affected surfaces.
- .4 Scarify and loosen topsoil in areas used for storage, haulage, machinery and the like.

### **3.9 SHORTAGE AND SURPLUS**

- .1 Supply all necessary fill to meet backfilling and grading requirements.
- .2 Dispose of surplus material off site.

**END OF SECTION**

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**Part 1 General****1.1 SECTION INCLUDES**

- .1 Materials and installation and/or restoration for asphalt concrete pavement for roads and parking lot areas.

**1.2 RELATED SECTIONS**

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

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM C88-99a, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 (No. 200) mm Sieve in Mineral Aggregates by Washing.
  - .3 ASTM C123-98, Standard Test Method for Lightweight Particles in Aggregate.
  - .4 ASTM C127-01, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
  - .5 ASTM C128-01, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - .6 ASTM C131-01, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .7 ASTM C136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .8 ASTM D698-00a, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
  - .10 ASTM D1557-00, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .11 ASTM D1559-89, Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, was withdrawn in 1998 with no replacement.
  - .12 ASTM D2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  - .13 ASTM D3203-94(2000), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
  - .14 ASTM D4318-00, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
  - .15 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 Asphalt Institute (AI)
  - .1 AI MS-2-1993 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
  - .3 CAN/CGSB-16.1-M89, Cutback Asphalts for Road Purposes.
  - .4 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.
  - .5 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

4. The Contractor is to examine and comply with the project geotechnical assessment document prepared by Golder Associates as follows:
  - a. September 10, 2015 report titled "Geotechnical Investigation Report; Proposed Maintenance Building, William Head Institution, Metchosin, BC"; report number 1314470497-010-R-Rev0-5000.

In the case of any conflict between the requirements of the specification sections and the project geotechnical assessment document referred to above, comply with the more stringent requirement.

## 1.4 SUBMITTALS

- .1 Submit asphaltic concrete mix design and trial mix test results to Departmental Representative for review, at least one week before commencing work.
- .2 **Materials to be tested by an accredited and independent testing laboratory including Marshall tests at a minimum rate of 1 per day and depth / density test cores at a rate of 1 per 300m<sup>2</sup> or part thereof.**
- .3 Submit test certificates showing suitability of materials at least 4 weeks prior to commencing work, certifying that asphalt cement meets the requirements of this section.
- .4 Inform Engineer of proposed source of aggregates and provide access for sampling, if required, at least 4 weeks prior to commencing work.
- .5 Testing and compliance records for granular base and sub-base materials as identified in item 1.5 of Section 31 00 99 - Earthwork for Minor Works.

## Part 2 Products

### 2.1 MATERIALS

- .1 Granular base and sub-base material meeting the following requirements:
  - .1 Well graded crushed or screened stone, gravel or sand.
  - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.

Table:

Sieve Designation	Granular Base (% passing)	Granular Sub-Base (% passing)	
		Select	Crushed
75 mm	-	100	100
50 mm	-	-	-
38 mm	-	-	60-100
25 mm	-	50-85	-
19 mm	100	-	35-80
12.5 mm	75-100	-	-
9.5 mm	60-90	-	26-60
4.75 mm	40-70	-	20-40
2.36 mm	27-55	-	15-30
1.18mm	16-42	-	10-20
0.600 mm	8-30	-	5-15
0.300 mm	5-20	-	3-10
0.150mm	-	0-15	-
0.075 mm	2-8	0-8	0-5

- .3 Granular base aggregates:
- .1 Crushed particles: at least 60 % of particles by mass retained on 4.75 mm sieve to have at least 1 freshly fractured face.
  - .2 Liquid limit: to ASTM D4318, maximum 25.
  - .3 Plasticity index: to ASTM D4318, maximum 6.
- .2 Asphalt concrete aggregates:
- .1 Coarse aggregate is aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C117.
  - .2 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.
  - .3 Do not use aggregates having known polishing characteristics in mixes for surface courses.
  - .4 Aggregate: material to following requirements:
    - .1 Well graded crushed stone or gravel, consisting of hard, durable , angular particles free from clay lumps, cementation, organic material, frozen material and deleterious materials.
    - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.
    - .3 Table:
 

Sieve Designation	Asphalt Concrete Lower Course (% Passing)	Asphalt Concrete Upper Course (% Passing)
19.0 mm	100	-
12.5mm	84-99	100
9.5 mm	73-88	-
4.75 mm	50-68	55-75
2.36 mm	35-55	38-58
1.18 mm	27-46	28-47
0.600 mm	18-36	20-36
0.300 mm	10-26	10-26
0.150 mm	4-17	4-17
0.075 mm	3-8	3-8
  - .4 Sand equivalent: to ASTM D2419, Minimum 40.
  - .5 Magnesium Sulphate soundness: to ASTM C88. Max % loss by weight: coarse aggregate 15, fine aggregate 18.
  - .6 Los Angeles Degradation: to ASTM C131. Max % loss by weight: coarse aggregate upper course 25, coarse aggregate lower course 35.
  - .7 Absorption: to ASTM C127. Max % by weight: coarse aggregate, 1.75.
  - .8 Loss by washing: to ASTM C117; Max % passing 0.075mm sieve: Coarse Aggregate 1.5.
  - .9 Lightweight particles: to ASTM C123. Max % by mass, with less than 1.95. Relative density (formally Specific Gravity): 1.5.
  - .10 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 3): Max % by weight: coarse aggregate, 10.

- .11 Crushed particles: at least 60 % of particles by mass within each of following sieve designation ranges to have at least 2 freshly fractured faces. Material to be divided into ranges using methods of ASTM C136 and ASTM C117.
- |                |    |                    |
|----------------|----|--------------------|
| <b>Passing</b> |    | <b>Retained on</b> |
| 25 mm          | to | 12.5 mm            |
| 12.5 mm        | to | 4.75 mm            |
- .12 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .3 Mineral filler for asphalt concrete:
- .1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.
- .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Engineer to improve mix properties.
- .4 Asphalt cement: to CAN/CGSB-16.3, 80 - 100.
- .5 Asphalt prime: to CAN/CGSB-16.1, grade MC-70.
- .6 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.
- .7 Asphalt tack coat: to CAN/CGSB-16.2, grade SS-1.

## 2.2 EQUIPMENT

- .1 Pavers: mechanical (grade controlled) self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers for parking lots and driveways:
- .1 Minimum drum diameter: 750 mm.
- .2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.
- .4 Haul trucks: of sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
- .1 Boxes with tight metal bottoms.
- .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
- .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
- .5 Suitable hand tools.

## 2.3 MIX DESIGN

- .1 Mix design to AI MS-2.
- .2 Design of mix: by Marshall method to requirements below:
- .1 Compaction blows on each face of test specimens: 75.
- .2 Mix physical requirements:

Property	Lower Course	Upper Course
Marshall Stability at 60 degrees C, kN minimum.	6.4	5.5
Flow Value, mm.	2-4	2-4
Air Voids in Mixture, %	3-6	3-5
Voids in Mineral Aggregate, % minimum	14	15
Index of Retained Stability, % minimum	75	75



- .3 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to ASTM D1559.
  - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
  - .3 Air voids: to ASTM D3203.
  - .4 Voids in mineral aggregate: to AI MS-2, chapter 4.
  - .5 Index of Retained Stability: measure in accordance with Marshall Immersion Test for Bitumen, ASTM D 1559.
- .4 Do not change job-mix without prior approval of Engineer. When change in material source proposed, new job-mix formula to be approved by Engineer.

### Part 3 Execution

#### 3.1 SUBGRADE PREPARATION AND INSPECTION

- .1 Verify grades of subgrade and items set in paving area for conformity with elevations and sections before placing granular base and sub-base material.
- .2 Obtain approval of subgrade by Geotechnical Engineer before placing granular sub-base and base.

#### 3.2 GRANULAR SUB-BASE AND GRANULAR BASE

- .1 Place granular base and sub-base material on clean unfrozen surface, free from snow and ice.
- .2 Place granular base and sub-base to compacted thicknesses as indicated. Do not place frozen material.
- .3 Place in layers not exceeding 150 mm compacted thickness. Compact to density not less than 95 % Modified Proctor Density in accordance with ASTM D1557.
- .4 Finished base surface to be within 10 mm of specified grade, but not uniformly high or low.

#### 3.3 ASPHALT PRIME

- .1 Cutback asphalt:
  - .1 Heat asphalt prime for pumping and spraying in accordance with CAN/CGSB-16.1.
  - .2 Apply cutback asphalt prime to granular base, at rate not exceeding 2 L/m<sup>2</sup>.
  - .3 Apply on damp surface, unless otherwise directed by Engineer.
- .2 Emulsified asphalt:
  - .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved.
  - .2 Apply diluted asphalt emulsion not exceeding 5 L/m<sup>2</sup>.
  - .3 Apply on damp surface unless otherwise directed.
- .3 Do not apply prime when air temperature is less than 5 degrees C or when rain is forecast within 2 hours.
- .4 If asphalt prime fails to set within 24 hours, spread sand blotter material in amounts required to absorb excess material. Sweep and remove excess blotter material.

#### 3.4 ASPHALT TACK COAT

- .1 Apply asphalt tack coat only on approved clean, dry surfaces.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application. Mix thoroughly by pumping.
- .3 Apply tack coat evenly to pavement surface not exceeding 0.7L/m<sup>2</sup>, when diluted.

- .4 Paint contact surfaces of curbs, edges, headers, gutters, manholes and like structures with thin uniform coat of asphalt tack coat material.
- .5 Do not apply tack coat at air temperature below 5 degrees C or when rain forecast within 2 hours of application.
- .6 Apply tack coat only to surfaces that are to be overlaid same day.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming.
- .8 Where traffic is to be maintained treat no more than one half the width of the surface in one application.
- .9 Keep traffic off tacked areas until asphalt tack coat has set.

### 3.5 PLANT AND MIXING REQUIREMENTS

- .1 In accordance with ASTM D995.

### 3.6 ASPHALT CONCRETE PAVING

- .1 Obtain approval of base, tack coated and primed areas before placing asphalt mix.
- .2 Place asphalt mix only when base or previous course is dry and air temperature is above 5 degrees C. Place overlay pavement only when air temperature is above 10 degrees C.
- .3 Place asphalt concrete in compacted layers not exceeding 50 mm per lift and not less than 35mm per lift.
- .4 **Where the project geotechnical report specifies a total asphalt layer thickness of 50mm, the asphalt concrete paving is to be installed as a single layer complying with the "Upper Course" mix properties specified in this Section.**
- .5 Minimum 135 degrees C mix temperature required when spreading.
- .6 Maximum 160 degrees C mix temperature permitted at any time.
- .7 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.
- .8 Compact parking lot and driveway asphalt concrete to density not less than 97 % of density obtained with Marshall specimens prepared in accordance with ASTM D1559 from samples of mix being used. Roll until roller marks are eliminated.
- .9 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.
- .10 Moisten roller wheels with water to prevent pick up of material.
- .11 Compact mix with hot tampers or other approved equipment, in areas inaccessible to roller.
- .12 Finished surface is to be within 6 mm of design elevations and not uniformly high or low. Surface irregularities are not to exceed 6 mm when checked with a 3m straight edge in any direction. Water ponding on the finished surface is not permitted.
- .13 Repair areas showing checking, rippling, segregation or which are otherwise out of compliance with specified criteria.

### 3.7 JOINTS

- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
  - .2 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
  - .3 For cold joints, cut back to full depth vertical face and tack face with hot asphalt.
  - .4 For longitudinal joints, overlap previously laid strip with spreader by 25 to 50 mm.
-

**3.8 PROTECTIVE COATING**

- .1 Apply 2 coats of protective coating to completed paved areas and asphalt curbs in accordance with manufacturer's instructions.

**3.9 PROTECTION**

- .1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38 degrees C. Do not permit stationary loads on pavement until 24 hours after placement.
- .2 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.

**END OF SECTION**

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**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Proposed 100mm wide continuous WHITE pavement markings to delineate between parking stalls at locations indicated on contract drawings.
- .2 Restoration, as required, of existing 100mm wide dashed YELLOW pavement markings along existing road edges and of other existing pavement markings as may be removed or deteriorated as a result of the works.

**1.2 RELATED REQUIREMENTS**

- .1 Section 32 12 16.02 – Asphalt Paving for Building Sites.

**1.3 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.
  - .2 CAN/CGSB 1.74-01, Alkyde Traffic Paint.
- .2 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

**1.4 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Paint:
  - .1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.
  - .2 Paints: in accordance with MPI recommendation for surface conditions.
    - .1 Paints: maximum VOC limit 100 g/L to SCAQMD Rule 1113 to GS-11.
  - .3 Colour: to MPI listed, white.
- .2 Thinner: to MPI listed manufacturer.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.
  - .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

**3.2 EQUIPMENT REQUIREMENTS**

- .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

**3.3 APPLICATION**

- .1 Pavement markings: Contractor to lay out pavement markings and obtain approval.
- .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .4 Do not thin paint unless approved.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines: of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

**3.4 TOLERANCE**

- .1 Paint markings: within plus or minus 10 mm of original / indicated dimensions.
- .2 Remove incorrect markings to satisfaction of the Departmental Representative.

**3.5 PROTECTION OF COMPLETED WORK**

- .1 Protect pavement markings until dry.

**END OF SECTION**

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**PART 1 General**

**1.1 RELATED SECTIONS**

- .1 Structural drawings: Cast-in-Place Concrete.
- .2 Section 05 50 00: Metal Fabrications.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A90/A90M-11, Standard Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
  - .3 ASTM A491-11, Standard Specification for Aluminum-Coated Steel Chain Link Fence Fabric.
  - .4 ASTM A653/A653M-14, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
  - .2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
  - .3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
  - .4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
  - .5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

**1.3 SHOP DRAWINGS**

- .1 Submit Shop Drawings in accordance with Section 01 01 50 – General Instructions.
- .2 Drawings to indicate: fence layout, swing gates, sliding gates, post and rail sizes, chain fabric, spacing, foundations, miscellaneous fittings.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions for Construction/Demolition Waste Management And Disposal clause.
  - .2 Collect and separate for disposal packaging material for recycling in accordance with Construction Waste Management Plan and City of Whitehorse Regulations.
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**PART 2      Products**

**2.1            MATERIALS**

- .1 Chain-link fence fabric: to CAN/CGSB-138.1.
    - .1 Type 1, Class A, galvanized, commercial heavy gauge, minimum 6 ga. 50 mm openings.
    - .2 Height of fabric: as indicated.
    - .3 Fabric with knuckled top and bottom selvage.
  - .2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe , continuous lengths, galvanized Schedule 40 steel pipe.
    - .1 Terminal/corner posts: 2 7/8" o.d.
    - .2 Line posts: 2 3/8" o.d.
    - .3 Top, bottom and intermediate rails: 1 5/8" o.d.
  - .3 Bottom tension wire: to CAN/CGSB-138.1, Table 2, single strand, galvanized steel wire, 5 mm diameter. Stretched along the bottom of fabric and fastened to the fabric at intervals of not more than 18 inches, using steel hog rings. Tension wire shall be attached with brace band, and nut and bolt. Tension wire shall be terminated around the bolt to itself with a minimum of three complete wraps.
  - .4 Tie wire fasteners: to CAN/CGSB-138.1, 8 gauge aluminum alloy with 9 gauge core wire, single strand,
  - .5 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel. Provide two tension bars for each gate, end post, corner and pull posts.
  - .6 Tension bar bands shall be pressed steel per ASTM F 626-89a spaced not over 300 mm o.c. to secure tension bars to end, corner, pull, and gate posts.
  - .7 Gate: to CAN/CGSB-138.4.
  - .8 Gate frame: to ASTM A53/A53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.
    - .1 Fabricate gates as indicated with electrically welded joints and hot dip galvanize after welding and paint.
    - .2 Fasten fence fabric to gate with twisted selvage at top.
    - .3 Hinges: Pressed steel to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 2 hinges for each leaf. Drill, tap, and set screw or weld to frame and post to prevent rotation.
    - .4 Single Gate Latch: Provide heavy-duty gate fork latch of correct size malleable iron to permit operation from either side of gate, with padlock eye as integral part of latch.
    - .5 Gates to have locking pins with aluminum locking pin sleeves recessed into concrete securing gates in both open and closed positions. Spring loaded locking pin operation to prevent locking pin from dragging on ground.
-

**MAINTENANCE BUILDING**

- .6 Gates to maintain no gaps greater than 50 mm between gateposts and frames and 38 mm above ground.
- .7 All fittings hot dipped galvanized.
- .9 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy, galvanized steel or malleable or ductile cast iron of industrial quality.
  - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
  - .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail. Overhang tops to provide waterproof fit, to hold top rails.
  - .4 Turnbuckles to be drop forged.
  - .4 All fittings except nuts and bolts shall be galvanized.
- .10 Organic zinc rich coating: to CAN/CGSB-1.181. Galvacon two coat application to all joints, welds and damaged areas.

**2.2 FINISHES**

- .1 Galvanizing:
  - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
  - .2 For pipe: 550 g/m<sup>2</sup> minimum to ASTM A90.
  - .3 For other fittings: to CAN/CSA-G164.

**PART 3 Execution**

**3.1 ERECTION OF FENCE**

- .1 Erect fence along lines as indicated and to CAN/CGSB-138.3.
- .2 Space line posts maximum 2.4 m apart, measured parallel to ground surface.
- .3 Install additional straining posts at sharp changes in grade and where directed by Consultant.
- .4 Install corner post where change in alignment exceeds 10 deg .
- .5 Install end posts at end of fence. Install gate posts on both sides of gate openings.
- .6 Place galvanized pipe insert sleeves c/w base plates as anchors for post tops and bases.
- .7 Install pipe insert supports for interior fencing. Drill expansion anchors in concrete floor and underside of slab.
- .8 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface. Install braces on both sides of corner and straining posts in similar manner.
- .9 Install overhang tops and caps.



**MAINTENANCE BUILDING**

- .10 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .11 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .12 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Knuckled selvedge at top and bottom.
- .13 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 300 mm intervals. Give tie wires minimum two twists.
- .14 Install rails and fabric to top of Gas Tank storage area.

**3.3 INSTALLATION OF GATE**

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom approximately 50 mm above ground surface.
- .3 Determine position of centre gate rest for double gate. Cast gate rest in concrete as directed. Dome concrete above ground level to shed water.
- .4 Install gate stops where required.

**3.4 TOUCH UP**

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas in accordance with Section 09 91 23 - Painting. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

**3.5 CLEANING**

- .1 Clean and trim areas disturbed by operations. Dispose of surplus material.
- .2 Dispose of waste materials in conformance with Construction Waste Management Plan.

**END OF SECTION**

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**Part 1 General**

**1.1 RELATED SECTIONS**

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

**1.2 SUBMITTALS**

- .1 Product Data:
  - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Provide product data for:
    - .1 Seed mixture complete with supplier's recommended:
      - .1 Mechanical placement rates
      - .2 Fertilization products, rates and frequency.
    - .2 Fertilizer compatible with seed mixture suppliers recommendations.

**1.3 QUALITY ASSURANCE**

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**1.4 SCHEDULING**

- .1 Schedule seeding to coincide with preparation of soil surface.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Divert unused fertilizer from landfill to official licensed hazardous material collections site.
- .2 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

**Part 2 Products**

**2.1 GRASS SEED**

- .1 Canada "Certified" "Canada Pedigreed grade" seed, "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
  - .2 In packages individually labelled in accordance with "Seeds Regulations" and indicating name of supplier.
-

**2.2 WATER**

- .1 Free of impurities that would inhibit germination and growth.

**2.3 FERTILIZER**

- .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
- .2 Complete synthetic fertilizer with guaranteed minimum analysis as specified.

**Part 3 Execution**

**3.1 QUALITY OF WORK**

- .1 Do not perform work under adverse field conditions such as excessive wind speeds, frozen ground or ground covered with snow, ice or standing water.
- .2 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site to a licensed contaminated soils disposal site.

**3.2 SEED BED PREPARATION**

- .1 Verify that grades are correct. If discrepancies occur, notify and do not commence work until instructed by Departmental Representative.
- .2 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of plus or minus 15mm, surface draining naturally.
- .3 Cultivate fine grade to 25mm depth immediately prior to seeding.

**3.3 SEED PLACEMENT**

- .1 For mechanical seeding:
    - .1 Use "Brillion" type mechanical landscape seeder which accurately places seed at specified depth and rate and rolls in single operation.
  - .2 For manual seeding only outside of the areas accessible to mechanical seeder:
    - .1 Use "Cyclone" type manually operated seeder.
    - .2 Use manually operated, water ballast, landscaping type, smooth steel drum roller.
  - .3 On cultivated surfaces, sow seed uniformly at rates recommended by supplier provided at 1.2.1.2 above.
  - .4 Blend applications 300mm into adjacent grass areas and previous applications to form uniform surfaces.
  - .5 Sow half of required amount of seed in one direction and remainder at right angles as applicable.
-

- .6 Incorporate seed by light raking in cross directions.
- .7 Consolidate mechanically seeded areas by rolling area if soil conditions warrant immediately after seeding.
- .8 Protect seeded areas from trespass until plants are established.

### **3.4 FERTILIZING PROGRAM**

- .1 Fertilize during establishment period to as per product data / supplier recommendations provided at 1.2.1.2 above:

### **3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative:
  - .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
  - .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
  - .3 Cut grass to 50mm whenever it reaches height of 100mm. Remove clippings which will smother grass.
  - .4 Fertilize seeded areas after first cutting or in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in.
  - .5 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.

### **3.6 FINAL ACCEPTANCE**

- .1 Seeded areas will be accepted by Departmental Representative provided that:
  - .1 Areas are uniformly established and turf is free of rutted, eroded, bare or dead spots and free of weeds.
  - .2 Areas have been cut at least twice.
  - .3 Areas have been fertilized.
  - .4 Any establishment practices, including scheduled or recommended fertilizations, not yet accomplished to be recorded in the Operations and Maintenance Manual.
- .2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

### **3.7 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

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**Part 1 General****1.1 RELATED SECTIONS**

- |    |   |                     |
|----|---|---------------------|
| .1 | Cast-in-place concrete (short form)     | Section 03 30 00.01 |
| .2 | Earthwork for Minor Works               | Section 31 00 99    |
| .3 | Public Sanitary Utility Sewerage Piping | Section 33 31 13    |
| .4 | Storm Utility Drainage Piping           | Section 33 41 00    |

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C478M, Specification for Precast Reinforced Concrete Manhole Sections.
  - .2 ASTM A48, Specification for Gray Iron Castings.
  - .3 ASTM C-497, Test Methods for Concrete Pipe, Manhole Sections, or Tile
  - .4 ASTM-D-4101, Polypropylene Plastic Injection and Extrusion Materials.
  - .5 ASTM A615M, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - .6 ASTM C443M, Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  - .7 ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
  - .8 ASTM A185, Reinforcing steel welded mesh fabric
- .2 Canadian Standards Association (CSA International)
  - .1 CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .2 CSA-S157, Strength Design in Aluminum.
  - .3 CSA A82.56, Aggregate for Masonry Mortar.
  - .4 CAN/CSA-A8, Masonry Cement
  - .5 CAN3-A165 Series, CSA Standards on Concrete Masonry Units.
  - .6 CAN/CSA-A3001 - Cementitious Materials for Use in Concrete.Precast manhole units

**1.3 MATERIALS**

- .1 Precast manhole and catch basin units to: ASTM C478M complete with ladder rungs.
- .2 Manhole lids: to be precast reinforced concrete designed to withstand H20 loading.
- .3 Cast iron frame and cover, cast with the word "Storm" or "Sanitary" as applicable:
  - .1 Frame and cover must conform to ASTM A48 be designed to withstand H20 loading.
  - .2 Frame and cover must bear manufacturer identification on castings.
- .4 Ladder rungs to be:

**MAINTENANCE BUILDING**

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- .1 To conform to ASTM C-497, C-478 load test.
- .2 20 mm cold rolled steel, hot dipped after bending to CSA G164, welded to reinforcing bars and cast with manhole sections or epoxy grouted into manhole walls.
- .3 20 mm aluminum alloy #6351-T6 (CSA-S157 and NBC 1977), complete with polyethylene anchor precast or drilled holes in manhole sections.
- .4 Polypropylene encased steel ladder rungs; polypropylene ASTM-D-4101 steel core to be ½ inch dia grade 60 as per ASTM A615M.
- .5 Distance from top of manhole cover to top rung to be maximum 500 mm where no handhold provided. Maximum distance may be extended to 660 mm where handhold provided.
- .6 In compliance with all requirements of Workers' Compensation Board.
- .5 Precast catch basin sections: to ASTM C478M.
- .6 Catchbasin leads to be minimum 150 mm diameter and of PVC DR35.
- .7 Catchbasin lids: to be precast reinforced concrete designed to withstand H20 loading.
- .8 Cast iron catchbasin and lawn drain frame and grate:
  - .1 Frame and grate must conform to ASTM A48 and be designed to withstand H20 loading.
  - .2 Frame and grate must bear manufacturer's identification on casting.
- .9 Joints: made watertight using cement mortar or rubber gaskets to ASTM C443.
- .10 Mortar:
  - .1 Aggregate: to CSA A82.56
  - .2 Cement: to CAN/CSA-A8.
- .11 Adjusting rings: to ASTM C478.
- .12 Concrete Brick: to CAN3-A165 Series.
- .13 Drop manhole pipe: same as sewer pipe.
- .14 Galvanized iron sheet: approximately 2 mm thick.
- .15 Concrete for cast-in-place bases and benching to be minimum 20 MPa with constituent materials conforming to CAN/CSA-A5, A23.5 and A23.1.
- .16 Precast concrete lawn drain units manufactured to withstand AASHTO H-20 loading, wet-cast from concrete with compressive strength of 4000 PSI at 28 days. Reinforcing mesh to ASTM A185. Reinforcing steel deformed bars to ASTM A615.

**Part 2 Execution****2.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
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**MAINTENANCE BUILDING**

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**2.2 EXCAVATION AND BACKFILL**

- .1 Excavate and backfill in accordance with Section 31 00 99 Earthwork for Minor Works and as indicated.
- .2 Obtain approval of the Departmental Representative for manholes or catch basins.

**2.3 CONCRETE WORK**

- .1 Do cast-in-place concrete work including surface tolerances, finishing and field quality control, in accordance with CAN/CSA-A23.1.
- .2 Position metal inserts in accordance with dimensions and details as indicated.

**2.4 INSTALLATION**

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.
- .2 Place minimum 100 mm of 25 mm bedding gravel compacted to minimum 95% Modified Proctor density in compliance with ASTM D1557.
- .3 Set all inlet and outlet pipes to specified alignments and elevations.
- .4 Connect concrete pipe into manhole using spigot or bell precast into manhole wall or, alternatively, grout pipe into pre-formed rough core in manhole wall using fast-setting grout.
- .5 Connect PVC pipe into manhole using “manhole adapter ring” or approved equal.
- .6 Ensure excavation free of water and approved by geotechnical engineer prior to placing concrete.
- .7 Set remaining precast riser sections plumb with joints consisting of cement mortar or gasket to ASTM C443.
- .8 Brace capped inlets or stubs to withstand testing head.
- .9 Set frames by firmly embedding in mortar on a minimum of 1, maximum of 3 courses of bricks or precast concrete riser rings, or cast-in-place form system with due regard to maximum distance to first step.
- .10 Plug lifting holes in pipe.
- .11 Ensure frames conform to design contour of pavement or existing surface.
- .12 Clean units of debris and foreign materials.
  - .1 Remove fins and sharp projections.
  - .2 Prevent debris, silt and contaminants from entering system.

**2.5 ADJUSTING TOPS OF EXISTING UNITS**

- .1 Remove existing gratings, frames and store for re-use at locations designated by the Departmental Representative.
  - .2 Precast units:
    - .1 Raise or lower precast units by adding or removing precast sections as required.
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**MAINTENANCE BUILDING**

- .2 When amount of raise is less than 300 mm use standard manhole bricks, precast riser rings or cast-in-place form system.
- .3 Re-set gratings and frames to required elevation on not more than 3 courses of brick. Make brick joints and join brick to frame with cement mortar, parge and trowel smooth.
- .4 Ensure adjustments conform to requirements regarding distance to first step.

**2.6 CLEANING**

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

**END OF SECTION**



**Part 1            General****1.1            SECTION INCLUDES**

- .1        Materials and installation for water mains, hydrants, valves, valve boxes, and valve chambers, including service connections.

**1.2            RELATED SECTIONS**

- .1        Section 31 00 99 –Earthworks for Minor Works.
- .2        Section 03 30 00.01 – Cast-in-Place Concrete (Short Form) - Civil

**1.3            REFERENCES**

- .1        American National Standards Institute/American Water Works Association (ANSI/AWWA)
    - .1        ANSI/AWWA B300, Hypochlorites.
    - .2        ANSI/AWWA C500, Metal-Seated Gate Valves for Water Supply Service (Includes Addendum C500a-95).
    - .3        ANSI/AWWA C504, Rubber-Seated Butterfly Valves.
    - .4        ANSI/AWWA C651, Disinfecting Water Mains.
    - .5        ANSI/AWWA C800, Underground Service Line Valves and Fittings (Also Included: Collected Standards for Service Line Materials).
    - .6        ANSI/AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Distribution.
  - .2        American Society for Testing and Materials International, (ASTM)
    - .1        ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
    - .2        ASTM B88M, Standard Specification for Seamless Copper Water Tube [Metric].
    - .3        ASTM C117, Standard Test Method for Material Finer Than 75 [MU] m (No. 200) Sieve in Mineral Aggregates by Washing.
    - .4        ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .5        ASTM C478M, Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric].
    - .6        ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m<sup>3</sup>)).
    - .7        ASTM D2310, Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
    - .8        ASTM D2657, Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
    - .9        ASTM D2992, Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fitting.
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- .10 ASTM D2996, Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
- .11 ASTM F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .12 ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
  - .3 CAN/CGSB-1.88, Gloss Alkyd Enamel, Air Drying and Baking.
  - .4 CGSB 41-GP-25M, Pipe, Polyethylene, for the Transport of Liquids.
- .4 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-A257 Series-M92(R1998), Standards for Concrete Pipe.
  - .2 CAN/CSA-A3000-98(April 2001), Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
  - .1 CAN/CSA-A8, Masonry Cement.
  - .3 CSA B137 Series 02, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
  - .1 CSA B137.1, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
  - .2 CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
  - .4 CAN/CSA-G30.18-M92(R1998), Billet Steel Bars for Concrete Reinforcement.
  - .5 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .6 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA)
- .7 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - March 1998(R2002)
- .8 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S520, Hydrants.
  - .2 CAN4-S543, Internal-Lug, Quick Connect Couplings for Fire Hose.

#### **1.4 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures, for the following:

- .1 Proposed tie-in fittings at connections to existing watermain
- .2 Inform the Departmental Representative of proposed source of bedding materials and provide access for sampling at least 4 weeks prior to commencing work, in addition to providing test results in accordance with item 1.5 of Section 31 00 99 – Earthwork for Minor Works.
- .3 Submit manufacturer's test data and certification that pipe materials meet requirements of this section at least 4 weeks prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.
- .4 Pipe certification to be on pipe.

## **1.5 SCHEDULING OF WORK**

- .1 Schedule Work to minimize interruptions to existing services.
- .2 Submit schedule of expected interruptions to the Departmental Representative for approval and adhere to interruption schedule as approved by the Departmental Representative.
- .3 Notify the Departmental Representative minimum of 48 h in advance of interruption in service.
- .4 Do not interrupt water service for more than 3 h at any one time and schedule this period in consultation with the Departmental Representative.
- .5 Notify fire department of any planned or accidental interruption of water supply to hydrants.
- .6 Provide 300mm x 300mm x 13mm plywood marker sign clearly stencilled "NOT IN SERVICE" on hydrant not in use.

## **Part 2 Products**

### **2.1 PIPE, JOINTS AND FITTINGS**

- .1 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900. Pressure class 235, DR 18 unless stated otherwise.
  - .1 CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket and/or coupling.
- .2 Fittings:
  - .1 Ductile iron fittings to AWWA C110 suitable for pressure rating equal to or greater than that of the PVC C900 pipe, cement mortar lined to AWWA C104/A21.4.
  - .2 Compact ductile iron fittings to AWWA C153/A21.53-94 suitable for pressure rating equal to or greater than that of the PVC C900 pipe, cement mortar lined to AWWA C104/A21.4.
  - .3 All fittings shall be provided with integral tie lugs. Weld on lugs are unacceptable.

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- .4 Single rubber gasket for push on bell and spigot type joint and / or mechanical pipe joints: to AWWA C111. All push-on joint hubs to be equipped with tie-rod lugs.
  - .5 Flanged Joints:
    - .1 Flat faced conforming to the face dimension and drilling of ANSI B16.1, Class 125.
    - .2 Pressure pressure rated equal to or greater than that of the PVC C900 pipe.
  - .6 Flange gaskets shall be 3.175 mm thick manufactured from natural rubber with lead tip and a layer of cotton on both sides.
  - .7 Bolts and nuts:
    - .1 Bolts to be carbon steel, Grade B to ASTM, heavy hex style, zinc plated to ASTM B633 or cadmium plated to ASTM B766. Bolt sizes to AWWA C110.
    - .2 Nuts and washers: Nuts to be carbon steel, Grade A to ASTM A563. Washers to be flat hardened steel to ASTM F436. Nuts and washers to be zinc plated to ASTM B633 or cadmium plated to ASTM B766.
  - .8 Tie rods and nuts
    - 1. Tie rods to be continuous threaded, quenched and tempered alloyed steel to ASTM A354, Grade BC. To be zinc plated to ASTM B633 or cadmium plated to ASTM B766. Tie rod sizes to be minimum 19mm diameter or greater.
    - 2. Nuts and internally threaded couplings to be heavy hex finish to ASTM A563. Washers to be flat hardened steel to ASTM F436. Nuts and washers to be zinc plated to ASTM B633 or cadmium plated to ASTM B766.
  - .9 Thrust blocks shall be used at all directional change fittings; elbows, tees, etc. where the water pipe installation is of PVC (plastic) materials.
  - .10 Couplings and Flanged Coupling Adapters
    - .1 Suitable for pressure class equal to or exceeding the proposed water main.
    - .2 Flanges and full face flange gaskets as specified elsewhere in this Section.
    - .3 To AWWA C219.
    - .4 Anti-corrosion of interior and exterior centre sleeves and end rings to AWWA C219, AWWA C213, AWWA C210, or AWWA C550 as applicable.
    - .5 Compression gaskets to AWWA C219.
    - .6 Bolts and nuts high strength low alloy steel to AWWA C111, stainless steel to ASTM F593 or ASTM F738 for bolts and ASTM F594 or ASTM F836M for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.
    - .7 Ductile iron casings to ASTM A536, Grade 65-45-12.
  - .11 Tapping sleeves for branch connections 75mm and larger:
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- .1 Pressure class to meet or exceed that specified for proposed watermain piping. Exterior condition of existing water mains as found in the field may alter type and / or materials.
- .2 To AWWA C219 for sleeve and gasket materials and generally for design, manufacture and performance.
- .3 Flanges and full face flange gaskets as specified elsewhere in this Section and AWWA C207 and C208 for fabricated carbon steel sleeves. Flange gaskets for use with epoxy coated flanges to be annular ribbed type.
- .4 Anti-corrosion coating of fabricated carbon steel and ductile iron sleeve assemblies to AWWA C213 (Fusion-Bonded Epoxy) or shop coated to AWWA C219.
- .5 Bolts and nuts high strength low alloy steel to AWWA C111, stainless steel to ASTM F593 or F738 for bolts and ASTM F594 or F836M for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.
- .6 Ductile iron castings to ASTM A536, grade 65-45-12.
- .7 Branches shall include a threaded test plug 19mm NPS minimum if tapping machine to be used does not have provision for pressure testing.
- .8 Tapping sleeves for cast iron, ductile iron, asbestos cement, PVC to AWWA C900, pre-stressed concrete pressure pipe or steel mains for taps other than size-on-size:
  - .1 Split assembly to incorporate an annular gasket cemented or mechanically held in place on the branch end **or** split assembly incorporating ring seal and wrap around sleeve length gasket liner.

## **2.2 VALVES, VALVE BOXES, INDICATOR POSTS & SIAMESE CONNECTIONS**

- .1 Mainline Valves – General Requirements:
  - .1 Valves to open counter-clockwise
  - .2 All valves to have manufacture's name, year of manufacture, size and working pressure on the bonnet or body.
  - .3 Valves 400 mm and larger to have by-pass sized to AWWA 500.
  - .4 Gate valves 400 mm and larger to have gear operators.
- .2 Mainline Gate valves:
  - .1 To AWWA C500: 75 to 300 mm to working pressure 1380 kPa; 400 mm and larger to working pressure 1035 kPa, gray cast iron or cast ductile iron body, bronze mounted solid wedge, or double disc, non-rising stem, hub or flanged ends.
  - .2 To AWWA C509: 75 to 300 mm to working pressure 1380 kPa; Gray cast iron or ductile iron body resilient seated, non-rising stem, hub or flanged ends.
  - .3 Stem seal to be O-ring type.
  - .4 Valves to be complete with 50 mm square operating nut for underground service.

- .5 Acceptable products:
  - .1 Fire Service (for combined domestic/fire service or fire service), ULC listed for fire service:
    - 75mm and smaller: Crane 438, Nibco T-1040 or equivalent approved.
    - 100mm and larger: Terminal City Iron Works 583; Darling 55FM or equivalent approved.
- .3 Mainline Valve Boxes:
  - .1 All valves shall be fitted with minimum 135mm Nelson type cast iron valve box with cap on section of cast or ductile iron pipe down to the valve with a hub of the pipe over the valve.
  - .2 Provide a 20mm dia proprietary valve stem extension with centering disc and 50mm square top nut. Base of extension to have suitable socket to fit over and pin to valve nut. Length of stem extension to be sufficient that top of extension is within 150mm of finished surface.
  - .3 For valve boxes not in concrete or asphalt paved areas, centre valve boxes in 600mm x 600mm x 230mm concrete block set flush with finished grade.
- .4 Siamese Connections:
  - .1 Refer to Mechanical Engineer's Drawings.
  - .2 Free standing sidewalk siamese fire department connections.
  - .3 Brass escutcheon plate, polished brass pipe sleeve, 90 degree single clapper brass siamese connection, swivels, brass plugs and chains.
  - .4 Size: 64 mm x 64 mm x 100 mm siamese with a 600 mm overall height.
  - .5 Acceptable Products: National Fire Equipment model 207, or equivalent approved.

## **2.3 FIRE HYDRANTS**

- .1 Compression dry-barrel hydrant type with two hose nozzles and one pumper nozzle, ULC listed and conforming to AWWA C502-85.
- .2 Hose and pumper nozzle threads, operating nut and cap nut shall conform to the standards of CSC, PWGSC and the local fire fighting authority.
- .3 Red enamel finish paint color.
- .4 Acceptable Products: Terminal City C71-P, Clow, Mueller, or equivalent approved.
- .5 Provide 300mm x 300mm x 13mm plywood marker sign clearly stencilled "NOT IN SERVICE" on hydrant not in use.

## **2.4 PIPE BEDDING AND SURROUND MATERIAL**

- .1 Pipe bedding and surround material per Section 31 00 99 – Earthwork for Minor Works.
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**MAINTENANCE BUILDING**

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- .2 Concrete mixes and materials required for bedding cradles, encasement, supports, thrust blocks: to Section 03 30 00.01 - Cast-in-Place Concrete (Short Form) – Civil.

**2.5 BACKFILL MATERIAL**

- .1 Backfill material per Section 31 00 99 – Earthwork for Minor Works.

**2.6 PIPE DISINFECTION**

- .1 Sodium hypochlorite to ANSI/AWWA B300 to disinfect water mains.
- .2 Undertake disinfection of water mains in accordance with ANSI/AWWA C651.

**Part 3 Execution****3.1 PREPARATION**

- .1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.
  - .1 Inspect materials for defects to approval of the Departmental Representative.
  - .2 Remove defective materials from site.

**3.2 TRENCHING**

- .1 Do trenching work in accordance with Section 31 00 99 – Earthwork for Minor Works.
- .2 Trench depth to provide cover above crown of pipe of not less than 1.0m from finished grade.
- .3 Trench alignment and depth require the Departmental Representative's approval prior to placing bedding material and pipe.

**3.3 GRANULAR BEDDING**

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% of corrected maximum dry density.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 00 99 – Earthwork for Minor Works.

**3.4 PIPE INSTALLATION**

- .1 Lay pipes to ANSI/AWWA C600 and manufacturer's standard instructions and specifications. Do not use blocks except as specified / permitted elsewhere in contract documents.
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**MAINTENANCE BUILDING**

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- .2 Join pipes in accordance with ANSI/AWWA C600 and manufacturer's recommendations.
  - .3 Bevel or taper ends of PVC pipe to match fittings.
  - .4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
  - .5 Lay pipes on prepared bed, true to line and grade.
    - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
    - .2 Take up and replace defective pipe.
    - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
  - .6 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.
  - .7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
  - .8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
    - .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
  - .9 Position and join pipes with equipment and methods approved by the Departmental Representative.
  - .10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
  - .11 Align pipes before jointing.
  - .12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  - .13 Avoid displacing gasket or contaminating with dirt or other foreign material.
    - .1 Remove disturbed or contaminated gaskets.
    - .2 Clean, lubricate and replace before jointing is attempted again.
  - .14 Complete each joint before laying next length of pipe.
  - .15 Minimize deflection after joint has been made.
  - .16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
  - .17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by the Departmental Representative.
  - .18 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
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**MAINTENANCE BUILDING**

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- .19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .20 Do not lay pipe on frozen bedding.
- .21 Do hydrostatic and leakage test and have results approved by the Departmental Representative before surrounding and covering joints and fittings with granular material.
- .22 Backfill remainder of trench.

**3.5 VALVE INSTALLATION**

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes or valve chambers by means of bedding same as adjacent pipe. Maximum length of pipe on each end of valve shall be 1 m. Valves not to be supported by pipe.
- .3 Install valve boxes or indicator posts on all valves.

**3.6 BUILDING CONNECTIONS**

- .1 Terminate building water service 1 m outside building wall. Perform all tests described in this specification section prior to tying in to mechanical plumbing. Following passing of all specified tests:
  - .1 Install coupling necessary for connection to building plumbing.
  - .2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker to locate pipe end.
- .2 Place temporary location marker at ends of plugged or capped unconnected water lines.
  - .1 Each marker to consist of 38 x 89 mm stake extending from pipe end at pipe level to 600 mm above grade.
  - .2 Paint exposed portion of stake blue with designation "WATER SERVICE LINE" in black.

**3.7 TAPPING SLEEVE INSTALLATION**

- .1 Thoroughly clean the exterior of the main to be tapped. Grind or file any protrusions or irregularities in the pipe exterior which may interfere with uniform seating of gaskets or clamping bands. In accordance with Section 10 of AWWA C651, dust interior surface of the tapping sleeve annulus with calcium hypochlorite powder before attaching to main in accordance with manufacturer's instructions.

**3.8 FIRE HYDRANTS**

- .1 Install fire hydrants with isolation valves at locations indicated on the drawings.
  - .2 Fire hydrant installations shall be provided with thrust blocks at the tee and mechanically restrained between the hydrant isolation valve and the hydrant boot using Tyton joints complete with lugs and two tie rods of 25mm diameter.
  - .3 Set fire hydrants plumb, with hose outlets parallel with the edge of the pavement or curb line.
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- .4 To provide proper drainage for each hydrant standpipe, excavate a pit measuring not less than 1.0 x 1.0 x 0.5 m deep and backfill with drain rock complying with Master Municipal Construction Document 2009 Section 31 05 17 item 2.6 to a level 150 mm above the hydrant drain holes. Hydrant boot to rest on 100 x 300 x 300 mm precast concrete blocks bedded on a minimum of 300 mm of previously stated drain rock in previously stated pit. Generally comply with Master Municipal Construction Document 2009 Standard Drawing W4.

### **3.9 THRUST BLOCKS AND RESTRAINED JOINTS**

- .1 For thrust blocks: do concrete Work in accordance with Section 03 30 00 - Cast-in-Place Concrete. Place heavy gauge polythene sheet between pipe fitting and concrete.
- .2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed firm bearing soil or as directed by the Departmental Representative.
- .3 Valves shall be anchored to a block of concrete.
- .4 Anchors that restrain upward forces or forces in a direction in which no suitable undisturbed bearing surface is available shall consist of inverted U-bars at the joint being restrained set in the concrete of the thrust block. Thrust blocks in this application shall be of that mass or weight required to restrain the forces involved.
- .5 Keep joints and couplings free of concrete.
- .6 Minimum size of thrust blocks shall be as follows:

<b>Largest Pipe Size at thrust location</b>	<b>Dead Ends, Tees and Wet-Tap connections</b>	<b>90° Bends</b>	<b>45° Bends</b>	<b>22.5° Bends</b>
100 mm	0.36 m2	0.36 m2	0.27 m2	0.18 m2
150 mm	0.54 m2	0.63 m2	0.36 m2	0.36 m2
200 mm	0.72 m2	0.81 m2	0.54 m2	0.54 m2
250 mm	1.08 m2	1.62 m2	0.90 m2	0.72 m2
300 mm	1.62 m2	2.40 m2	1.26 m2	1.08 m2

- .7 Do not backfill over concrete within 24 hours after placing.
- .8 For restrained joints: only use restrained joints approved by the Departmental Representative.

### **3.10 HYDROSTATIC AND LEAKAGE TESTING**

- .1 Do tests in accordance with ANSI/AWWA C600 [C603].
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify the Departmental Representative at least 48 hours in advance of proposed tests.
- .1 Perform tests in presence of the Departmental Representative.

**MAINTENANCE BUILDING**

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- .4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.
  - .5 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by the Departmental Representative.
  - .6 Upon completion of pipe laying and after the Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated.
  - .7 Leave hydrants, valves, joints and fittings exposed.
  - .8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.
  - .9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
  - .10 Open valves.
  - .11 Expel air from main by slowly filling main with potable water.
    - .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
    - .2 Remove stops after satisfactory completion of test and seal holes with plugs.
  - .12 Fill asbestos cement pipe and concrete pipe at least 24 hours before testing to allow water absorption by pipe material.
  - .13 Thoroughly examine exposed parts and correct for leakage as necessary.
  - .14 Apply hydrostatic test pressure of 1380 kPa [200 psi] based on elevation of lowest point in main and corrected to elevation of test gauge, for period of [1] hour.
  - .15 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
  - .16 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
  - .17 Repeat hydrostatic test until defects have been corrected.
  - .18 Apply leakage test pressure of 690 kPa after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of [2] hours.
  - .19 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for 2 hours.
  - .20 Do not exceed allowable leakage of 1.079 L/day/km/mm of pipe, including lateral connections.
  - .21 Locate and repair defects if leakage is greater than amount specified.
  - .22 Repeat test until leakage is within specified allowance for full length of water main.
-

**3.11 PIPE SURROUND**

- .1 Upon completion of pipe laying and after the Departmental Representative has inspected Work in place, surround and cover pipes as indicated.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
  - .1 Do not dump material within 2 m of pipe.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95% of corrected maximum dry density.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 90% of corrected maximum dry density.

**3.12 BACKFILL**

- .1 Backfill and compact per Section 31 00 99 – Earthworks for Minor Works.

**3.13 FLUSHING AND DISINFECTING**

- .1 Flushing and disinfecting operations: witnessed by the Departmental Representative carried out by specialist contractor.
  - .1 Notify the Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.
- .2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.
- .3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150
- .4 Provide connections and pumps for flushing as required.
- .5 Open and close valves, hydrants and service connections to ensure thorough flushing.
- .6 When flushing has been completed to the Departmental Representative approval, introduce strong solution of chlorine as approved by the Departmental Representative into water main and ensure that it is distributed throughout entire system.
- .7 Disinfect water mains to AWWA C651-86. This shall be done by a specialist contractor OR the contractor shall perform the treatment process under the supervision of a certified and independent agency fully qualified in this work. A report shall be submitted outlining the treatment parameters upon completion of the water treatment. Pot type feeders shall be used on closed systems; and pump type feeders (with attendant agitators, level controls, etc.) shall be used in

**MAINTENANCE BUILDING**

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open systems. Ensure that chlorine disinfectant does not enter existing watermains during the disinfection procedures.

- .8 Rate of chlorine application to be proportional to rate of water entering pipe.
- .9 Chlorine application to be close to point of filling water main and to occur at same time.
- .10 Operate valves, hydrants and appurtenances while main contains chlorine solution.
- .11 Flush line to remove chlorine solution after 24 hours.
- .12 Measure chlorine residuals at extreme ends of pipe-line being tested and take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.
- .13 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours. Take further samples at extreme ends of pipe-line, at hydrants and service connections to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.
- .14 Perform bacteriological tests on water main, after chlorine solution has been flushed out.
  - .1 Take samples daily for minimum of two days at:
    - .1 Extreme ends of new main at which tie-ins are proposed
    - .2 All ends stubbed out for building service plumbing tie-ins
    - .3 All other dead ends or permanent blow offs
  - .2 Should contamination remain or recur during this period, repeat disinfecting procedure.
  - .3 Specialist contractor to submit certified copy of test results. Absence of coliform organisms is required to achieve successful test.

**3.14 TIE-IN INSTALLATION**

- .1 Ensure all testing is successfully passed and obtain approval of the Departmental Representative before tying in to existing water distribution system.
  - .2 Comply with notice periods and approvals stated elsewhere regarding interruptions to services.
  - .3 The Contractor is to locate, by physical exposure, the existing watermain at the proposed tie-in location prior to any construction. The Contractor is to ascertain the precise location and elevation of the tie-in as well as the fittings required for the tie-in. Any discrepancies with the contract drawings are to be immediately brought to the attention of the Departmental Representative.
  - .4 The Contractor is to ensure that the tie-ins to the existing watermain are witnessed by the Departmental Representative.
  - .5 Sterile construction practices must be followed during installation of the final connections so that there is no contamination of the new or existing works with foreign material or groundwater. Clean the exterior of the main to be tied-into. Grind or file any protrusions or irregularities in the pipe exterior which may
-

interfere with uniform seating of couplings, gaskets or clamping devices. The new pipe and fittings required for the connection may be spray-disinfected or swabbed with a minimum 1 to 5% solution of chlorine immediately prior to being installed. Comply with AWWA C651.

**3.15 SURFACE RESTORATION**

- .1 After installing and backfilling over water mains, restore surface as specified elsewhere.

**END OF SECTION**

**Part 1 General****1.1 SECTION INCLUDES**

- .1 Materials and installation for gravity sanitary sewers.

**1.2 RELATED SECTIONS**

- .1 Earthwork for Minor Works Section 31 00 99
- .2 Manholes and Catch Basin Structures Section 33 05 13

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  - .2 ASTM D2412, Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
  - .3 ASTM D3212, Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
  - .4 ASTM F477, Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe.
  - .5 ASTM D1557, Specification for Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (475 mm) Drop.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA B182.2, Large Diameter, Type PSM PVC Sewer Pipe and Fittings.
  - .2 CSA B182.11, Recommended Practice for the Installation of Plastic Drain and Sewer Pipe and Pipe Fittings.

**1.4 DEFINITIONS**

- .1 Pipe section is defined as length of pipe between successive manholes and/or between manhole and any other structure which is part of sewer system.

**1.5 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate proposed method for installing carrier pipe for under-crossings.
  - .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .4 Inform the Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling, in addition to providing samples as referred to in Section 31 00 99 – Earthwork for Minor Works.
  - .5 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
-

- .6 Ensure certification is marked on pipe.
- .7 Submit manufacturers information data sheets and instructions in accordance with Section 01 33 00 - Submittal Procedures.

**1.6 SCHEDULING**

- .1 Maintain existing sewage flows during construction. Do not interrupt existing sanitary services or mains during tie-in or at other times. Allow for all methodology and temporary measures required to maintain sewage flows throughout.

**Part 2 Products****2.1 PLASTIC PIPE & SERVICE CONNECTIONS**

- .1 Type PSM Polyvinyl Chloride (PVC): to CSA-B182.2.
  - .1 Standard Dimensional Ratio (SDR): 35.
  - .2 Locked-in or Separate gasket and integral bell system.
  - .3 Nominal lengths: 6 m.

**2.2 CEMENT MORTAR**

- .1 Portland cement: to CAN/CSA-A5
- .2 Mix mortar one part by volume of cement to two parts of clean, sharp sand mixed dry.
  - .1 Add only sufficient water after mixing to give optimum consistency for placement.
  - .2 Do not use additives.

**2.3 PIPE BEDDING AND SURROUND MATERIALS**

- .1 General requirements for granular pipe bedding are as per Section 31 00 99 articles 2.1.1 or 2.1.2
- .2 Gradation requirements for granular pipe bedding are as per Section 31 00 99 article 2.1.4 (type 1 gradation).
- .3 Concrete encasement, where noted on drawings, to be minimum 20MPa, with constituent materials in conformance to CAN/CSA-A5, A23.5 and A23.1.

**2.4 BACKFILL MATERIAL**

- .1 As per Section 31 00 99 item 2.1 (applicable articles).

**Part 3 Execution****3.1 PREPARATION**

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



- .1 Handle pipe in accordance with manufacturer's recommendations. Do not use chains or cables passed through pipe bore so that weight of pipe bears upon pipe ends.
- .2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. PVC pipe to CSA B182.11.
- .3 Install Pipes to the following tolerances:  
Horizontal tolerances:            plus or minus 50 mm from specified alignment;  
Vertical tolerances:    plus or minus 10 mm from specified grade. Reverse grade is not  
  
   acceptable.
- .4 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .5 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .6 Pipes on curved alignments:
  - .1 Smooth profile PVC pipe: for 100 mm to 300 mm sizes conform to required curvature by bending pipe barrel. In no case is radius of curvature to be less than 300 times outside diameter of the barrel. Joint deflection not permitted for smooth profile PVC pipe.

- .7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Whenever work is stopped, install removable watertight bulkhead at open end of last pipe laid to prevent entry of water and foreign materials.
- .8 Cut pipes as required, as recommended by pipe manufacturer, without damaging pipe and leave smooth end at right angles to axis of pipe.
- .9 Joints:
  - .1 Install gaskets as recommended by manufacturer on all pipe unless specified otherwise.
  - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  - .3 Align pipes carefully before joining.
  - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
  - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
  - .6 Complete each joint before laying next length of pipe.
  - .7 Minimize joint deflection after joint has been made to avoid joint damage.
  - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .10 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes of as otherwise specified.
- .11 When any stoppage of work occurs, restrain pipes in an approved manner to prevent "creep" during down time.
- .12 Make watertight connections to manholes. Use shrinkage compensating grout when suitable gaskets are not available. Core neat circular holes in walls of existing manholes. Do not hammer or chip except as approved by the Department Representative.
- .13 Where concrete encasement of pipes is noted on drawings, trench to be trimmed to accept minimum 150mm concrete surround. Pipe may be positioned on concrete blocks to facilitate placing of concrete. When necessary, rigidly anchor or weight pipe to prevent flotation during concrete placement. Do not backfill over concrete within 24 hours of placing. Pipe joints to be spaced so that encased section of pipe does not span across joints or extend to within 300mm of joints.

### **3.5 PIPE SURROUND**

- .1 Place surround material in unfrozen condition.
  - .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
  - .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
    - .1 Do not dump material within 1 m of pipe.
-

- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to underside of pipe to at least 95 % Modified Proctor
- .6 Surround material should be compacted with a hand compactor.

**3.6 BACKFILL**

- .1 Place unfrozen backfill material in accordance with Section 31 00 99 article 3.4.

**3.7 FIELD TESTING**

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 After substantially completing backfilling and compaction work, carry out leakage test of each section by means of low pressure air test in the presence of Departmental Representative, as follows:
  - .1 Wet inside perimeter of test section.
  - .2 Seal test section at openings by means of removable water-tight plugs.
  - .3 Increase pressure in test-section to 24kPa above average groundwater pressure and observe rate of drop.
  - .4 Maintain 25kPa above average groundwater pressure for at least 5 minutes before commencing test. (Do not exceed 35kPa above average groundwater pressure).
  - .5 Commence test when pressure decreases to 24.0kPa above average groundwater pressure. Do not add air to test section during test period. The sewer shall be deemed to have failed the test if the test period is less than:
    - .1 2 minutes and 32 seconds for 100mm pipe.
    - .2 3 minutes and 50 seconds for 150mm pipe.
    - .3 5 minutes and 6 seconds for 200mm pipe.
    - .4 6 minutes and 22 seconds for 250mm pipe.
    - .5 7 minutes and 39 seconds for 300mm pipe.
    - .6 8 minutes and 56 seconds for 350mm pipe.
    - .7 9 minutes and 35 seconds for 375mm pipe.
  - .6 In the case of test failure, repair leaks and repeat low pressure air testing.
  - .7 As the Departmental Representative will not witness the low pressure air test until after backfilling, the contractor is encouraged to check air-tightness regularly throughout pipe-laying and backfilling and to address any leakage issues early. This should minimize the potential for test failure when the witnessed test is done.
- .3 Acceptable Ponding: Mainline PVC sewers; 300 mm diameter or less: 20 mm maximum ponding over 3m length of pipeline.
- .4 Remove foreign material from sewers and related appurtenances by flushing with water.
- .5 Television and photographic inspections:

**MAINTENANCE BUILDING**

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- .1 Immediately after flushing, carry out inspection of installed sewers by television camera and provide the Departmental Representative with two copies of inspection report and DVD recorded, logged and produced to WRc inspection and coding standards.
- .2 Provide means of access to permit Departmental Representative to do inspections.

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for storm sewer.

**1.2 RELATED SECTIONS**

- .1 Earthwork For Minor Works Section 31 00 99
- .2 Manholes and Catch Basin Structures Section 33 05 13

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  - .2 ASTM D2412, Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
  - .3 ASTM D3212, Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
  - .4 ASTM F477, Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe.
  - .5 ASTM D1557, Specification for Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (475 mm) Drop.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA B182.2, Large Diameter, Type PSM PVC Sewer Pipe and Fittings.
  - .2 CSA B182.11, Recommended Practice for the Installation of Plastic Drain and Sewer Pipe and Pipe Fittings.

**1.4 DEFINITIONS**

- .1 A pipe section is defined as length of pipe between successive catchbasins and/or manholes.

**1.5 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate proposed method for installing carrier pipe for undercrossings.
  - .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .4 Inform the Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling, in addition to providing samples as referred to in Section 31 00 99 – Earthwork for Minor Works.
  - .5 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
-

- .6 Ensure certification is marked on pipe.
- .7 Submit manufacturers information data sheets and instructions in accordance with Section 01 33 00 - Submittal Procedures.

## **1.6 SCHEDULING**

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.

## **Part 2 Products**

### **2.1 PLASTIC PIPE**

- .1 Polyvinyl chloride pipe up to 1200 mm in diameter, DR35 Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5.0% deflection, ASTM D2412. Pipe to be manufactured to specifications for pipe size ranges as follows:  
  
100 mm dia. – 375mm dia. To ASTM D3034  
  
Pipes to be certified by Canadian Standards Association to standards for pipe size ranges below.  
  
100 mm dia. – 1200 mm dia. To CSA B182.2
- .2 Joints: To conform to ASTM D3212; pipe to include integral bell and spigot ends with stiffened wall section and formed groove for a rubber gasket; elastomeric gaskets to ASTM F477.
- .3 Maximum installed deflection not to exceed 7.5% of the base inside diameter.

### **2.2 PIPE BEDDING AND SURROUND MATERIAL**

- .1 General requirements for granular pipe bedding are as per Section 31 00 99 articles 2.1.1 or 2.1.2
- .2 Gradation requirements for granular pipe bedding are as per Section 31 00 99 article 2.1.4 (type 1 gradation).
- .3 Concrete encasement, where noted on drawings, to be minimum 20MPa, with constituent materials in conformance to CAN/CSA-A5, A23.5 and A23.1.

### **2.3 BACKFILL MATERIAL**

- .1 As per Section 31 00 99 item 2.1 (applicable articles).

## **Part 3 Execution**

### **3.1 PREPARATION**

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

### **3.2 TRENCHING**

- .1 Do not allow contents of sewer or sewer connection to flow into trench.
-

- .2 Trench alignment and depth as shown on Contract Drawings.
- .3 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by the Department Representative.

### 3.3 GRANULAR BEDDING

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in a uniform layer not exceeding 150 mm compacted thickness, surround material compacted with a hand compactor.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.
- .4 Compact each layer full width of bed to minimum 95% Modified Proctor Density in compliance with ASTM D1557.
- .5 Shape transverse depressions as required to suit joints.
- .6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

### 3.4 INSTALLATION

- .1 Handle pipe in accordance with manufacturer's recommendations. Do not use chains or cables passed through pipe bore so that weight of pipe bears upon pipe ends.
  - .2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. PVC pipe to CSA B182.11.
  - .3 Install Pipes to the following tolerances:
    - Horizontal tolerances: plus or minus 50 mm from specified alignment;
    - Vertical tolerances: plus or minus 10 mm from specified grade. Reverse grade is not acceptable.
  - .4 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
  - .5 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
  - .6 Pipes on curved alignments:
    - .1 Smooth profile PVC pipe: for 100 mm to 300 mm sizes conform to required curvature by bending pipe barrel. In no case is radius of curvature to be less than 300 times outside diameter of the barrel. Joint deflection not permitted for smooth profile PVC pipe.
  - .7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Whenever work is stopped, install removable watertight bulkhead at open end of last pipe laid to prevent entry of water and foreign materials.
  - .8 Cut pipes as required, as recommended by pipe manufacturer, without damaging pipe and leave smooth end at right angles to axis of pipe.
-

- .9 Joints:
  - .1 Install gaskets as recommended by manufacturer on all pipe unless specified otherwise.
  - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  - .3 Align pipes carefully before joining.
  - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
  - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
  - .6 Complete each joint before laying next length of pipe.
  - .7 Minimize joint deflection after joint has been made to avoid joint damage.
  - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .10 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise specified.
- .11 When any stoppage of work occurs, restrain pipes in an approved manner to prevent "creep" during down time.
- .12 Make watertight connections to manholes. Use shrinkage compensating grout when suitable gaskets are not available. Core neat circular holes in walls of existing manholes. Do not hammer or chip except as approved by the Department Representative.

### **3.5 PIPE SURROUND**

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
- .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
  - .1 Do not dump material within 1 m of pipe.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to underside of pipe to at least 95 % Modified Proctor
- .6 Surround material should be compacted with a hand compactor.

### **3.6 BACKFILL**

- .1 Place backfill material in unfrozen condition and in accordance with Section 31 00 99 article 3.4.

### **3.7 FIELD TESTING**

- .1 Repair or replace pipe, pipe joint or bedding found defective.
-



- .2 Acceptable Ponding: Mainline PVC sewers; 300 mm diameter or less: 20 mm maximum ponding over 3m length of pipeline.
- .3 Remove foreign material from sewers and related appurtenances by flushing with water.
- .4 Flushings to be vacuum pumped for disposal offsite to prevent foreign material, silts etc., from entering interceptors, filter chambers and soakaways. Offsite disposal to comply with environmental legislation / bylaws.
- .5 Television and photographic inspections:
  - .1 Immediately after flushing, carry out inspection of installed sewers by television camera and provide the Departmental Representative with two copies of an inspection report and DVD recorded, logged and produced to WRc inspection and coding standards.
  - .2 Provide means of access to permit Departmental Representative to do inspections.

**END OF SECTION**

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- .1 Perforated rigid drainage pipe: Polyvinyl Chloride (PVC) to CSA-B182.2.
- .2 Standard Dimensional Ratio (SDR): 35.
- .3 Pipe stiffness: 320 kPa at 5% deflection, ASTM D2412.

- .4 Fitting: solid hub by hub.
- .5 Size: 150mm [6"] unless otherwise noted.

## **2.2 Cleanout**

- .1 Extended ferrule, Dura-Coated cast iron body with gas and water tight ABS countersunk plug.

## **PART 3 EXECUTION**

### **3.1 Preparation**

- .1 Clean and dry pipes and fittings before installation.
- .2 Obtain Departmental Representative's approval of pipes and fittings prior to installation.

### **3.2 Excavation**

- .1 Do excavation work in accordance with Section 31 23 33.

### **3.3 Pipe Bedding and Cover**

- .1 Subsoil drain shall be laid to on 150 mm drain gravel and covered with 250mm of drain gravel measured from the top of pipe, unless otherwise shown or specified. Do not place material in frozen conditions.
- .2 Shape bed true to grade to provide continuous uniform bearing surface for pipe. Do not use blocks when bedding pipe.
- .3 Shape transverse depressions in bedding as required to suit joints.
- .4 Fill excavation below design elevation to bottom of specified bedding in accordance with Section 31 23 33 with backfill material.

### **3.4 Installation**

- .1 Lay and join pipes in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Handle pipe using methods approved by the Departmental Representative. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.
  - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
  - .2 Correct pipe which is not in true alignment and grade or pipe which shows differential settlement after installation great than 10 mm in 3 meters.
  - .3 Subsoil drain shall be laid continuous and even falls of not less than 0.5% unless otherwise noted.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipe during construction, except as may be permitted by the Departmental Representative.
- .7 Install plastic pipe and fittings in accordance with CSA B182.11.
- .8 Make watertight connections to manholes and catch basin. Use shrinkage compensating grout when suitable gaskets are not available. Stabilize pipe at openings made in rock pit manhole with shrinkage compensating grout.
- .9 All changes in direction shall be made with solid hub by hub fittings. Vertical drops shall be solid with a minimum of 100mm [4"] gravel curtain around pipe. Branches will be taken off with Y's and catch basin connections shall be made with one length of cast iron pipe.
- .10 Provide cleanouts at changes in direction, extended to terminate flush with grade.
- .11 Where noted on drawing, provide geotextile materials.

**END OF SECTION**



Real Property  
Line Drawings

Region:  
Pacific

Institution:  
William Head  
Institution

0 20 40 60 80 100

Scale:  
1:3750

Issue Date:  
03-31-2016



BUILDING INDEX				
#	Name	Area m²		
B	Chief Maintenance Services	78.8	121a	Fuel Tank Enclosure 29.6
D	Paint Shop	95.4	200	Hobby Building 319.5
3	Garage/Engineering Carp. Shop	765.7	201	Compactor
003a	Fishing Warf Washroom	5.3	202	PWGSC Trailer 89.7
4	Plumbers Shop	72.8	206	Storage 211.4
8	Storage Building	23.0	208	Greenhouse/Storage 332.8
006	Bunker Storage	53.8	208a	Greenhouse Potting Shelter 64.6
29	Chapel	144.5	210	Compactor Building 36.9
30	Central Stores	554.3	211	Compost Building 237.4
30a	Central Stores Storage	25.0	212	Work Release Building 81.0
101	Kitchen & Dining	561.5	213	Staff Fitness/ERT Building 175.2
102	Library	238.6	214	Native Healing Centre 279.9
103	Inmate Training	1106.7	214a	Native Carving Shed 89.2
104	Principal Entrance	376.2	214b	Sweat Lodge 36.8
105	Vocational Training	1131.6	214c	Sweat Lodge Storage 3.7
106	Administration	426.6	215	Inmate Weight Lifting Bldg 202.5
106a	Gazebo	23.8	PVF-1	Private Family Visiting 97.2
106b	Gazebo	7.5	PFV-2	Private Family Visiting 64.1
108	Laundry / ISS	392.4	NH A	Neighbourhood A 917.5
109	Hospital / SCU	673.4	NH B	Neighbourhood B 873.0
110	Pump House	45.7	NH C	Neighbourhood C 873.0
111	Reservoir	156.5	NH E	Neighbourhood E 873.0
114	Chlorination Building	15.1	NH F	Neighbourhood F 873.0
115	Stand-By Power	67.8	SS-1	Storage Building 11.8
115a	Diesel Tank Enclosure	15.7	SS-4	Ball Field Storage 7.7
116	Security Shelter	7.3	SS-5	Garden Shed 1 11.5
117	Security Shelter	7.3	SS-6	Garden Shed 2 6.3
119	Sewage Treatment Plant	56.0	SS-7	Garden Shed 3 6.3
120	Lift Station	26.8	SS-8	Fire Wood Shed 7.6
121	Fuel Pump Station	13.6	SS-9	Garden Shed 4 7.7
			T-11	Storage 29.7
			GS	Grounds Shed 11.7

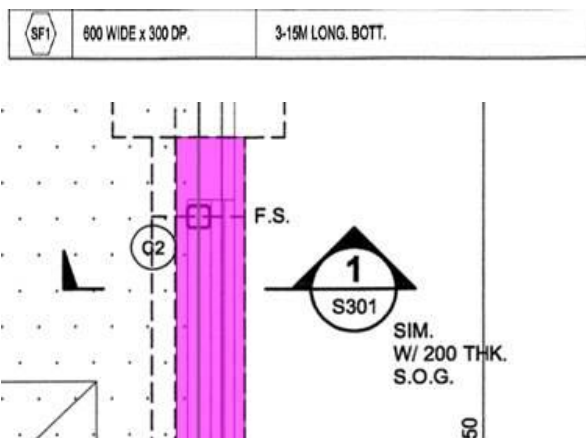
The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

### **STRUCTURAL ADDENDUM No. 1**

This Addendum contains 2 pages and 1 - 8 1/2"x11" & 1 -11"x17" sketches.

### **RESPONSE TO QUESTIONS**

**QUESTION:** Can you please confirm on the width of strip footing 1 (SF1)? The legend on S201 says 600 wide but the drawings appear to show a width of 800.

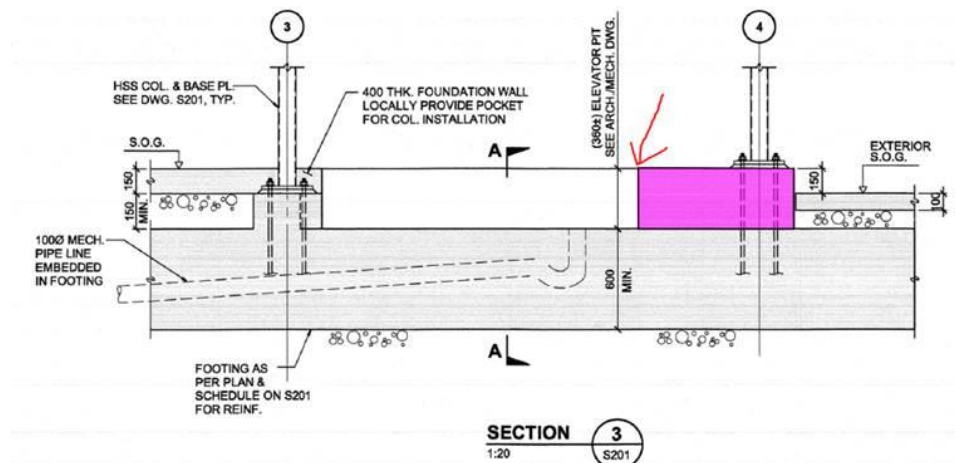
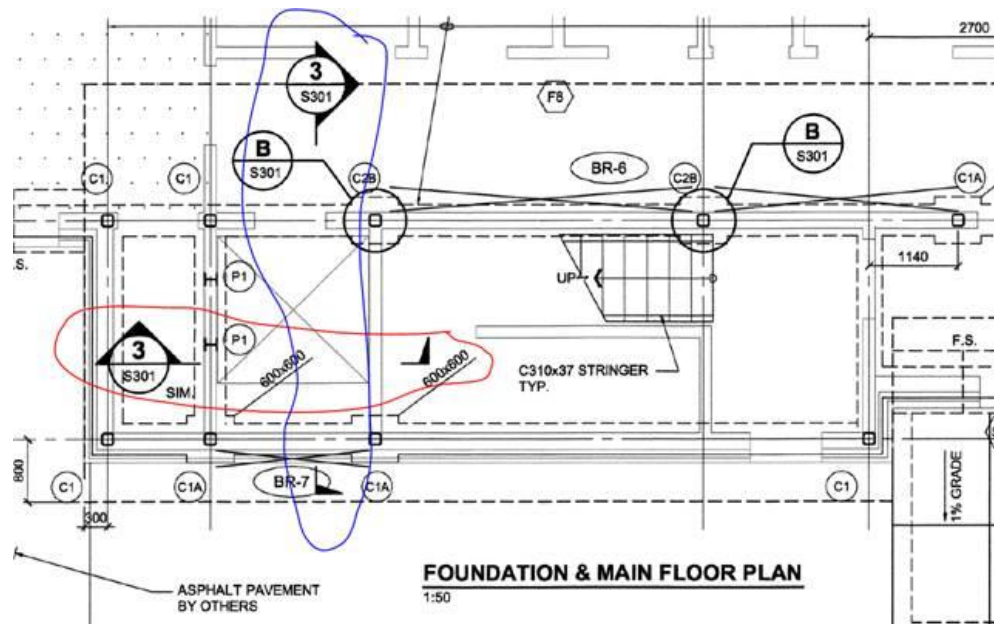


**RESPONSE:** Revise size of strip footing (SF1) to 800wide x 300 deep.

**QUESTION:** Drawing S201 shows the same section markers at the same location, but at right angles to each other.

- The **blue circled** section marker is referenced correctly according to the gridlines.
- The **red** circled section marker is completely incorrect, based on the gridlines alone but then also the content of the section drawing does not match this orientation.
- And the detail that is referenced (3/S301) shows a 925 wide ... foundation wall? shown along Gridline 4, on the right side. This item (in pink) is not drawn/drawn correctly on S201. Because it isn't drawn, we can't know the full extent of this item and it can't be taken off/included in our estimate.



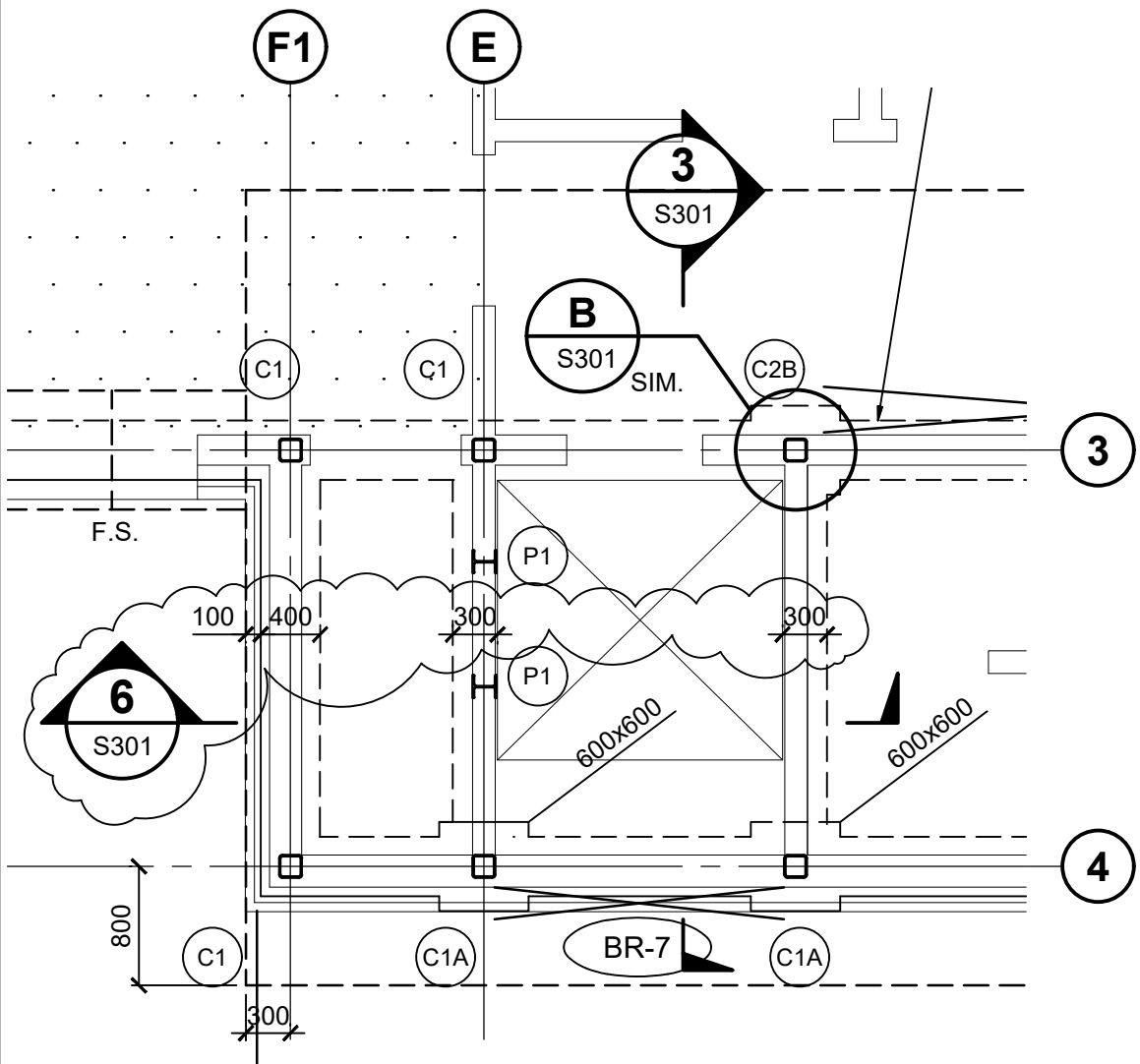


**RESPONSE:** Replace section 3/S301 SIM. by section 6/S301 and revise section 3/S301 & section A-A for clarification; refer to sketch AD-01 for details.

## **1.0 DWG S101**

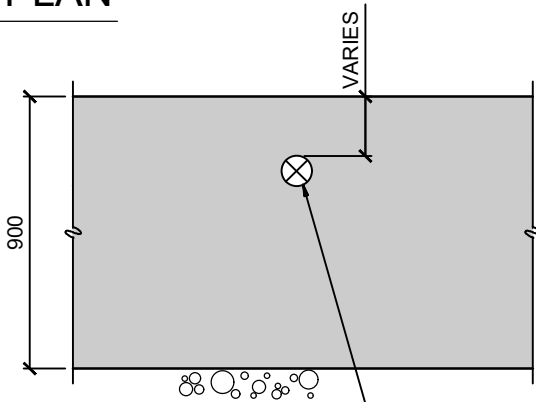
1.1 **ADD** Typical Pull Box Details as per sketch AD-02.

**END OF STRUCTURAL ADDENDUM No .1**



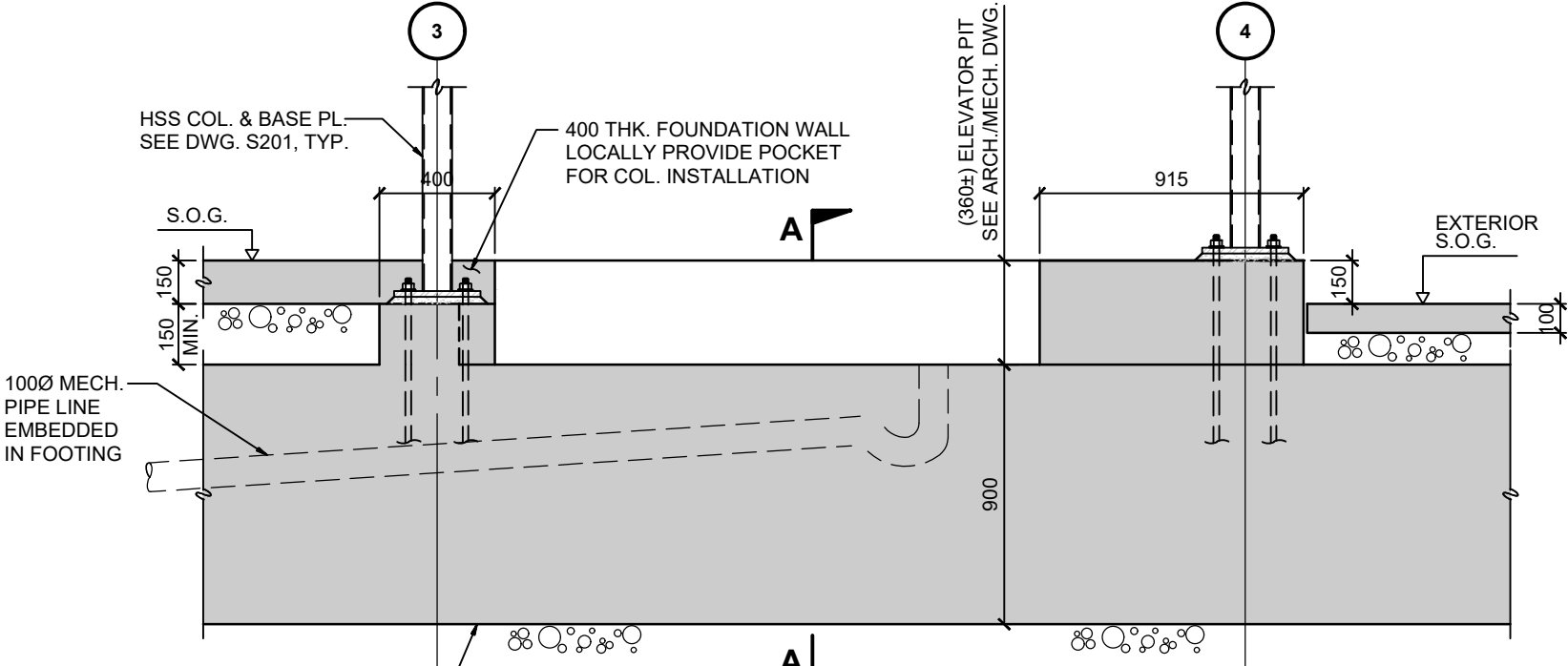
PARTIAL FOUNDATION & MAIN FLOOR PLAN

1:50 (REF. S201)



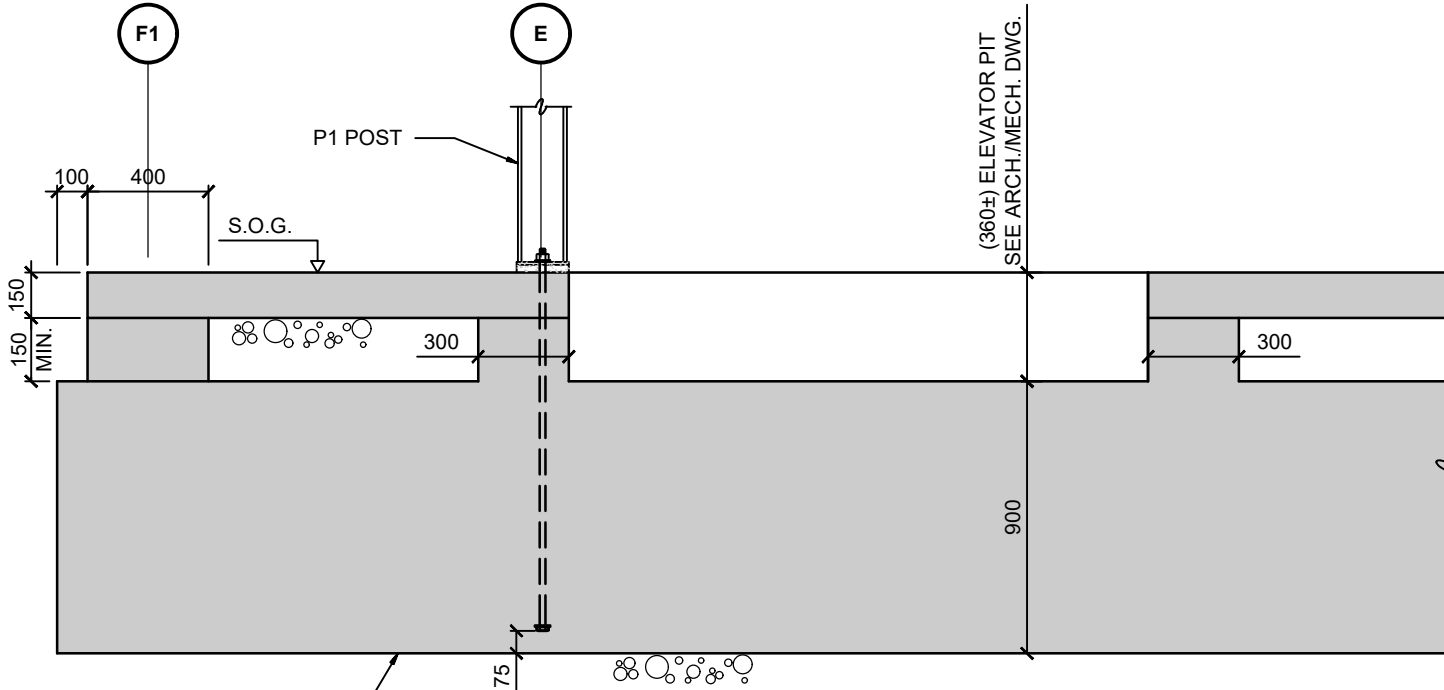
SECTION A - A

1:20 (REF. S301)



SECTION 3

1:20 (REF. S301)



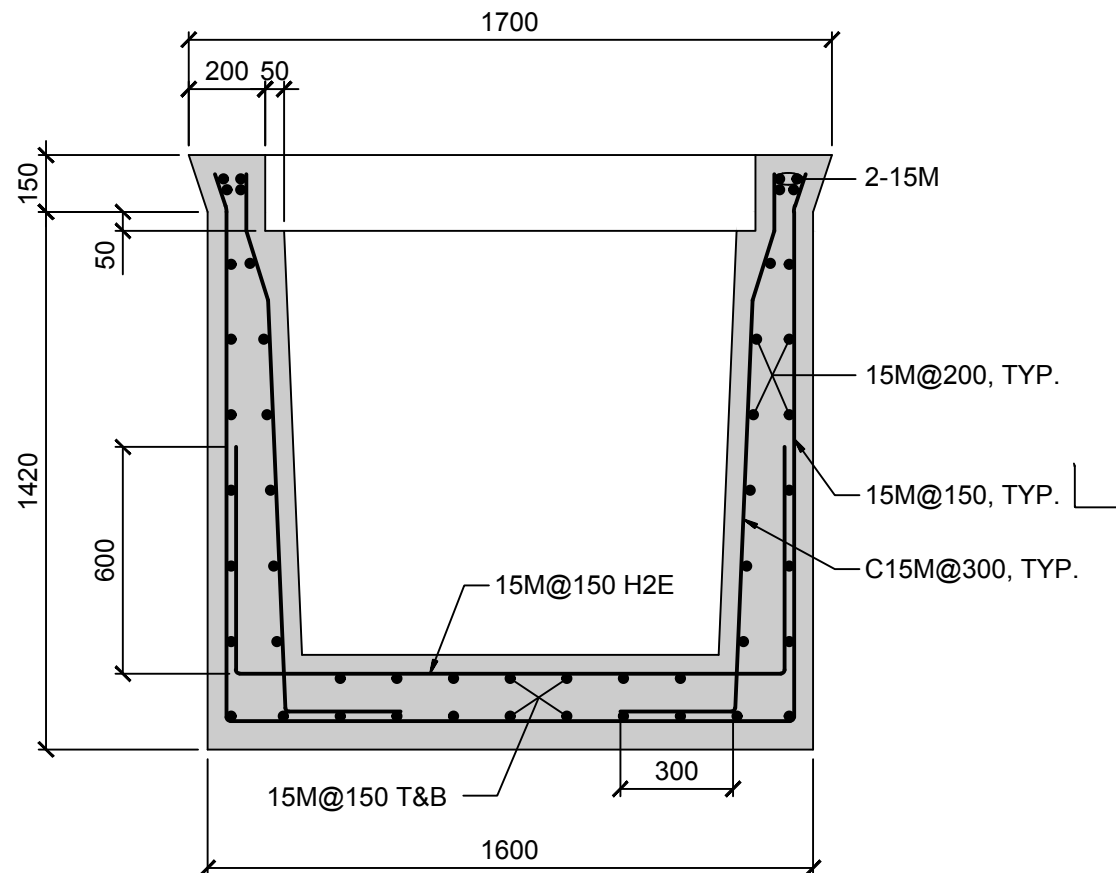
SECTION 6

1:20 (REF. S301)

12751

<b>Client/client</b>  CORRECTIONAL SERVICE CANADA	<b>Project title/Titre du projet</b>  WILLIAM HEAD INSTITUTION MAINTENANCE BUILDING (BUILDING 107) 6000 WILLIAM HEAD ROAD, METCHOSIN, B.C.	<b>Drawing title/Titre du dessin</b>  FOUNDATION & MAIN FLOOR PLAN REVISED SECTION 6 ADDED (REFER TO DWG. S201 & S301)	<b>Consultant Signature &amp; Date Only</b>  Designed by/Concept par LL  Drawn by/Dessine par CAD	<b>PWGSC Project Manager/Administrateur de Projets TPSGC</b>  PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architecture et de génie, TPSGC  Date/Date 2018-06-28	<b>Project No./No. du projet</b> R.069377.001  <b>Sheet/Feuille</b> AD-01 OF XX	<b>Revision/ Révision</b>  -
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## TYPICAL PULL BOX DETAILS

1:20

12751

Client/client <b>CORRECTIONAL SERVICE CANADA</b>	Project title/Titre du projet <b>WILLIAM HEAD INSTITUTION MAINTENANCE BUILDING (BUILDING 107)</b> 6000 WILLIAM HEAD ROAD, METCHOSIN, B.C.	Drawing title/Titre du dessin <b>TYPICAL PULL BOX ADDED (REFER TO DWG. S101)</b>	Consultant Signature Only	PWGSC Project Manager/Administrateur de Projets TPSCC	Scale/Echelle AS SHOWN
			Designed by/Concept par LL	Project Engineer/Ingénieur et Ingénierie Services/ Généraliste P. Ingén. Services d'ingénierie et de P. Ing. P. Ing.	Date/Date 2018-06-28
			Drawn by/Dessiné par CAD	Project No./No. du projet R.069377.001	Sheet/Feuille AD-02

The following changes in the tender documents are effective immediately. This addendum will form part of the Contract Documents.

## **ELECTRICAL DRAWINGS AND SPECIFICATIONS**

### E100 – ELECTRICAL SITE PLAN

#### **1.0 CIVIL REMEDIATION**

Proponents to have a clear understanding that trenching for the HV ductbank will cross the existing paved roadway in front of the existing administration building 106. Include all work associated with the asphalt reinstatement.

### E505 – MECHANICAL EQUIPMENT AND LUMINAIRE SCHEDULES

#### **2.0 LIGHTING ALTERNATES**

The following alternate luminaires are acceptable:

Type A – Philips #FBX12LL40-UNV  
Type B – Philips #LBX40L840-UNV/ LBX-LVR4  
Type C – Philips #2EVG38L840-4-D-UNV DIM  
Type D – Philips #1EVG30L840-4-D-UNV DIM  
Type E – Philips #OWL230L840-UNV-DIM  
Type F – Philips #FSW430L840-UNV-DIM  
Type G – Philips #P6RD10NZ10UVB/P6R D835VB/P6RLWCC  
Type H – Philips #C6RN/C6L10830MZ10 U/C6RDLCCF CA6RFT C6RVPWH  
Type J – Eclipse #KV A FT LED30 3K EBU BZ  
Type K – Saylite #VPW 17W 900L MV 50K SN  
Type X – Emergi-Lite EA3WI

- 2.1 Clarification on the mounting of the Type 'B' shop luminaires: Provide a fixture rod/ stem with swivel assembly for the main fixture supports, extend down 24" from the ceiling and provide aircraft cable for the seismic supports.

### E506/ E301 – SHOP EQUIPMENT SCHEDULE

#### **3.0 C1 TABLE SAW**

The table saw and work table assembly have two (2) existing duplex receptacles mounted on the table face. Provide a dedicated circuit from panelboard '2D', extend wiring from the equipment run in the under-slab conduit as required.

#### **3.1 DIRECT CONNECT SHOP EQUIPMENT**

There are approximately eight (8) devices directly connected in the existing carpentry shop. Upon disconnection and relocation of the equipment, make safe and remove disused wiring to the load side of the disconnect switches. Coordinate with CSC forces prior to starting the work.

**QUESTIONS & ANSWERS**

- Q1** *"26 09 02.b Part 2.1 – We are to supply a converter to interface the new meter with the existing site DDC system. Please confirm the existing site DDC system and the communication protocol required to interface with the existing systems?"*
- A1** Upon contract award, information regarding the existing DDC will be provided, assume BACnet to be the protocol in use.
- Q2** *"26 09 13 Part 2.1.7 – Please provide confirmation of the existing site metering software program, software and version in order to be able to get pricing to meet this specification requirement."*
- A2** Upon contract award, information regarding the existing DPM software will be provided. A previous project related to this work was performed by Houle Electric.
- Q3** *"26 05 00 Part 1.20.2 and 26 24 17 part 2.2.2 – reference shutdowns and work to a 1200A Emergency distribution panel in Building 115. There is no other information referencing this in the drawings, please clarify?"*
- A3** Ignore reference to building 115. A shut-down is required for energization of the new pad mount transformer which is connected to the existing switching kiosk located in front of administration building 106.
- Q4** *"26 64 35 part 3.1.1.1 and 26 64 35 part 3.1.2.2 reference performing power studies in building 115 normal and emergency distribution. No single-line or other information regarding building 115 is provided. Please clarify?"*
- A4** Ignore reference to building 115. Power study and downstream coordination from the existing switching kiosk to the switchgear in building 107.
- Q5** *"26 24 part 3.1.8 Please clarify the scope and intent of this clause and what we are to allow for?"*
- A5** Incomplete query reference, unable to respond. If query is in reference to specification subsection: '26 24 17 Panelboards – Breaker Type', part 3.1.8, disregard reference.
- Q6** *"Please reference Drawing E501 and Spec 26 05 14 – the 15kV feeder from VF-4 is shown as a #2 Copper. Specifications call for Aluminum MV cable. Please confirm which is required?"*
- A6** Provide copper HV feeder, refer to single-line diagram.
- Q7** *"Please reference Drawing E501 and E504 – 6CDP calls for a 3P100A breaker as spare on E501. Panel schedule calls for a 3P60A as spare on E504. Please confirm which is correct?"*
- A7** Reference spare breakers (quantity & size) listed on single-line diagram only.
- Q8** *"Please reference Drawing E501 and E504 – 2CDP on E501 and Panel Schedule on E504 do not match. Please confirm which is correct and what breakers are required?"*
- A8** Reference spare breakers (quantity & size) listed on single-line diagram only.
- Q9** *"Please refer to Drawing E505 and P-3 & P-4 – Under the control type column there is the abbreviation for a fire alarm flow switch (FAFS) for control type. Please clarify the intent for this?"*
- A9** Ignore FAFS reference for sump pumps P-3 & P-4. Proponents shall refer to mechanical drawings and specifications for requirements by Div. 26. Coordinate and include all provisions.
- Q10** *"There are 6 baseboard heaters, these baseboard heaters are specified in section 23 85 00 for supply and installation requirements. Please confirm which trade is responsible for the installation of the heaters?"*
- A10** Electrical contractor to allow for installation of the baseboard heaters. Coordinate installation requirements with mechanical prior to rough-in.

- Q11** *"Please reference drawing E100 and "detail cut symbol" C/E101. The detail referenced on E101 "c" for the duct bank will not work for the installation shown on E101. Please clarify what is required at this location?"*
- A11** Trench Section 'C' to also include spare (empty) conduits from building 107 to the existing power pull pit which services the PFV houses.
- Q12** *"Please refer to drawing E100 detail 3 – under the pad mount transformer notes; #1 Please confirm which division/trade is to supply and install the ground enhancement material?"*
- A12** Electrical Contractor to provide Ground Enhancement Material (GEM)  
<https://www.erico.com/catalog/literature/E978B-WWEN.pdf> or equivalent product. Coordinate installation with civil where required.
- Q13** *"Reference drawing E507. In the notes for the vault, they require H20 live load rating. This is fine for the vault, but do you require the hatch lid to also meet the same requirement?"*
- A13** Pullpits are located in landscaped areas, not on roadways. Provide galvanized, hinged, split hatch covers, with SS locking hardware rated for boulevard use and occasional loading.
- Q14** *"Please refer to drawing E301 – Keynote 17 indicates that mechanical to supply and install complete dust control system. Is mechanical also supplying the starters required as shown on E501? Mechanical Electrical schedule on E505 is blank and does not clarify who is to supply the control for the dust collection system."*
- A14** For tender purposes, proponents should allow for the provision of magnetic motor starters associated with the dust collection system. Proponents shall refer to mechanical drawings and specifications for requirements by Div. 26. Coordinate and include all provisions.
- Q15** *"Please refer to drawing E402 and Keynote 6 – During the relocation of the Fire Alarm work station, are there any special provisions that must be allowed? Can the work occur during normal hours? Is there a fire watch required during the relocation until the system can be re-verified?"*
- A15** Work associated with the existing site fire alarm system and the new fire alarm system in building 107 will be directed by the Departmental Representative. While work is expected to occur during normal working hours, for tender purposes proponents should allow for after-hours work including fire watches.
- Q16** *"Please confirm the work in building 106 and 107 can occur during normal hours (8am- 4:30pm)?"*
- A16** While work is expected to occur during normal working hours, for tender purposes proponents may be required to work in the existing building 106 during after-hours to suit daily operations of the institution.